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NOVEMBER 15, 1987
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Midrange Shootout: Minis vs. Pcs and Workstations

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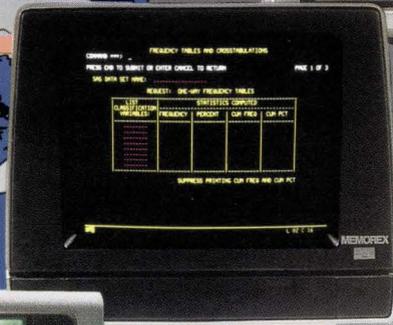
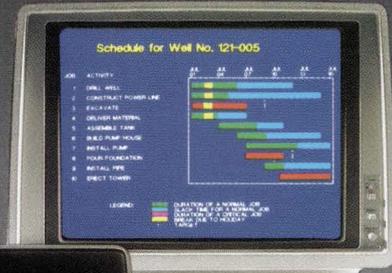


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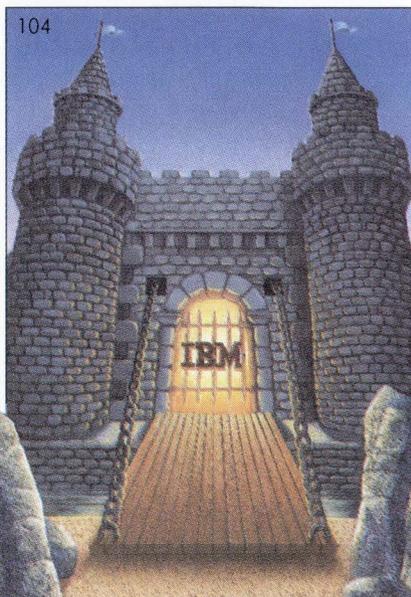
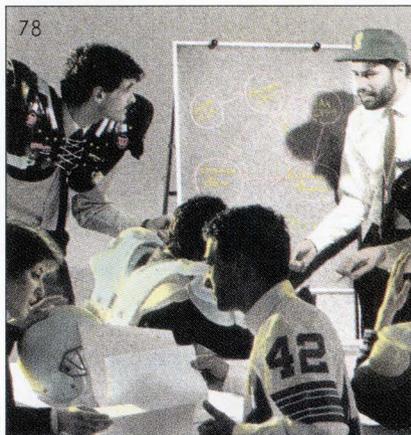
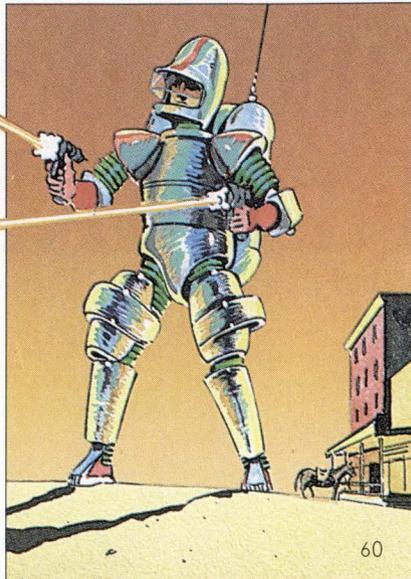
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Cover Illustration by Andreas Baruffi

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Editorial

Don't Jump Ship

Clearly, end-user organizations have overcome the indigestion problems that have plagued the computer industry in the past year and a half, if the results of the 1987-88 DATAMATION/Cowen & Co. Institutional Services mini/micro computer survey (p. 60) are anywhere near as accurate as the 10 previous surveys have been. Manufacturers and service companies intend to spend 14% more on minicomputers and 23% more on personal computers in the year ahead—a purchasing outlook that is far more aggressive than the one expressed a year ago.

A number of vendors also seem to have set out on the road to recovery, having streamlined their operations and having focused on customer needs. Pitches by executives from AT&T, Cullinet, Data General, and other information technology suppliers at last month's DATAMATION/Cowen & Co. conference resounded with an air of confidence that has been unheard of in recent years—except, of course, at Digital Equipment Corp. press conferences.

It's uncertain, however, whether such vendors have progressed far enough to make a difference in customers' eyes. The percentage of end users that are considering switching vendors has reached a five-year high of 16.5%. More than half the users of Datapoint, Four-Phase (Motorola), and Modcomp equipment are considering shopping elsewhere. Concurrent, Gould, and Honeywell customers are growing more restless. And the number of AT&T minicomputer sites considering a switch has nearly doubled in a year.

The beneficiaries of their discontent are established giants, notably IBM and DEC, along with relatively young companies such as Sun Microsystems and Apollo in workstations, Stratus and Tandem in OLTP applications, and Compaq in pcs.

We can't fault end users for wishing to standardize their applications on enduring architectures such as DEC's VAX design, nor can we criticize them for beating a path to the door of better mousetrap makers such as Sun and Apollo. We do, however, question whether some customers are jumping ship too hastily.

Customers shouldn't lose faith in their traditional vendors just because the vendors have suffered one bad financial year, particularly if those vendors have served them well in the past. Instead, customers should listen to what those vendors have to say and consider what they have to offer. After all, competition improves price/performance more than any other single factor.



Tim Mead

TIM MEAD
EDITOR-IN-CHIEF

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Letters

Cheers

We received the Sept. 15th issue of DATAMATION this morning and were intrigued by the thickness, then noticed the 30th Anniversary cover and were lured immediately into the center pages. We especially enjoyed your "Hall of Fame," "Three Decades of DATAMATION Cartoons," and "A Day in Your Life Without Computers." With just this quick look, it is definitely a keeper!

Congratulations on your 30th! Most important, however, is a hearty, "Good job, well done!" on this issue.

KEN & BJ ANDERSON
The Anderson Report
Anderson Publishing Company
Simi Valley, Calif.

My sincere compliments for the superb 30th Anniversary issue. It was extremely gratifying to see "The DATAMATION Hall of Fame" (p. 56), particularly four persons with whom I had business contacts while with Remington Rand Univac many, many years ago: J. Presper Eckert, Grace M. Hopper, John X. Mauchly, and William F. Norris.

GEORGE SOTER
Connecticut State Labor Department
Wethersfield, Conn.

Jeers

Jeers for omitting Steve Jobs from your "Hall of Fame." Steve Wozniak certainly belongs in any such Hall, but to omit Steve Jobs seems a deliberate and silly slap in the face. Jobs is the man behind the Mac, and should automatically have been included in your "Hall of Fame."

PAUL WILFONG
Verac Inc.
San Diego

While I enjoyed your 30th anniversary issue, I was astonished at the absence of John Vincent Atanasoff from your "DATAMATION Hall of Fame." He built a device in 1939 that incorporated binary logic, regenerative memory, and even vector processing, and was visited in the 1940s by an interested John Mauchly, who I notice did make your Hall.

ED PRIOR
Poquoson, Va.

I was extremely disappointed to note the absence of John Vincent Atanasoff from your initial list of 30 honorees in "The DATAMATION Hall of Fame."

Having given credit (and much certainly is due) to Messrs. Eckert and

Mauchly, we should not jade history by ignoring the work Atanasoff and his graduate student Clifford Berry accomplished in the years 1936 through 1939.

ROGER S. GOULD
MASSCOMP
Westford, Mass.

Unhistoric?

Bruce J. Schulman's review (August 15, p. 124) of my book, *The New Capitalism*, seems a bit unhistoric coming from a historian. Although he astutely notes the enormous barriers to modernizing our economy for an information age, he neglects the powerful forces that are relentlessly driving this transition on. The New Capitalism is evolving now—not out of enlightened ideas, good intentions, or even sound planning—but because an explosion of information technology exerts new imperatives that are forcing big business in this direction.

Numerous studies, economic data, examples, authoritative opinion, and other evidence show that the New Capitalism is fairly well defined, although it is as yet in an early state of development and limited to leading-edge companies. There are now about 50 cooperative R&D consortiums in the U.S. Dozens of major corporations now have employee directors on their boards, and most big companies are developing various incentive systems to give their workers a piece of the action. Many large firms are experimenting with flexible structures that bring the entrepreneurial advantages of the free market into their own organizations. Similar moves are even appearing in China and the USSR, again simply out of necessity.

These and the other 40 major trends I've documented in *The New Capitalism* show that such ideas are slowly becoming a reality because executives are being forced to take steps that would have been considered unbelievable just a few years ago. I will admit this does not comprise a precise, inevitable forecast, but simply a preliminary guide that we will have to revise until it becomes more concrete about the year 2000. But it marks off the new territory ahead by showing how historic forces now being unleashed by a technological revolution are inexorably creating a new system of business and economics—a New Capitalism for the information age.

WILLIAM E. HALAL
The George Washington University
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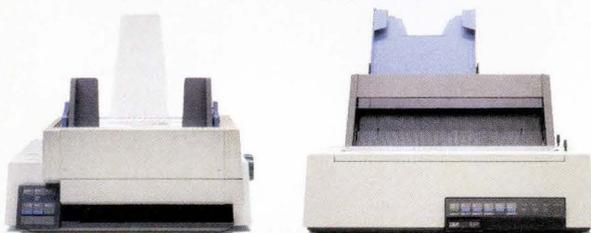
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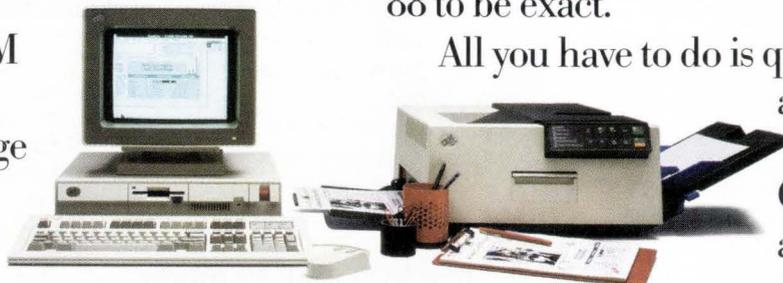
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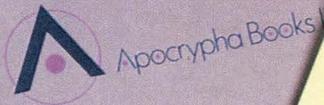
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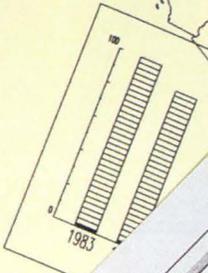
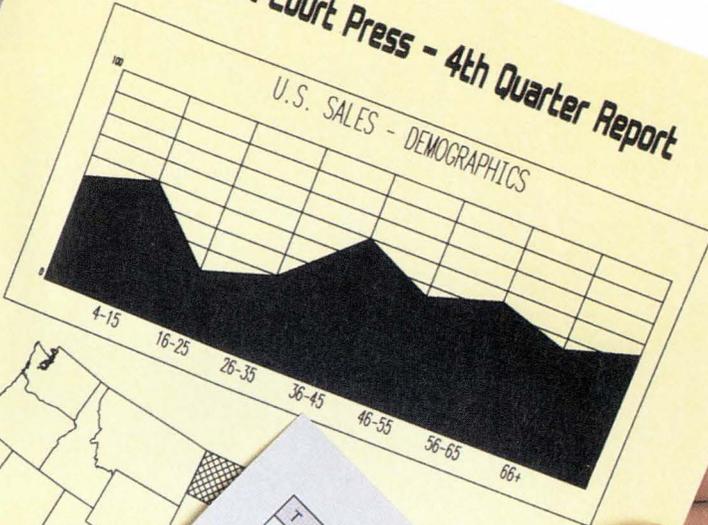
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The B by D Two

Daniel Dir

Full Court Press - 4th Quarter Report

U.S. SALES - DEMOGRAPHICS



All-Stars Clinch Division Title

Heavy hitting powers All-Stars to the top



Last night, the All-Stars won the game, the title and a chance to shuffle off to Buffalo next week for the championships. The All-Stars powered over the Grass Stars, who had been tied with the All-Stars for first place. The game was tight until the bottom of the fourth when the All-Stars blasted into the lead with two home runs to the upper deck in left field.

The game was highlighted by a most improbable play in which three All-Star players, each running at different speeds, ended up on third base at the same time. Fortunately, the third baseman missed the throw from centerfield, allowing two of the runners to score.

"I can't believe we pulled it off," exclaimed the All-Star manager. "A three-man pileup near third base, and they didn't even get one man out!"

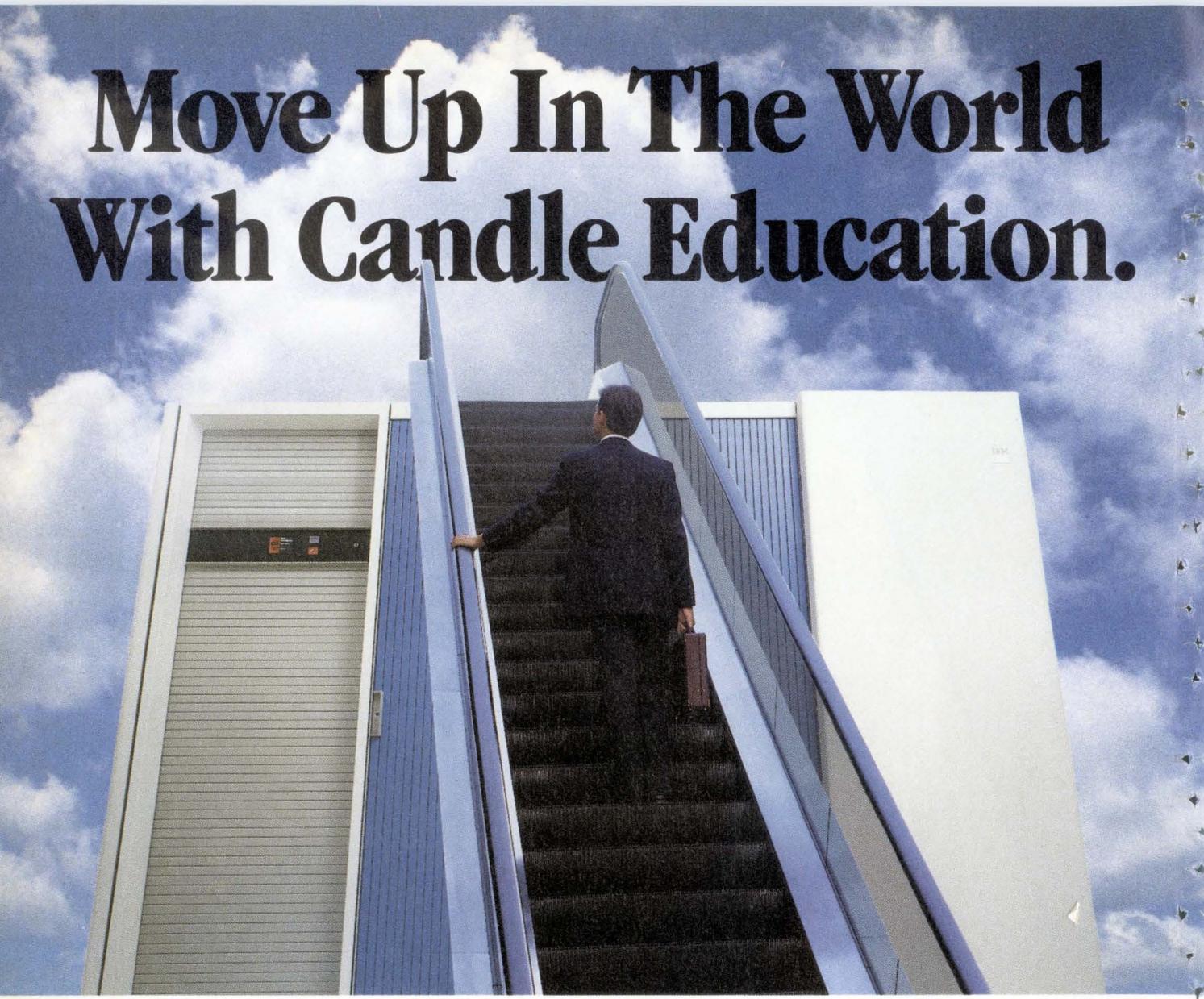
The company will hold a pep rally for the All-Stars on Thursday at 2:00 p.m. in the conference room.

All-City League Final Standings

Division	Team	W	L
East Division	Warlords	15	1
	Bruslers	14	2
	Watercoolers	10	6
	Print Outs	7	9
	Overachievers	4	12
North Division	All-Stars	14	2
	Grass Stars	13	3
	Maulers	9	9
	Backstops	6	11
	Smashers	2	14
West Division	Coffee Spills	14	2
	Crunchers	12	4
	Ramblers	10	8
	Go-Getters	11	5
	Trappers	8	7



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Look Ahead

IBM'S NEW PBXS HAVE ODD RING

SANTA CLARA -- Customers of IBM's new 9750 and 8750 private branch exchanges should think twice before sharing PBX application software with Big Blue. Why? IBM may sell the results to competitors. IBM/Rolm president Raz Abuzayyad tells DATAMATION that the success of its new PBXs "will depend heavily on custom solutions arrived at by customers of IBM." Does this mean that if Salomon Brothers, for example, and IBM develop a voice/data application for a 9750, Big Blue would then market the solution down Wall Street to Morgan Stanley? "Of course," Abuzayyad answers, stressing that IBM will remarket only codeveloped applications--not ones created solely by customers.

IBM WIDENS VM/XA ADDRESS

LONDON -- According to a senior IBM divisional manager addressing a U.K. seminar, VM/XA SP--which was announced in June 1987 for first quarter 1988 release--will offer not just 31-bit CMS addressing but also 40-bit or 44-bit addressing, which will allow one trillion to 16 trillion bytes of virtual storage to be addressed. All 3090E systems in the field have the addressing circuitry required to use this facility as soon as it is released. The purpose of this wide address range is to introduce the same single-level addressing for virtual memory and data (virtual data) on large 3090E systems that IBM's System/38 has offered from its inception with its 48-bit addresses.

PROFS, DISOSS FOR TEXT MANAGEMENT SYSTEM

DUBLIN, OHIO -- BASIS, the text information management system from Information Dimensions Inc. is in line to support some major IBM programs. This time next year, Release L of the variable length text management package will contain interfaces to PROFS and DISOSS. The new release is also expected to add full-screen capability to the current menu-driven and command language functions. Another improvement will lie in the thesaurus--the character count will be expanded to 240 words. Release K, the current version of BASIS, which is available on IBM VM/MVS, VAX, and Wang equipment, began shipping in June. Don't be surprised if Release M includes an SQL interface.

SUPERS FROM WEST GERMANY

KARLSRUHE, WEST GERMANY -- Local supercomputer start-up Integrated Parallel Systems intends to begin deliveries of its first products next year. A two-and-a-half-year-old spinoff from a research group at the University of Karlsruhe, IP Systems has a planned product range consisting of parallel architecture machines using off-the-shelf components and reaching a performance level of around 20GFLOPS.

Look Ahead

AND THE TALK GOES ON, ON, ON

NEW YORK -- The communication lines between IBM and ADAPSO are open and humming with "We can work it out" talk. ADAPSO chairman Jay Goldberg--who used ADAPSO's fall meeting to let IBM know that the trade group was mad as hell about the source code issue and wasn't going to take it anymore--met last month with a group of IBM software execs. The Big Blue boys said they were ready to talk about the software services industry's problems. Goldberg, ceo of Money Management Systems, New York, said he was "thrilled," but that didn't stop him from sending a letter to IBM chairman John Akers, saying it makes no sense for IBM not to talk about source code and that he didn't want to hear that it's not negotiable. "We need them and they need us," Goldberg says. They'll see how deep that need is when they meet later this month.

FIRST VERSION OF OS/2 DUE EARLY...

SAN CARLOS, CALIF. -- It looks like IBM will beat its promised early-1988 shipping date for the initial version of its PS/2 operating system. IBM Entry Systems chief Bill Lowe recently told a group of California industry executives that the initial version will ship to users in December. Users can expect OS/2 applications and SolutionPacs to follow rapidly. Observers also expect slight availability accelerations for OS/2 Presentation Manager and Extended Edition. Presentation Manager is expected in mid-1988, Extended in late '88.

... AS CLONE MAKERS WORK INTO THE NIGHT

SAN JOSE -- IBM's new PS/2 Micro Channel may not prove to be the insurmountable technical hurdle for clone makers that some observers have made it out to be. At least two clone chip makers--Western Digital Corp. of Irvine, Calif., and Chips and Technologies Inc. of San Jose--already have introduced chips that allow add-on boards to interface to the Micro Channel. Next, the firms are planning parts that will enable clone cpu and system boards to tie into Micro Channel as well, effectively completing the Micro Channel cloning process. But first, Western Digital and Chips and Technologies feel they need to get IBM to agree to license them to use the Micro Channel's multimaster arbitration process. Sources say the companies already have held several negotiations with IBM and they feel IBM is willing to agree to a license for fees between 1% and 3% of Micro Channel-related sales. If they succeed in getting a licensing deal, look for the clone chip makers to announce their system-card-to-Micro Channel interface parts in early '88.

(continued on p.12)

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Look Ahead

TAKE TWO, ON UNIX

SAN JOSE -- Olivetti is said to be getting ready to announce phase two of its multiuser Unix product strategy as early as next week. The announcement will involve a family of higher-performance Unix-based systems based on Olivetti's own 68020 design and on a system produced by Edge Computer Corp. of Scottsdale, Ariz., which Olivetti will resell. The Edge-built system, based on a CMOS implementation of the 68000, is rated at up to 11MIPS in a two-processor configuration. Olivetti also has become an equity investor in Edge with a \$3 million stake.

DISCOUNTS ON IBM PBX

GENEVA -- After IBM's Rolm announcement of the new 9750 and 8750 PBXs, talk is that IBM is prepared to offer current Rolm users around 20% off to move to the new systems. An IBM spokesman refused to comment other than to say that IBM will determine discounting "on a case-by-case basis." Meanwhile, archrival Northern Telecom is not sitting still. A top exec says that an attack is under way to grab Rolm customers and he doesn't rule out such discounts to get the job done.

X.400 BETA FOR SPECTRUM

GENEVA -- Hewlett-Packard Co. is beta testing an implementation of the X.400 standard for electronic messaging on its HP 3000 minicomputers. Formal announcement should come in early 1988 with availability later in the year. To date, HP has shown X.400 only on its Spectrum Unix workstation. Separately, HP has been demonstrating an ISDN card for its Vectra pc line. The card should hit the formal HP price list early next year in the \$800-to-\$1,000 range, but some insiders are already talking of prices down in the \$200 range once ISDN catches on.

RUMORS AND RAW RANDOM DATA

On-line transaction processing-intensive companies may get an unexpected Christmas present from Digital Equipment Corp. The mini maker plans to introduce some enhancements and new products for the OLTP market this year. . . . Japan's trade with Israel is taking a battering because of the U.S.-Japan semiconductor agreement and subsequent sanctions, say Israeli electronics executives. They say that because the Japanese chip makers don't want to acknowledge publicly that they are selling to Israel for fear of being boycotted by Arab nations, most are refusing to sell even to those Israeli companies they have been quietly dealing with for more than 10 years. Sony and NEC are exceptions to the general rule, say the executives. The Israeli companies make graphics boards for pcs, factory control systems, modems, and EPROM programmers.

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U.S. SEMINARS

AL	Huntsville	Oct 7, Nov 5, Dec 3
	Mobile	Dec 15
	Montgomery	Oct 15
AR	Little Rock	Nov 10
AZ	Phoenix	Oct 22, Nov 19, Dec 10
	Tucson	Oct 21, Dec 9
CA	Lafayette	Nov 10
	Los Angeles	Oct 15, Oct 29, Nov 12, Dec 8
	Newport Beach	Oct 6, Dec 15
	Sacramento	Oct 15, Dec 10
	San Diego	Oct 8, Dec 17
	San Francisco	Oct 14, Nov 17, Dec 15
	San Jose	Oct 7, Nov 5, Dec 3
CO	Denver	Oct 15, Nov 12, Dec 15
CT	Hartford (Farm.)	Nov 3, Dec 8
	New Haven	Oct 14, Nov 12
DE	Wilmington	Oct 1
FL	Ft. Lauderdale	Nov 5
	Orlando	Nov 4
GA	Atlanta	Nov 11
	Augusta	Dec 9
IA	Des Moines	Nov 17
ID	Boise	Nov 19
IL	Chicago	Oct 15, Nov 18, Dec 15
	Springfield	Nov 19
IN	Indianapolis	Oct 20, Nov 24, Dec 17
KS	Wichita	Oct 6
LA	Baton Rouge	Oct 22
	New Orleans	Oct 23
MA	Boston	Oct 20, Nov 10, Dec 15
	Burlington	Dec 2
	Springfield	Nov 17
	Worcester	Nov 5
MD	Annapolis	Oct 27
	Baltimore	Oct 8, Dec 17
	Bethesda	Oct 6, Oct 27, Nov 24, Dec 15
ME	Portland	Oct 8
MI	Detroit	Oct 13, Nov 12
	Grand Rapids	Nov 4
	Traverse City	Oct 28
MN	Minneapolis	Oct 29, Nov 18, Dec 10
MO	Kansas City	Nov 10
	St. Louis	Oct 13, Nov 10, Dec 9
NC	Charlotte	Dec 8
	Raleigh	Dec 15
	Winston-Salem	Oct 7
NE	Omaha	Dec 8
NH	Manchester	Oct 21
NJ	Cherry Hill	Oct 29
	Iselin	Oct 8, Nov 5, Dec 3
	Princeton	Oct 14, Nov 12, Dec 9
NM	Albuquerque	Nov 5
NV	Las Vegas	Oct 27
NY	Albany	Oct 6, Nov 4, Dec 3
	Buffalo	Dec 3
	Long Island	Oct 15, Nov 12
	New York City	Oct 7, Oct 21, Nov 4, Nov 10, Dec 2, Dec 17
	Rochester	Oct 22, Nov 18, Dec 17
	Syracuse	Oct 15
OH	Cincinnati	Oct 1, Dec 9
	Cleveland	Oct 15, Nov 12
	Columbus	Dec 8
	Dayton	Oct 20, Nov 17
OK	Oklahoma City	Nov 17
	Tulsa	Oct 20, Dec 8
OR	Portland	Oct 6, Dec 10
PA	Harrisburg	Oct 22, Dec 10
	Philadelphia	Nov 5, Dec 10
	Pittsburgh	Oct 20, Nov 4, Dec 8
SC	Greenville	Oct 14
TN	Knoxville	Nov 4
	Memphis	Oct 14, Dec 10
	Nashville	Oct 21
TX	Amarillo	Oct 13
	Austin	Oct 9
	Dallas	Oct 6, Nov 4, Dec 9
	Houston	Oct 16, Nov 18, Dec 10
	San Antonio	Oct 8
UT	Salt Lake City	Oct 29, Dec 10
VA	Richmond	Nov 17
	Virginia Beach	Oct 15
WA	Seattle	Oct 15, Nov 10, Dec 8
WI	Madison	Nov 12
	Milwaukee	Oct 14, Dec 3

CANADIAN SEMINARS

Calgary	Nov 18
Edmonton	Dec 1
Hamilton	Oct 20, Dec 15
London	Nov 17
Ottawa	Oct 1, Nov 5, Dec 3
Regina	Oct 27
Saskatoon	Nov 3
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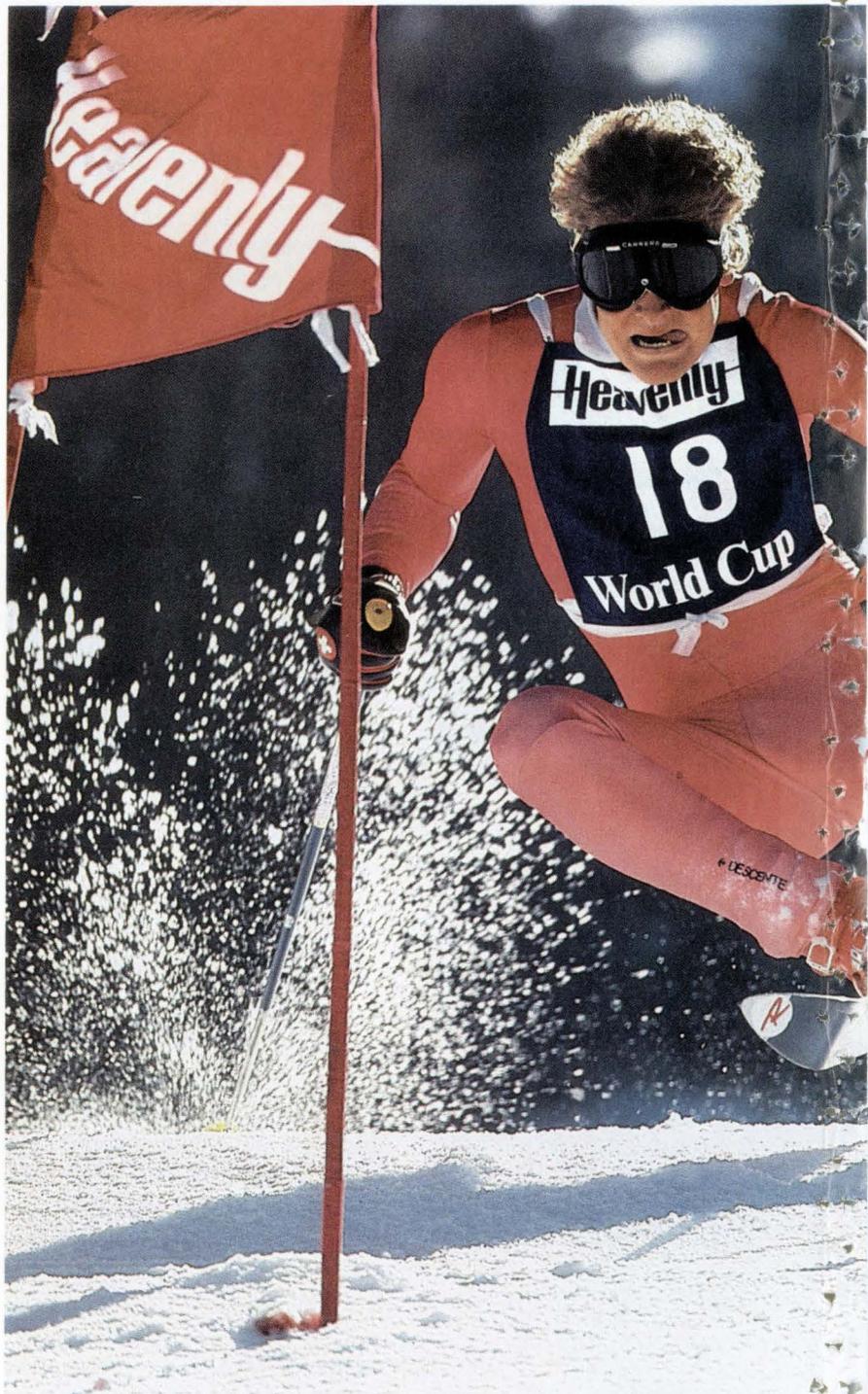
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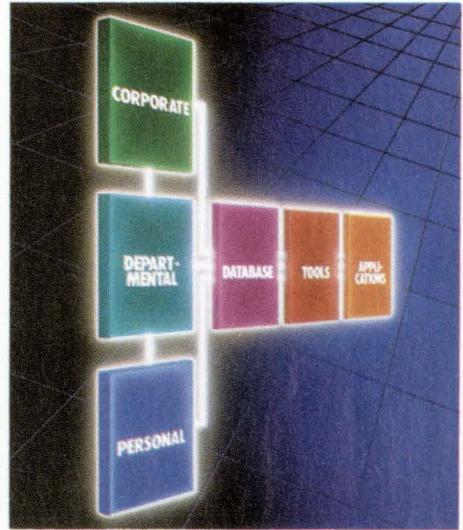
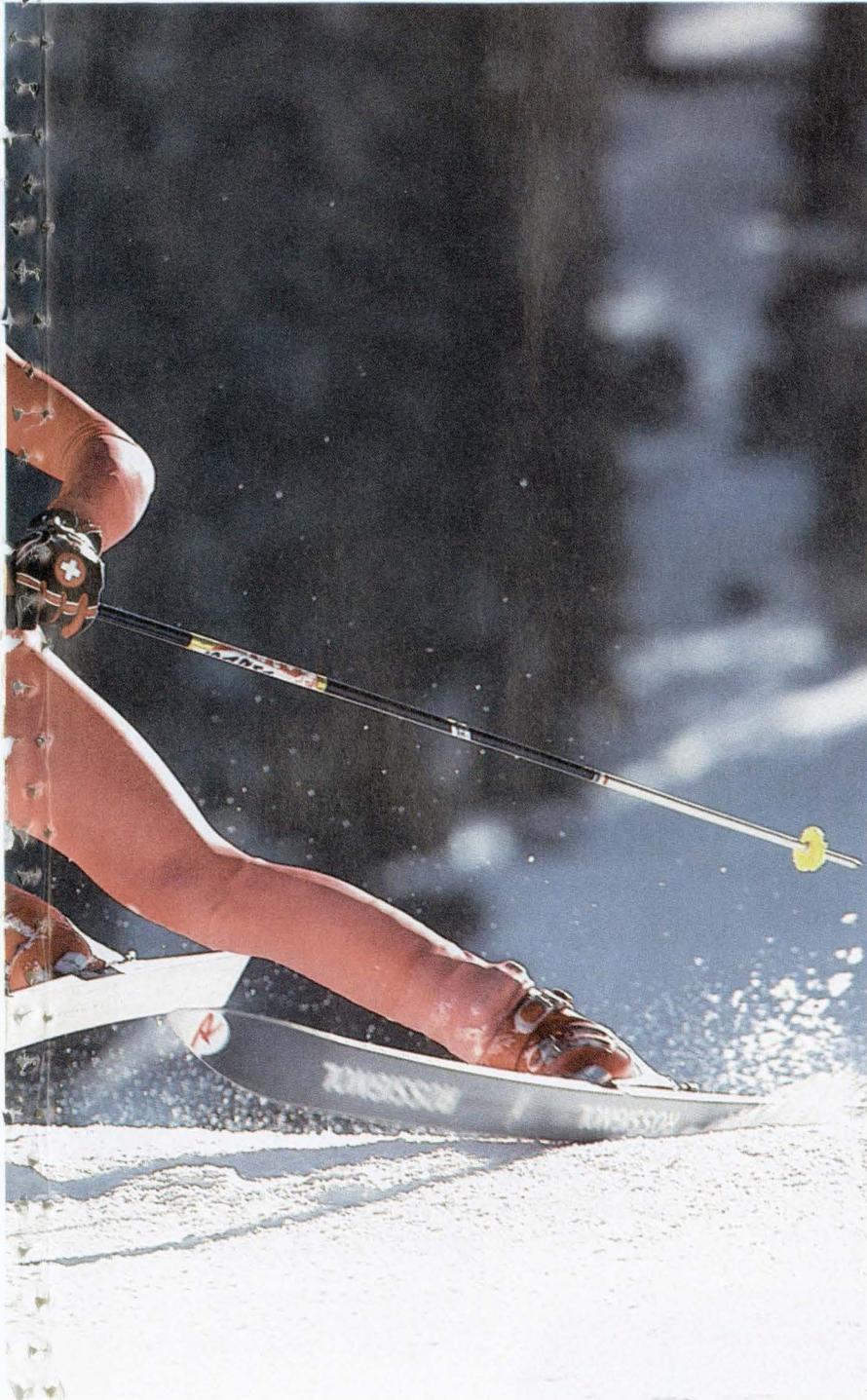
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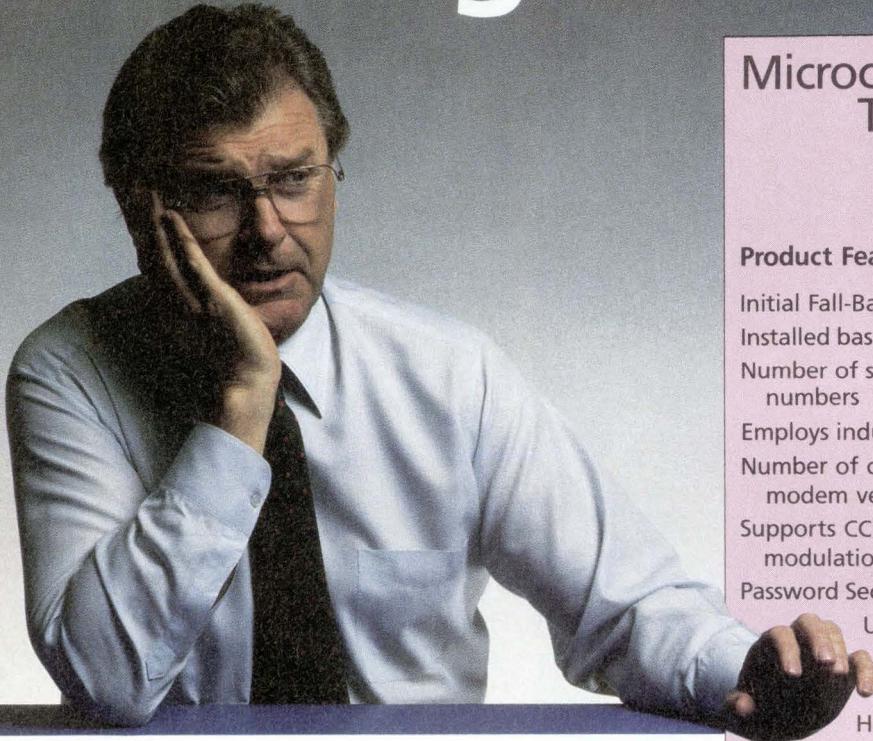
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News in Perspective

STRATEGIES

Leading IS Shops Shifting To a Centralized Structure

Security Pacific and Merrill Lynch, seeking to contain out-of-control budgets, adopt a management-by-results plan. But will this massive refocusing catch on?



MERRILL'S PETERSON: MBR will be an integral part of decentralization programs in the future.

BY RALPH EMMETT CARLYLE

They're separated by the length and breadth of a continent, but they have come to share the same management process in the expectation that they will slice millions, even billions, of dollars off their respective IS budgets over the next five years.

Security Pacific Corp. (SPC) in Los Angeles and Merrill Lynch in New York are as different as chalk and cheese—but they agree on one thing: IS budgets everywhere have been out of control for years, largely because corporations have been investing in information technology on the basis of intuition or blind faith. Moreover,

these companies have had no idea what return, if any, they have been getting on their money. SPC and Merrill Lynch are convinced that they've hit on a new formula that makes it possible to manage MIS like any other large organizational resource or capital asset—that is, with an eye to a substantial, and measurable, return on investment.

Both of these companies lost control of ambitious decentralization programs and are now reverting to centralized structures under the control of powerful IS executives. The trend to recentralization is surfacing elsewhere in the financial services sector as IBM's customers attempt to integrate their data structures and acquire com-

petitors. These companies are learning the benefits of centralized purchasing and telecommunications, in addition to the new IS management techniques.

These techniques—collectively known as the management-by-results (MBR) program—don't just pay lip service to the notion that the customer is king, but put the idea into practice in such a way that wild swings in the IS budget and wrenching cycles of MIS centralization and decentralization will become a thing of the past.

One major ingredient of the MBR formula is a unique service-level agreement that draws the IS department and end users into a close marriage contract in which stra-

tegic goals are jointly conceived, built, and owned, and in which productivity measures are predetermined and rewards shared. This contract is an actual signed document. End users are not tied to the IS department of their own corporation but can go outside to obtain equipment and services if they so desire. All IS personnel have regular involvement in training and customer satisfaction programs and are awarded cash bonuses, vacations, or luxury items for each milestone they achieve. All IS department profits are plowed back into the business, and end users benefit through cost reductions, rebates, dividends, etc.

At Security Pacific, where the MBR process was developed and refined, board members of the nation's sixth largest bank (\$74 billion in assets) have recently disclosed savings in IS spending of hundreds of millions of dollars achieved over the past five years. Security Pacific is looking forward to more of the same in the years ahead. Merrill Lynch, which lured away SPC's MIS chief last year, has even more grandiose expectations. Insiders reveal that a new five-year plan submitted to the board in September refers to savings in IS spending



This story is the second in a series of articles that will appear from time to time analyzing how users and suppliers are using information technology to become more competitive in their markets. The series is part of an ongoing reporting effort by Cahners Publishing Co.'s Electronics & Computer Group.

News in Perspective

of over \$1.5 billion using MBR techniques.

Others Pay Attention

Such phenomenal numbers have grabbed the attention of IBM and its other leading customers—particularly at frontier organizations in such information-intensive businesses as banking, financial services, insurance, and

puter giant's customer executive program in San Jose, recently praised the SPC operation in an internal report. Callon, who works with IBM customers from all over the country, says in his study entitled "The Evolution of Information System Justification" that he has come across only two organizations in North America that know how to ef-

grate disparate systems," says George P. DiNardo, executive vice president of information management and research at the Mellon Bank in Pittsburgh. "They decentralized too fast, and often their plans for serving end users were naive."

DiNardo adds that this is the position Merrill Lynch finds itself in today. Merrill Lynch insiders privately confirm this. "The company is using the MBR discipline to try and integrate scores of independent business units into one harmonious whole. It's an awesome task," says DiNardo, who admits to being fascinated by what the outcome may be. "Everybody at my level is watching this."

Perhaps the subject of even closer scrutiny by top IS executives is the man masterminding Merrill Lynch's ambitious recentralization scheme, DuWayne Peterson, who was wooed away from SPC to join the brokerage giant. According to the company's 10K report, Peterson was paid a \$1.1 million salary last year—six or seven times the typical MIS vp salary. He is the first information systems executive known to have broken the \$1 million barrier and has set a precedent for all his former peers. At 55, Peterson's five-year program is the apex—probably, as he says, the "finale"—of his career.

As DiNardo says, "It's his swan song. If he pulls it off, he'll be a hero; a role model for the MIS profession."

The Allure of Power

Peterson admits to being more attracted to the power and control, and his role as corporate integrator, than to his precedent-setting salary. He is a member of the controlling board of Merrill Lynch, with the title of executive vp operations systems and telecommunications. His responsibilities go beyond even those of the much hyped new

CIO (chief information officer) position. "I have a budget of \$1 billion and 15,000 staffers under me," he says. "But more than anything, I have the full support of the board for my MBR program."

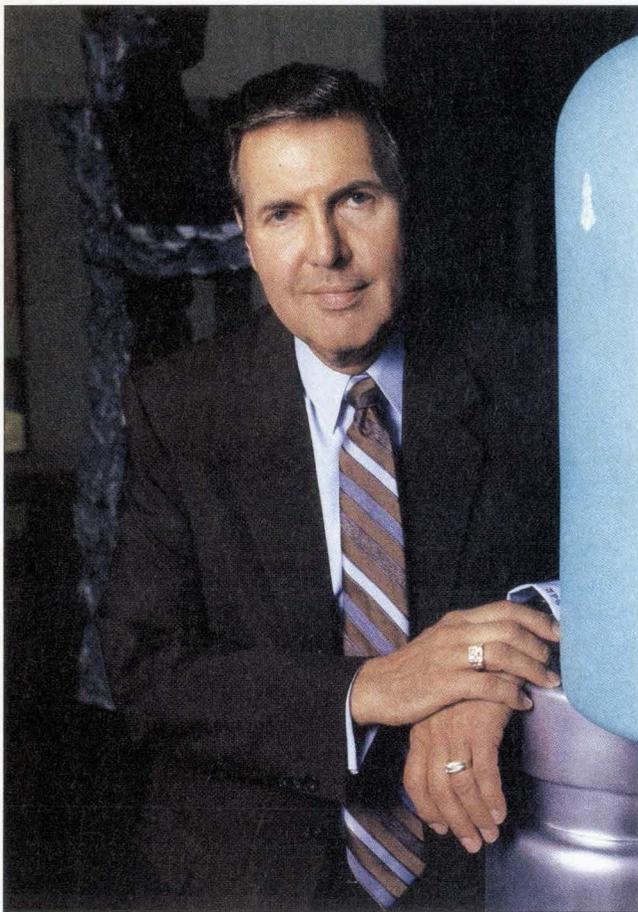
Peterson is quick to credit his former deputy at SPC, and current SPC vice chairman, John Singleton, for many of his ideas.

Singleton, now also head of his bank's computing arm, Security Pacific Automation Co. (SPAC), says that his ideas aren't patented, and hopes that they will spread throughout the industry. "Many large IBM customers are now in the position SPC was in five years ago," he notes. "Before we began to experiment with MBR in 1982, our MIS budget had been growing at a compound 28% a year rate for the previous five years as we played catch-up with a decentralization program that got horribly out of control."

He says that MBR, which has since become a formal program, has been an evolutionary phenomenon and has included an 802% increase in the MIS training budget since the program began. He reveals that SPAC's MIS budget hasn't grown since 1984. "But our electronic business volume is up anything from 50% to 200%, depending on markets," he says.

"I hear talk in the industry," he adds, "that dp budgets may grow 10% to 12% next year. Mine won't grow a cent," he says of his current budget level of \$405 million (employing 5,500 people). "By not growing at the industry average, we'll save around \$50 million in 1988—money that can be pumped back into the business, not into computer systems."

Since MBR is an integral part of massive centralization efforts at both SPR and Merrill Lynch, observers might be forgiven for thinking that we are witnessing a "back to the



SECURITY PACIFIC'S SINGLETON: Our MIS budget hasn't grown since '84.

the airline industry. These companies typically spend 2% or so of their total sales on information systems. But executives are now talking of that number growing to 5% by 1990 and 10% by 1995. Many of these organizations have heard of MBR through IBM itself.

One IBM information systems consultant, Jack Callon, who works with the com-

actively measure and manage MIS as a strategic resource. Those companies are IBM Canada and SPC.

Leading IS executives polled by DATAMATION have seen the study and think there is a chance that MBR, or MBR-like techniques, could become widely adopted during the next 10 years. "Many banks and financial institutions are scrambling to inte-

mainframe future" and the advent of the strong, charismatic information czar. Says Joseph Ferreira, a director at Index Systems Inc., a Cambridge, Mass., consulting company, and a DATAMATION advisor, "What we're really beginning to see is a centralizing of new environments for the first time."

Lack of a Cohesive Plan

Irwin Sitkin, an example of the new breed of CIO, and the vp of corporate administration at Aetna Life and Casualty, Hartford, Conn., agrees: "Many companies followed Citicorp's lead by pushing thousands of minis and micros out to departments. But often these well-intentioned efforts to get close to end users weren't accompanied by increased gravity and control at the center and a cohesive strategic plan."

Sitkin, DiNardo, and other MIS luminaries are convinced that certain corporate functions should never be decentralized. "You've got to centralize communications today," says John Gosden, recently vp of information services and the technology officer at Equitable Life, New York, and now a consultant based in Manhattan. "Telecommunications talent is so scarce that they have to be pampered and kept close to the MIS power base so you don't lose them."

Centralized purchasing is also vitally important, these experts say, and can confer numerous benefits. "With a \$1 billion budget, you can be sure I have IBM's ear at all times," quips Peterson. "I'm in a position to negotiate tremendous and lucrative deals with IBM for new systems."

Another force driving the trend to recentralization is the acquisition binge that many banks, for example, have been on. DiNardo, a big player in this area, has had to integrate and absorb numer-

ous acquisitions into his bank's single-system core. "It's the only way you can do it," he says, adding that there is always a great deal of waste involved in the process.

Perhaps the biggest need for a reaffirmation of centralized control, and for the strategic programs like MBR that must go with it, is the corporation's need for integrated data. "To compete today, and leverage off existing investments in information technology, corporations need a unified view of themselves. Which means a unified view of the data that run the business," says Index Systems' Ferreira. "Once they have that, they can develop families of products and services that draw on the same distribution, marketing, and support channels."

Adds Sitkin, "Information is our entire product. Data is its raw material. Those that are better at massaging and manipulating it will win out in the marketplace."

The Great Man Theory

Perhaps the ultimate in centralization is the new strong leader and person of vision who sits at the center of it. "The main difference between a centralized and decentralized operation is that the former has a strong figurehead at the heart of it," says Gosden.

DiNardo, a noted centralist and autocrat, admits that he has been approached with \$1 million-plus salaries by New York banks looking for another Peterson. Singleton has been promoted five times in four years and has seen his salary and benefits soar to keep him at SPC. "A handful of us are now being approached with these enormous salaries," he says. "Strong centralizers may be in vogue for a few years, before a new wave of decentralization occurs."

Both Peterson and Sin-

How Products Would Support the Shift

The pendulum keeps swinging from centralization to decentralization because the software needed to provide central control as well distributed functionality doesn't yet exist. That, essentially, is the message from top IS executives. They claim, however, that the type of program that could help make MBR a reality and could support the refocusing efforts of IBM's largest customers should be available in the near future.

For IS leaders and IBM beta sites, realization of the shift to centralization will depend upon a number of key, upcoming products. Among these products, not yet announced by IBM but hoped for by IS leaders, are a new release of SNA's VTAM software that supports the LU 6.2 protocol and finally allows mainframes to play an active role in peer sessions between minis and PCs; SNA Netview programs that enable IS directors to bring data and voice under one central control point; and a new database engine for PS/2 LANS based on Silverlake, IBM's fusion of its System/36 and System/38 architectures. Above all, they explain, it means an open SNA architecture as well as implementation of the new Systems Applications Architecture (SAA) blueprint, which, if realized, will provide the necessary DBMS, communications, and applications interfaces between IBM's three primary systems architectures—370, 3X (i.e., System/36 and /38), and PS/2.

The first significant application of SAA will be IBM's so-called OS/2 extended edition operating system for the PS/2 personal computer family. These IBM customers believe that the extended OS/2 coupled with the company's proprietary Micro Channel bus structure will, within 18 months, support IBM's AIX version of Unix, as well as the Systems/36 and 38 and the 9370—all running concurrently, and all accessible through the same PS/2 interface. IBM insiders are now referring to the PS/2 as the "end-user window into its systems of the future."

"What we're beginning to see," says Merrill Lynch's executive vp DuWayne Peterson, "is software that allows us to distribute processing and applications while maintaining the correct measure of central control."

gleton bristle at the notion that they are only centralizers of the old school, people trying to turn the clock back. "MBR can, and will, be an integral part of decentralization programs in the future," Peterson predicts. He believes that the methods and techniques that are emerging from information czars will become commonplace over the next 10 years and will become habitual as they percolate through organizations.

As for the notion that he is going back to the mainframe, Peterson says he's more likely to spend his millions on IBM's new personal

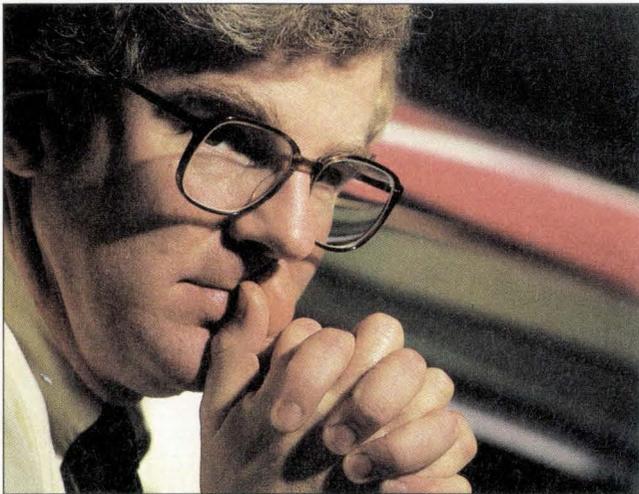
computers than anything else. An example is the deal he recently struck for 20,000 PS/2s.

As a mainframe-driven company, there is probably small comfort for IBM in Peterson's words and in the prospect of the shrinking budgets that MBR and similar techniques could bring about. As DiNardo says, "Big Blue is worried. They believe they only have about 200 big iron customers that can really grow the demand for mainframe MIPS. They'll have trouble growing this base, even with the centralization trend." ■

PRICING

Tracking Net Costs: A Slippery Task

A reexamination of chargeback procedures is catching on in IS shops.



WANG'S SAWYER: Spreading the cost of the network is key.

BY GARY McWILLIAMS

Chargeback holds distinct meaning in the world of telephony. Extracting information on telephone costs is a part of the network. Whether by division, department, or individual, isolating the cost is a feature typically offered by equipment suppliers and telephone company services.

In data communications, however, allocating costs of the data network requires a much more concerted effort on the part of users. The usage data that can be obtained often varies widely by network type and equipment vendor. Getting precise information often requires costly applications development.

The debate over a network's influence on employee productivity also has sidetracked many from implementing detailed chargebacks. As a result, whether the reasons are lack of appli-

cations or economic or organizational lethargy, the data network bill is one that few users ever see.

Recent trends in the way corporations view their data networks, however, indicate that the chargeback procedure is likely to surface. Particularly as data networks become positioned as business operations—rather than corporate overhead—chargeback is an issue looming on the horizon.

Gigi Wang, communications research director at the Yankee Group, the Boston research house, says IBM's endorsement of SNA network control centers will raise the fiscal profile of network operations. "Even if companies don't formally create a separate network division, they create a virtual business operation by consolidating network control," says Wang.

Already, she says, network management products

such as IBM's NetView and Cincom Systems' Net/Master are placing network managers in critical roles. "Running the network as a profit center is becoming more popular. It's placing more and more authority on the shoulders of the network manager and less on the systems manager [because] the vital information resides on the network."

Another change spurring interest in chargebacks involves the spread of network capacity leasing. As companies such as General Electric Co. and Sears Roebuck & Co. begin reselling capacity on private networks, the demand for accounting tools should spur equipment vendors to build in more usage data.

More Usage Data Coming

Even in personal computer networks, chargeback is on the way. New software features coming from Novell Inc., Provo, Utah, represent one attempt to provide more information on usage. Novell's Network Div. president Richard King says that the forthcoming release of NetWare SFT (Systems Fault Tolerant) version 2.1 enables network administrators to measure and control access to network servers.

The Novell product enables network managers to allocate server resources such as disk space, data files, applications, or even computer time. The reason? "Users want to know who's using the facilities on the network," says King.

Banyan Systems Inc., Westboro, Mass., has begun adding auditing features to its VINES networking software. Director of software Robert Nuber says chargebacks will follow. "Things are headed in that direction. The focus thus far has been on security; the next step is auditing behavior and auditing facilities usage."

Chargeback accounting methods to date have employed a hodgepodge of measurements. Raytheon Co.'s Scientific Computing Center and Hughes Aircraft Co., to take two examples, allocate their data network charges by simply adding total costs to the computer time charges that are assessed to divisional or departmental users.

"Right now, there is no mechanism in place to determine the source [of usage], so we can't chargeback to the user," says Fred Schnepel, who is communications manager at the Bedford, Mass.-based Raytheon Scientific Computer Center. The lack of such information leaves a gap in the present accounting policies, he says. "I would love to charge for network time, especially for high-bandwidth users, but [the mechanism] is not in place."

Raytheon can identify only those users who tap into the systems that handle billing. "There are people who are on the network but aren't using our computers, so we're not billing them for the usage," he says. Now driving home the issue for Raytheon is a new T1 network. The costs of installing the T1 network are shared among the company's three largest computer centers and their users. Others are getting a "free ride," he says.

While an advocate of improved network accounting, Schnepel opposes chargebacks that would put artificial curbs on users' access to network resources. "If you're restricting a user to only so many hours," he says, "what happens if the job is only 85% complete? What do you do?"

Questions on Budget Cutting

For those companies that rank networking as a vital business function, chargebacks raise the question of whether network access could fall victim to a local man-

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DATABASE SYSTEMS

Where's the DBMS For HP's Spectrum?

Availability of Allbase has still not been specified, but HP is covering its bets with the help of Oracle.

BY SUSAN KERR

Go backward in time to a February day nearly two years ago at the first public announcement of Spectrum, Hewlett-Packard's RISC-based computer platform.

Along with providing the first specs of an exciting hardware architecture, company officials laid out extensive details of a new, revolutionary database system that would combine the best of both network and SQL relational database worlds. The word "unique" was used frequently that day to describe the new system, called, appropriately enough, HP Allbase/XL. Also served up to the crowd in Palo Alto was the information that the first shipments of Allbase would coincide with the first Spectrum hardware shipments, then scheduled for the end of 1986.

Contrast that to the recent gathering in Las Vegas of HP 3000 minicomputer users. Nary a word was spoken about Allbase to the thousands of HP faithful present.

What's happened in the interim? The question has several answers, including priorities in allocating resources, promises that proved difficult to satisfy, and mixed and conflicting customer demands.

Allbase still exists, but on the drawing board rather than in customers' hands. HP instead is pushing its older, network model database system, TurboImage, on the new Spectrum 3000 Series 900 machines. Additionally, HP for the first time is arranging for

third parties, most notably Oracle Corp. of Belmont, Calif., to provide relational database management systems for Spectrum.

Gary Whitney, HP's information management products manager, says that in the first quarter of 1988, "there will be more announcements as far as timing, functionality, and specifics" of Allbase. Those specifics, however, may or may not include any promise about shipment dates, and Allbase will not be available in that quarter.

HP has been bitten, and bitten hard, by delivery promises about Spectrum. It's wisely taking a cautious path now with Allbase, but this decision has left some users confused. "I haven't had entirely accurate information on Allbase," comments John Hinrichsen, database specialist at Kirke-Van Orsdel Inc., a Des Moines insurance administration company and an HP site.

Although Scott Hirsh, another HP user and a technical support manager at RCM Capital Management, San Francisco, says, "I have no problem with Image," he allows, "I took native mode TurboImage [running on Spectrum] as a bad sign. The reason they did it is that the machines can't run Allbase—couldn't drive a fancier database."

When You Don't Have an RDBMS

HP decided it couldn't get out Allbase on time in the shape it desired. But the delay brings to light a current shortcoming in the HP database

ager's budget cutting. Wang Laboratories, for instance, charges its users a monthly fee for attaching systems to the network but not for actual usage. Director of network services John W. Sawyer says the practice spreads the cost of the network among all groups but doesn't inhibit the packet size or frequency of use.

The balance is one that many struggle to maintain. "It addresses the company philosophy," says the Yankee Group's Wang. "The issue is whether the network should be viewed as a corporate resource."

So far, most companies using chargebacks straddle the issue because of the less precise measurements available. But that could change. Hughes Aircraft, for example, employs four types of networks: packet switched, wide area interconnection of LANs, backbone voice and data, and point-to-point. Each uses differing pricing schemes because of the accounting methods available.

Doug V. Taylor, a Hughes corporate telecom manager, says that thus far the accounting tools have not kept up with the demands for precise information. "The technology has come along faster than the administration. The function of LANs and wide area interconnections are ahead of the tools needed to make them run well and securely. It will come," Taylor concludes.

For instance, since the packet switched network provides the best data on individual usage, its users are assessed a time and volume charge. Yet, lacking control over entry points to the network, charges are assessed to those that accept—rather than send—data. "We charge to the system that accepts [the data] because we've no visibility to the [sender]," he says. "The goal is to make the

people who use the service pay for the service." In other cases, the network costs are equally divided by all users, or by a formula measuring bandwidth usage.

Low Operating Overhead

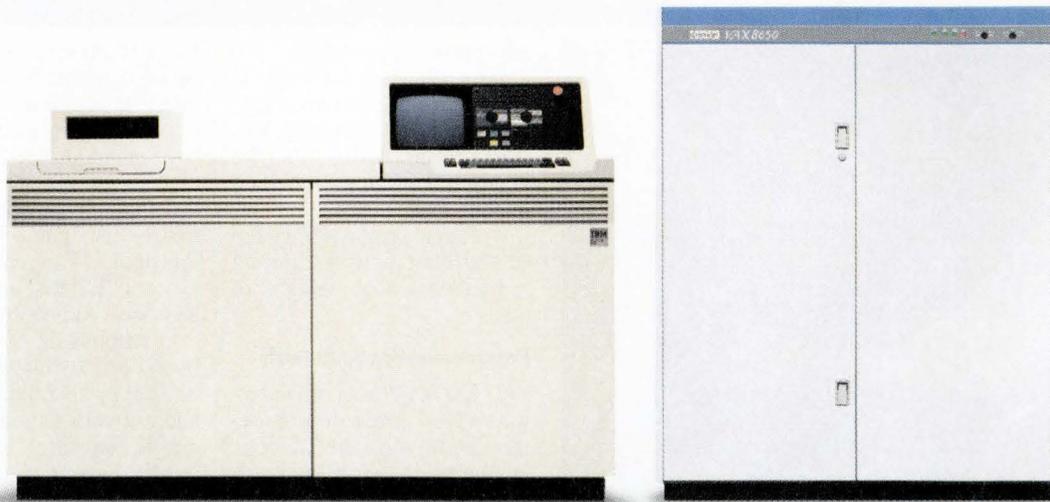
Others say even such general pricing schemes are not a priority because of the relatively low operating costs of private, packet switched networks. Coopers & Lybrand National Ltd., Toronto, which provides computing and communications services to Canadian offices of the accounting firm of the same name, is one example.

"The telecom costs are so low nobody gives a damn" about individual usage, says F. Holbrook Badgley, Coopers & Lybrand's national director of computer operations.

Once installation costs are absorbed, the incremental costs of network operation are negligible, he says. "We figured if all of our 3,000 employees sent every other one a two-page letter every day, the monthly packet charges would go up \$300," says Badgley. "The way we look at it, packet switching is so inexpensive we don't care about volume increases."

"It appears the cost of running a network is small—about \$12,000 a month," he continues. "In a \$200 million a year business, that's fairly insignificant."

Yankee Group's Wang concedes the costs of measuring usage are too great for smaller private networks. But as networks grow and are viewed as corporate profit and loss centers, the costs take on new meaning. Given the lack of vendor-supplied accounting tools, chargeback "requires an investment that would be too expensive" for smaller networks, she says. But "where it's run as a profit center, it's worth the investment." ■



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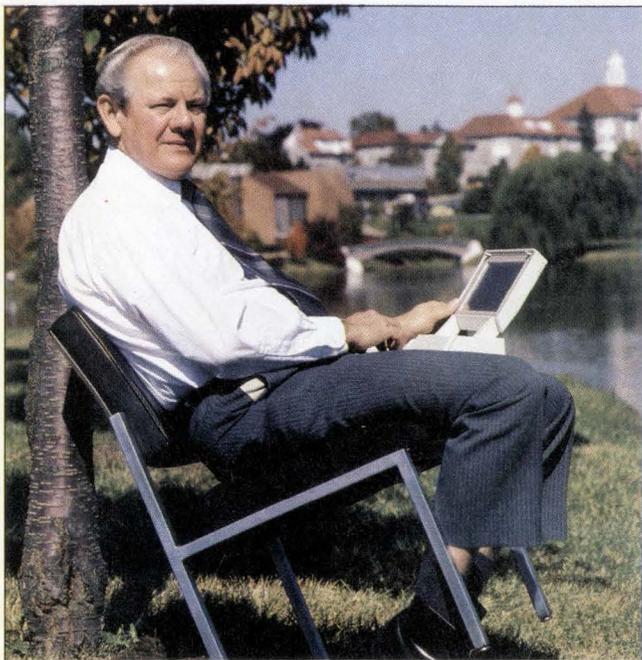
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MADISON'S YARBER: Needs relational for ad hoc reports.

lineup: the lack of a good relational database product.

The need to go relational isn't felt just within HP's present user community. HP officials acknowledge that it's a big enough point to have knocked HP from the running at some minicomputer sites.

"We have the Image product that everybody is happy with," says Whitney, "but in large accounts with multivendor environments they want an HP SQL product. Those [big accounts] tend to be lockouts" without a bona fide SQL offering.

Therein lies the reasoning not just behind HP's multiple database strategy but behind Spectrum itself. HP not only needs to satisfy current customers that were topping out in power, but has to attract new accounts that could otherwise go to IBM or Digital Equipment Corp. Despite its fine reputation, Image is not as good as it once was in attracting new, big accounts. Allbase and products from the likes of Oracle could do the job. But they won't begin to be ready until next year.

New database capability combined with powerful new hardware also will open up to HP opportunities for new applications. For example, in applications with many users making many changes to the database, such as for order entry, HP has been perceived as weak.

Image is a decade-old database system that receives kudos from its users. Because it was bundled with the HP 3000 MPE operating system, almost all HP 3000 users employ Image. As it provides network model access to databases, Image features speedy performance by predetermined access paths for repetitive applications. It falls short, however, on what is SQL's strength: ad hoc inquiries.

With information on more than 25,000 people in his database, Benjamin Yarber, administrative computing services director at James Madison University, says he needs to investigate offerings other than Image. "I do not need a relational system for what I call the bread-

and-butter applications," he comments, "but I do for ad hoc reports." The university, which is in Harrisonburg, Va., uses two HP Series 70s (the pre-Spectrum top-of-the-line system) and three DEC VAXs.

A year ago, HP unveiled HPSQL, a competitive offering to Image and not bundled with MPE.

Performance Not Up to Snuff

But HPSQL is criticized by users for uneven performance. HP says its success has been limited by the hardware restraints of the non-RISC versions of the 3000 line. SQL is much more compute- and address-intensive than Image. Illustrating the discrepancy, in a benchmark performed for McDonnell Douglas, HP found that SQL running on the top-end Spectrum Series 950 showed a performance boost of 20.5 times that of the Series 70. Nevertheless, HP officials warn that, although it is more flexible, HPSQL is still quite a bit slower than TurboImage.

While it's available as such, HP does not appear to be pushing HPSQL as a stand-alone product. Instead, HPSQL, which is the same as the SQL portion on Allbase, is a way to let customers experiment and get a handle on the technology while they wait for Allbase.

For any customers interested only in SQL, more standard SQL-based products, such as Oracle, may be the ticket. Oracle has announced that a first HP release is targeted for mid-1988, with fuller functionality ready six months after that. HP reportedly is talking about similar deals to other third parties, including Cullinet Software of Westwood, Mass., and Software AG of Reston, Va. (see Look Ahead, Oct. 1, p. 10).

"Oracle will be competitive to our products," says HP's Whitney. "We're seeing this more as an opportunistic

than strategic opportunity. Some companies have decided to standardize on Oracle."

Better to get accounts because of Oracle than not at all. But HP, proud of its database history, obviously would prefer to get in on the strength of its own database system. And that's where Allbase is to come into play.

Allbase is to combine HPSQL and HPImage database interfaces to offer relational and network data access in a single product. In other words, have it your way. Offering that amount of flexibility in a single database product could be a big selling point for HP. HP went one step further, however. It promised that HP TurboImage applications will be compatible with the HP-Image interface of Allbase.

Allocation of Resources

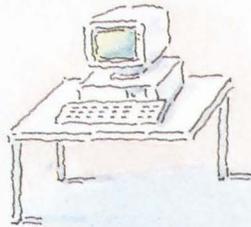
HP, rather than ship at the first release of Spectrum what it viewed as an incomplete system, decided in March to put its resources into a native mode version of TurboImage.

That suits some loyal users just fine. "With TurboImage, I can do a store/restore between the 950 and the Series 70," says one MIS director at an HP shop about to take delivery of a Spectrum system. "If you can't do that with Allbase, I don't want it. And I don't use SQL."

For users not interested in SQL, native mode TurboImage today is preferable to the first release of Allbase anyway. "We do expect TurboImage next year to outperform the Image portion of Allbase," says Dave Hoover, HP product marketing manager.

This points to the possibility that the 950, the current top of the product line, isn't big enough to handle the expected overhead of Allbase. HP is rumored to be preparing a larger system—tentatively called the 975—but Hoover refuses to comment.

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TERMINALS

Shaken by Price Erosion, 3270 Market Continues to Slide

Many users see more advantages in going to microcomputers, but a number of 3270 terminal manufacturers have counterattacked with new products.

He will say that "Allbase is the database we designed that will let us scale up to bigger systems. TurboImage won't be able to support the higher level of concurrency." Concurrency is the simultaneous access to a database by multiple users. Hoover won't assign a number to the users that TurboImage can support versus the expected numbers for Allbase. "Allbase is a new database with a lot of new code and different algorithms," he says. "To provide concurrency and relational access, we couldn't make it 100% compatible with TurboImage.

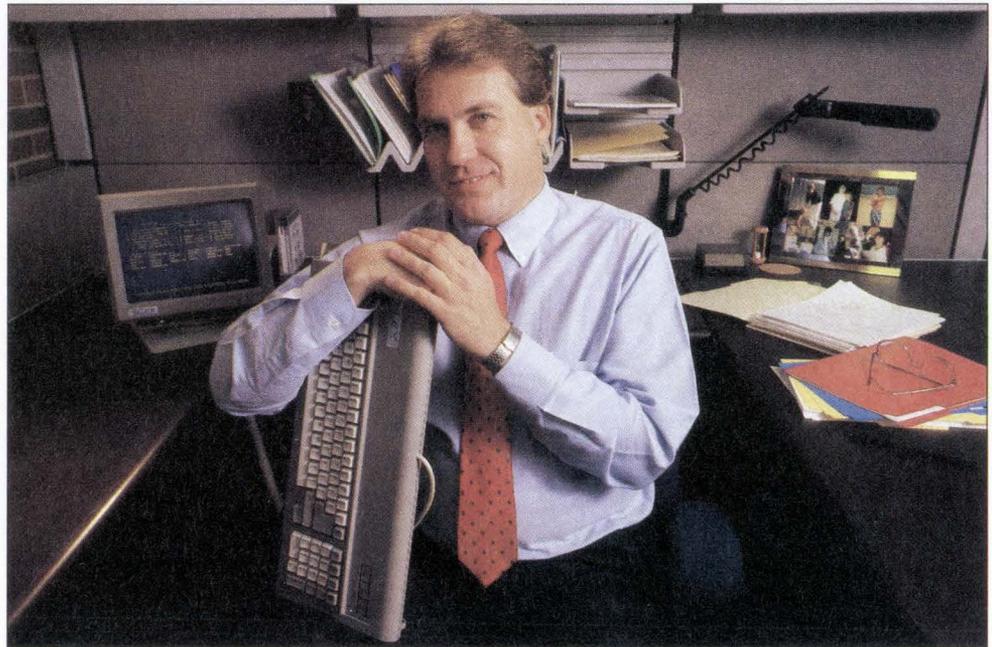
Because "Allbase is more stringent in defining transactions," says HP's Whitney, "customers would have to define logic more clearly" than they do with TurboImage. That also affected the decision to offer customers a smoother migration path via TurboImage.

Utility Won't Be Offered

In the course of these findings, HP has altered one other Allbase strategy as well. It has decided not to offer a software utility called TurboWindow/XL, originally defined as the path to allow smooth migration of TurboImage applications to Allbase's HPImage portion. Customers will instead code into HPImage directly.

It will be a while, though, before anyone outside of HP has to worry about that. HP now is emphasizing the performance gains that can be realized today by moving TurboImage onto the Series 950 from the 70.

Despite the question marks, HP insiders feel that for the first time in a long time they can meet the competition head-on. "HP's been on the defensive," admits HP senior vice president Doug Chance. But he insists that's beginning to change: "The best is yet to come." ■



TELEX'S FETTIG: "The 3270 is a mainstay of the American business community."

BY ROBERT FRANCIS

For companies that were said to have products about to be relegated to the scrap heap a few years ago, computer terminal manufacturers, particularly makers of IBM 3270-compatibles, have continued to show signs of life, even if the days of making easy dollars are over.

Conventional wisdom had computer terminal manufacturers ready to roll over and play dead as the price of pcs fell and took a chunk of the terminal market and forced terminal vendors to lower their prices. Though it's not possible to determine how much the market has been affected by the personal computer invasion, observ-

ers agree that the market for 3270 terminals has been slowing, if not declining.

According to Leslie Lord, senior research analyst at International Data Corp., Framingham, Mass., shipments of 3270-type terminals declined 7% in 1986, the first time the market has failed to show growth. Perhaps more important to note is that the value of those shipments declined to \$957 million last year from \$1.1 billion in 1985, a reflection of a decline in the price of the terminals.

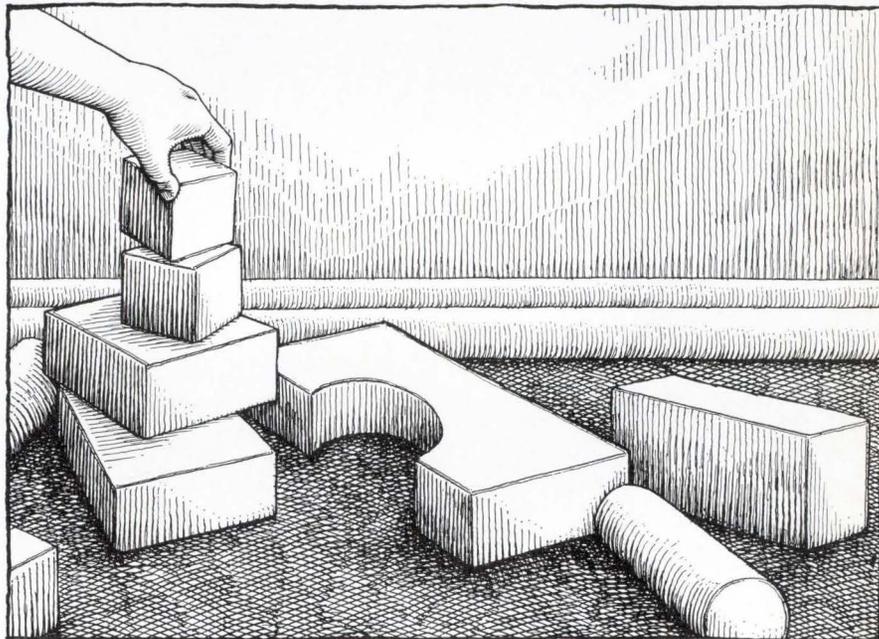
On a more positive note, analysts say that while shipments are declining, the installed base of 3270 units continues to grow, meaning the replacement market will play an increasingly vital role for

manufacturers. Price discounting is currently a staple of the 3270 market. At market leader IBM, for instance, the company is offering discounts on some models if purchased for delivery by the end of the year. One model in the discount program is list priced at \$1,525 but is available for \$1,395 under the program, an IBM spokesman reports.

Eyeing Price/Performance

For users, the advent of the lower-priced personal computer has certainly caused some reevaluation of the price and performance characteristics of the so-called dumb terminal, but not always to the benefit of the pc. A Dallas-based travel agency continues to use dumb termi-

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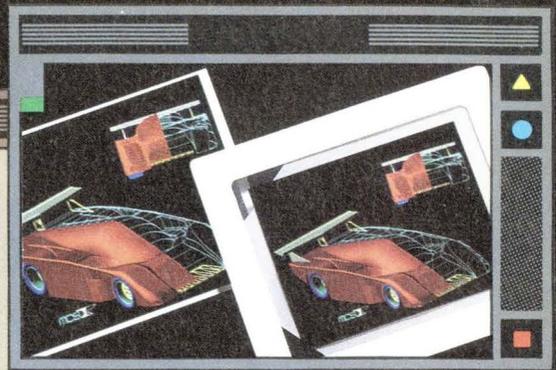


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nals for their agents, who don't need the processing power of a pc. "We decided to use that approach because the agents don't need the memory or the disks," according to the agency's IS manager, "while at the next level, some of the managers do, and they can work on the pcs." Furthermore, many companies are worried that some workers with pcs can download company files into a single workstation and produce potential security problems.

For some companies, adequate safeguards, along with the other advantages of pcs, have meant the replacement of dumb terminals in IS departments. Steve Gleave, director of data services at Frito-Lay Inc., Dallas, says his company has only one terminal now and is using personal computers where data terminals had once been stationed.

In the next few months, maybe even years, 3270 terminal users may find themselves with more options, at lower prices, than they've seen in several years, while the manufacturers find themselves responding to a changing market dominated by a new, more aggressive IBM.

Many of the major terminal makers are already on this road, with new products and functionality. Most terminal manufacturers are adding processing functions to their terminals, creating in the process a hybrid product, the processing terminal. Beehive International in Salt Lake City, for example, recently introduced a family of machines

with processing functions, such as record and playback, to offset some of the attractive characteristics of pcs.

Telex's Profit Streak Ends

Still, the road from a rapidly growing market to a maturing one is rocky, as several players, both large and small, have discovered. Tulsa, Okla.-based Telex Corp., which has steadily come in second in the 3270-compatible market behind IBM, has seen its seven-year string of profits snagged by changes in the market.

Telex, one of the few shining stars in Tulsa's beleaguered oil economy, wasn't caught unaware of these changes and, in fact, was readying a raft of new products, geared to shift revenue from the 3270-compatible market to new areas. But Telex officials disclosed earlier this year that those new products are taking more time to get off the ground than anticipated. That fact, along with severe price competition for the company's core products, in particular the 3270 compatibles, sent its stock into a tailspin and brought the formerly high-flying company to the attention of New York corporate raider Asher B. Edelman.

Last year, Telex's counterattack, consisting of voice data terminals, airline reservation terminals, and nine System 3X products, was designed to combat the expected revenue decline from the company's core computer terminal market. Two of the new products for the company's new airline systems

automation line include the 078-A terminal with a 12-inch display and the 080-A with a 15-inch display. Earlier this year, the company announced some other new products, including a diskless personal computer, designed to counter the pc trend.

Meanwhile, Telex officials are still positive about their presence in the 3270-compatible market. "The 3270 is a mainstay of the American—and worldwide—business community," says Dick Fettig, director of marketing at Telex. "So it's going to be around even though the

growth rate isn't going to be as fast as it had been. I think the pc revolution went unchecked for a while and the thing began to erode, but that's sort of been addressed by these new products."

Others also see Telex's introduction of new products as a positive move. Joe Wagner, an analyst for Dataquest, a research firm in San Jose, says the company is responding to the changes in the marketplace. It may just take some time, however, for the new products to get off the ground, he says.

Telex and Beehive are

From Role Model to Takeover Target

During the oil-fueled economic boom of the late 1970s and early 1980s, Telex Corp.'s revenues and profits were a mere blip on the economic screen of Tulsa, Okla., where companies involved in the oil and gas business overshadowed the computer terminal manufacturer.

Telex, however, became an important example of a successful, diversified company in the local economy, but now many are worried about what will happen to Telex since the company has become a takeover target of New York investor Asher B. Edelman.

Telex has found itself a takeover candidate not because it has been unsuccessful or unprofitable, but because it has been buffeted by two forces: severe price competition in its core, 3270-compatible market, now mature; and new-product snafus. Shipments of new products (System/3X offerings and airline reservation terminals) have not met expectations and the cost of development has been higher than anticipated, company officials say. In early September, the company announced that because of these problems it was slashing its earnings estimate for its second quarter ended Sept. 30, which sent its stock plummeting.

At that point, Edelman, currently chairman of two other computer companies he had previously purchased—Datapoint Corp. and Intelogic Trace Inc., both in San Antonio—entered the scene and offered to purchase Telex for \$870 million. At press time, Telex's board of directors had deferred a recommendation on Edelman's offer and had authorized management to seek other alternatives.

If Telex attempts to do battle with Edelman, it could benefit from some laws passed in Oklahoma following takeover artist T. Boone Pickens' attempt to gain control of Phillips Petroleum Co.

At press time, Telex's second-quarter earnings were not in, but the company had cut its earnings projection to about \$14.6 million, down from an earlier projection of \$21.9 million. In the same quarter last year, the company had a net income of \$19.4 million on revenues of \$204.9 million. For the fiscal year ended March 31, the company reported a net income of \$77.2 million on revenues of \$840.7 million.

3270 Terminal Shipments Decline

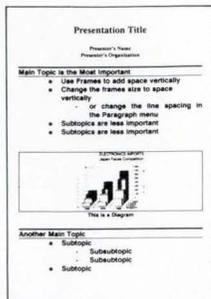
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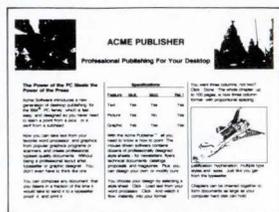
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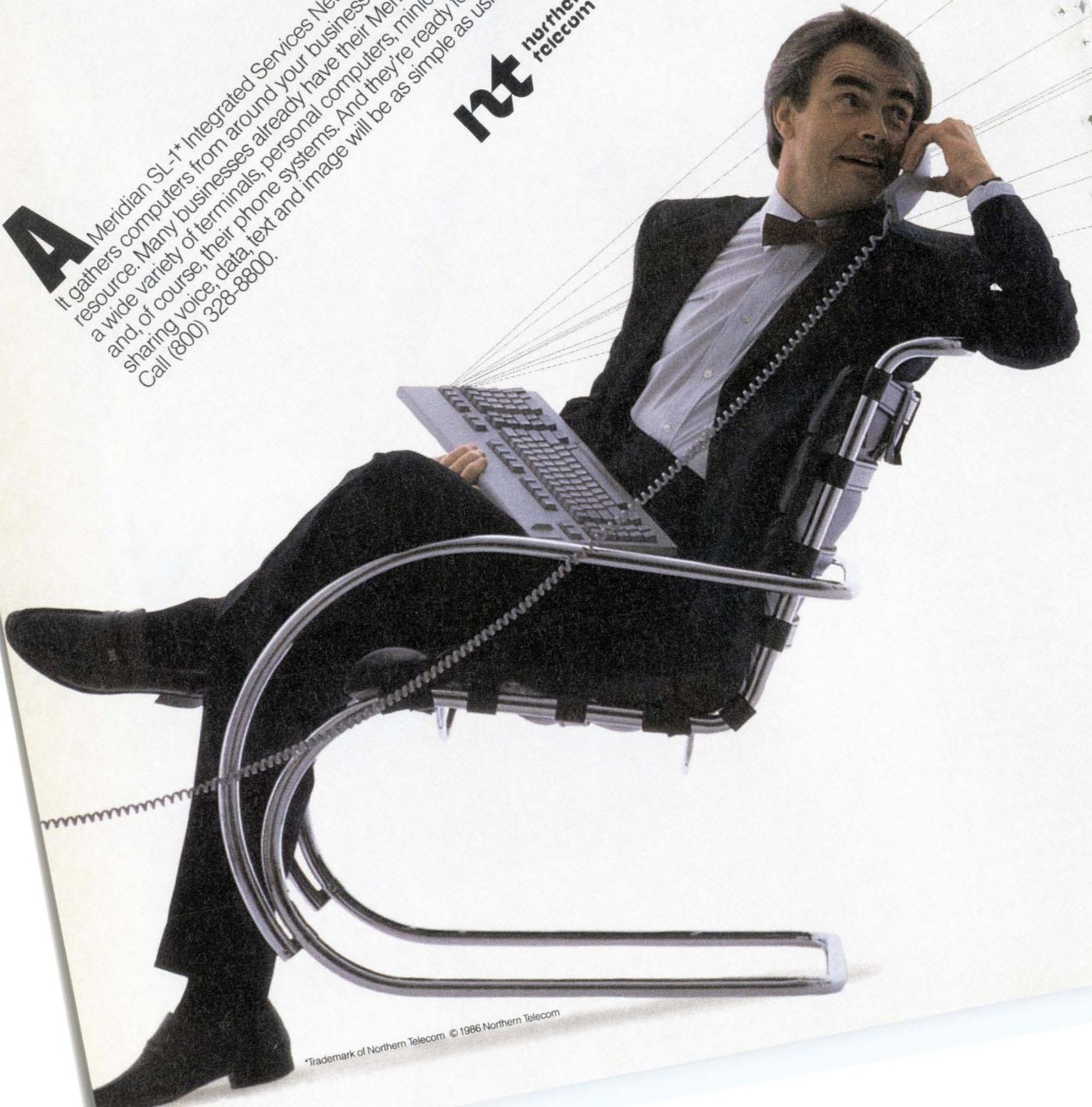
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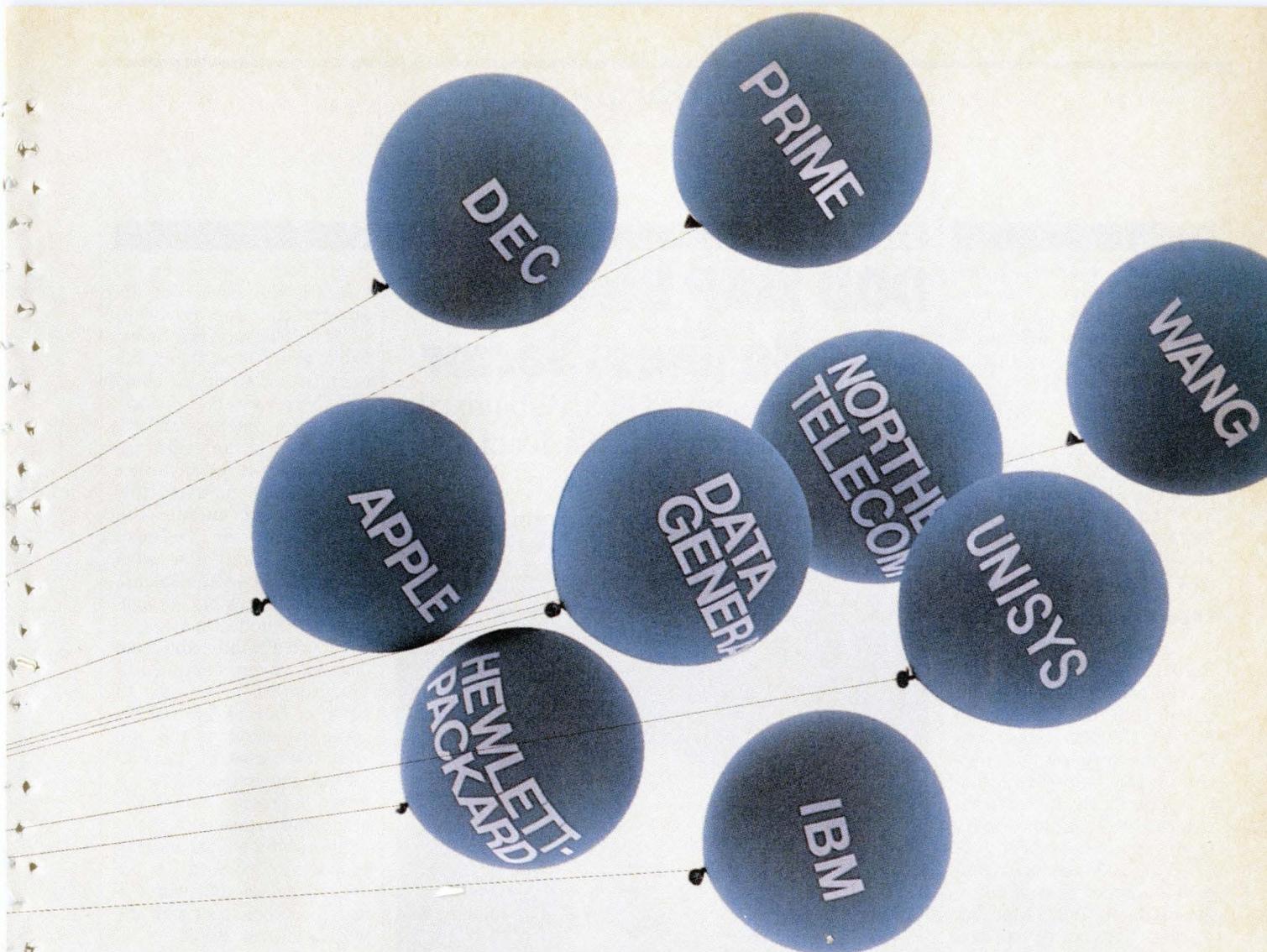
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DOD MAP Blessing Aids Business Sector

The government's GOSIP standard should be approved in '88, leading to a rush of vendor compliance.

not the only companies in this market to develop a new thirst for battle. "IBM introduced more new 3270 products in the past year than in the whole of the previous 10 years," says Dataquest's Wagner.

Last year, IBM introduced the 3191 terminal to replace the 3178 terminal. The 3191 has several new features, including an improved display, keyboard, and an optional three-year warranty.

HP Backing Terminals

Despite the shrinking 3270 market, at least one other company still sees profit potential in the terminals. In August, Hewlett-Packard entered the fray with its own line of IBM-compatible terminals. Previously, HP had manufactured terminals for its own systems, but recently decided to tackle the 3270-compatible market as well, introducing the HP 700/71 for that market. Says an HP spokesman, "When we go in to sell our own terminals, companies typically don't just use one system, they have a DEC or an IBM as well as a Hewlett-Packard. This way we can provide a full range of terminals."

In terms of market share, IBM has generally held between 55% and 65% of the market for 3270 terminals, with Telex coming in second with slightly more than 15%. Next up is Courier in Tempe, Ariz., with about 8%, then AT&T-Teletype with 5%, followed by, in descending order, Memorex, Lee Data, and Harris, then other, various smaller players, holding between 5% and 6% of the market.

How these numbers may change, if at all, over the next year is anybody's guess, but one thing's for sure: the 3270 world is still a fact of life for many IS shops and will continue to be so for some time to come. ■



BOEING'S BRIDE: GOSIP will be the standard for procurement.

BY WILLIE SCHATZ

After three years of a thousand million questions, MAP/TOP (Manufacturing Automation Protocol/Technical Office Protocol) is suddenly in so deep with the in crowd that the government has developed its own version.

Usually, that spells trouble. In this case, it may mean just the opposite.

"GOSIP [Government Open Systems Interconnection Protocol] is the most significant thing to happen in the last three years," Laurie Bride, TOP program manager for Boeing Computer Services, Seattle, said at the recent MAP/TOP Users Group meeting in Dallas. "It's industry and government working together toward a common goal—interoperability."

The goal may be the same, but for a while the specifications weren't. The first draft of GOSIP was not aligned with TOP. Enter the National Bureau of Standards (NBS) Implementors' Workshop, a combination of government and industry computer experts. Spurred by the MAP/TOP group's desire to have as much interoperability as possible available for the Enterprise Networking Event '88 International (ENE '88i), at which the latest in MAP 3.0 products will be shown, the workshop spent many hours trying to reconcile the differences between TOP and GOSIP to ensure that they would be identical. It was a rough job, but someone had to do it.

Guess what? They did. GOSIP is now a clone of TOP.

Every one of the seven ISO layers is the same. But the government, true as always to its bureaucratic principles, had to give TOP another name because not to do so could have been viewed as endorsing a private sector standard. The private sector could care less. A contract by any other name is still a contract. Now that the government—the Department of Defense (DOD) in particular—has adopted GOSIP as its standard, there will be plenty of signings on the dotted line.

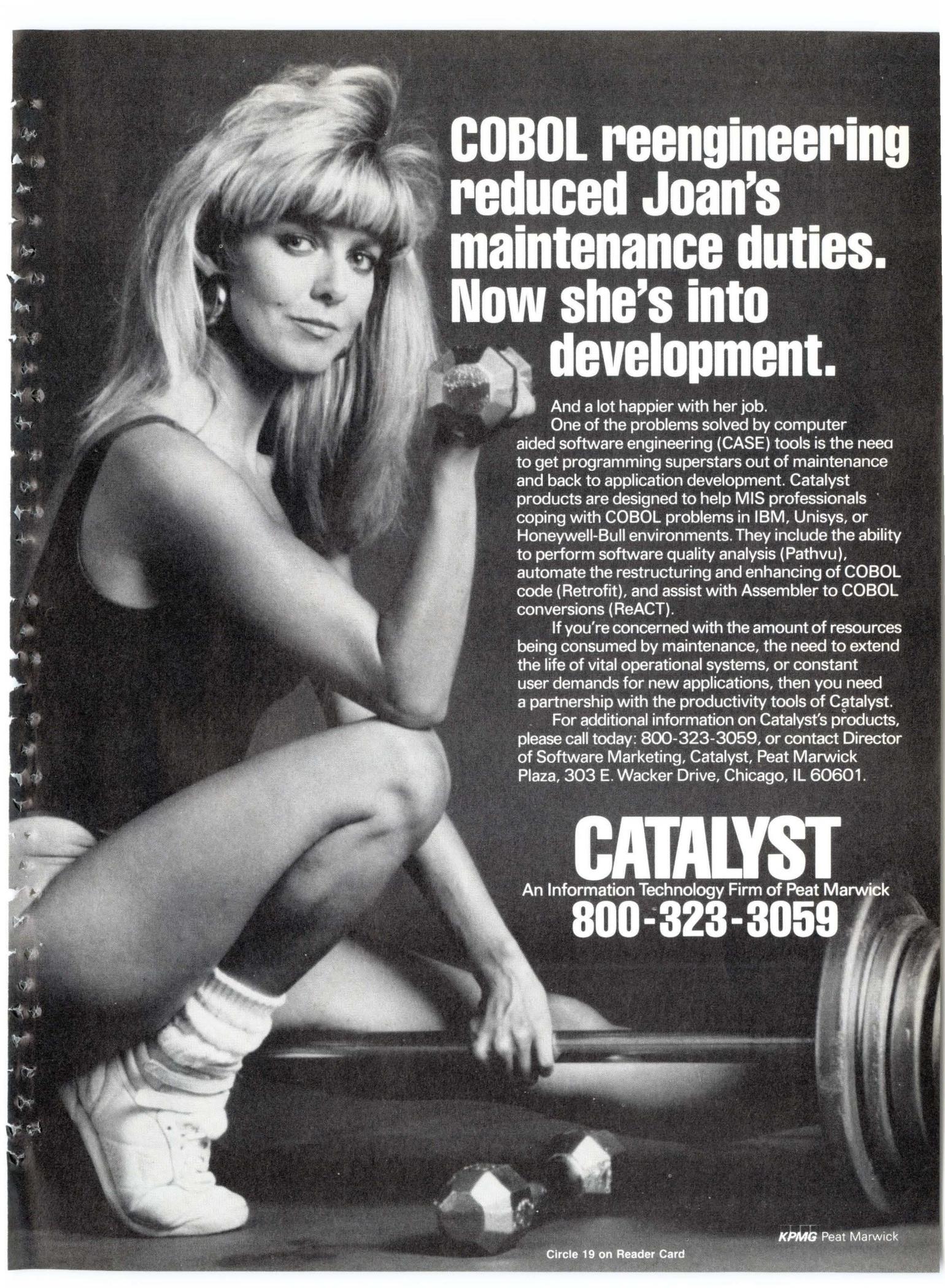
"GOSIP will be the standard for government agency procurement," according to Bride of Boeing. "It will become mandatory in the DOD within two years. At that point all DOD agencies will be allowed to procure only GOSIP-conformant products. So if vendors don't start making products to conform to the GOSIP standard, they won't be able to do business with the world's largest user."

A Private Sector Phenomenon

For a while it appeared that would be the scenario with or without GOSIP. Business hasn't exactly been booming up to this point. MAP/TOP has been mostly a private affair, with the government on the outside looking in. That's more a matter of the myriad bureaucracies in Washington not being able to get it together than a lack of desire to get involved in the MAP/TOP movement. If the private sector's computers can't talk to each other, imagine the linguistics problems in the government's systems.

The civilian agencies actually have been signing up for MAP/TOP at a reasonably brisk rate. That mattered little without the concurrence of DOD, which, as all those feeders at the government trough know, is the largest user with the most money.

DOD was unwilling to commit itself to GOSIP until users



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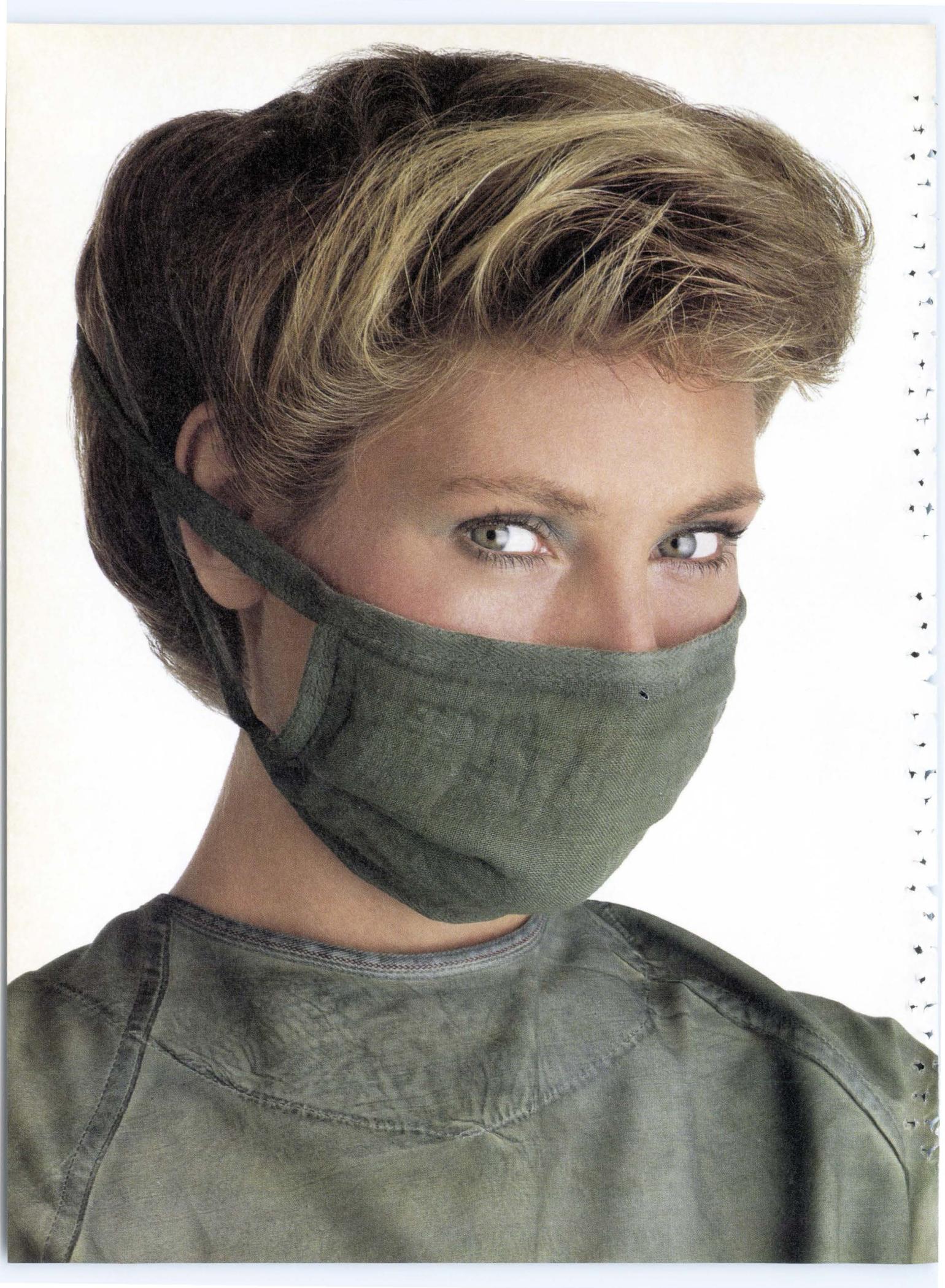
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Circle 2 on Reader Card

could acquire interoperable OSI message handling and file transfer products. Once that nirvana was achieved, the word came forth that GOSIP was indeed the way to go.

"It is intended to adopt the OSI protocols as a full co-standard with the DOD protocols when GOSIP is formally approved as a Federal Information Processing Standard [FIPS]," former assistant secretary of defense Donald Latham wrote. (Put your money on January). "Two years thereafter, the OSI protocols would become the sole mandatory interoperable protocol suite; however, a capability for interoperation with DOD protocols would be provided for the expectant life of systems supporting the DOD protocols."

Specific actions by the director of the Defense Communications Agency (DCA) include publication, by November, of a DOD-OSI Interoperability and Transition Plan, which will provide for interoperation of the DOD and OSI protocols at the application level. DCA also will join the Corporation for Open Systems (COS), the nonprofit consortium designed to deal with conformance testing of OSI.

A Force To Be Reckoned With

"That's all she wrote," said Mike Kaminski, GM's MAP program manager, in Dallas. "The government's been participating in MAP/TOP all along. NBS was pushing OSI pretty hard, but it never seemed to get off the ground.

"Now that we've got government approval, we'll be a force to be reckoned with. And when GOSIP becomes a FIPS, it will take off like wildfire. Vendors are going to have to make GOSIP products because that's all the government will buy. Some vendors are still dragging their feet about MAP/TOP, but they're beating a dead horse. They're arrogant

and they'll go down fighting, but they'll come around."

This time they probably can't afford not to. The ENE 88i organizers have encountered some resistance from vendors to commit serious resources to MAP version 3.0 products because they're not convinced that users think those products are where it's at. Exhibit A: neither IBM nor DEC at press time had committed to appearing in one of the six MAP booths at ENE 88i. Each had agreed to exhibit at the Corporation for Open Systems (COS) booth. That's hardly a sign of commitment to MAP/TOP, however, since COS is one of two organizations (along with International Testing Institute, Ann Arbor, Mich.) designing and conducting conformance tests for 3.0 products. But adding DOD's GOSIP approval to the equation raises the stakes considerably.

"GOSIP is great stuff," says Tony Helies, president of Concord Communications, Burlington, Mass, a leading supplier of MAP-compatible modems and other devices.

"It's going to open my market to places that weren't available previously," Helies says. "When you've got the government approving the standard, it changes everything. Now vendors won't be reluctant to go ahead with products." And users just might have more money to spend on them.

Generating Confidence

"Having the government in here will mean more money in the system," says Chuck Gardner, MAP manager for Eastman Kodak, Rochester, N.Y., and chair of the MAP/TOP Users Group. "They're the biggest [IS] users. So that's got to generate more confidence, which will make vendors move more quickly.

"This is policy-level stuff. It's done. There's no

more discussion. Vendors who were dragging their feet on TOP, like those in the aerospace industry, won't do it anymore. They'll be rushing to fill procurements. That will help the commercial side because products will come out faster."

It's not only the government that's driving this train. Users helped their cause considerably with a MAP/TOP Steering Committee specification-stability policy statement. After saying it would manage the change process in a way that protects user investment in hardware and application code, the committee promised to ensure that all releases of the MAP specifications for at least six years will include mechanisms for interoperability with MAP version 3.0. Compatible additions will be reviewed annually for inclusion in future releases of the MAP specification. The first review will occur six months after release of the final 3.0 specification; the only changes allowed in the 3.0 specifications are errata changes.

"This is all coming together at just the right time," says Wayne Hanna, telecommunications manager for McDonnell Douglas Corp., St. Louis. "The government can turn the marketplace around, and it needs it because some vendors have been reluctant to commit to products. It gives users tremendous impetus. It's a very important sign that MAP/TOP is going to work.

"As DOD goes, so goes aerospace," Hanna continues. "With DOD approving GOSIP as the path to OSI, aerospace vendors have to begin to build those products. If you know that's where DOD is going, you're going to go there too. It's one thing for a vendor when the auto industry gets behind MAP/TOP. It's another when the government does." ■

BENCHMARKS

AT&T Embraces RISC

AT&T has agreed to license a RISC-like microprocessor architecture developed by Sun Microsystems that will support a version of Unix System V and incorporate features of the Berkeley 4.2 system and SunOS, which is Sun's version of Unix. The architecture, called SPARC (Scalable Processor Architecture), was introduced by Sun last summer and will serve as the basis for a new generation of AT&T computers that the company says is more than two years away. Support for the different operating systems will be accomplished via a standard operating environment under development by AT&T and called application binary interface (ABI). AT&T says ABI will merge the kernels of each environment and give developers access to Sun's Network File System.

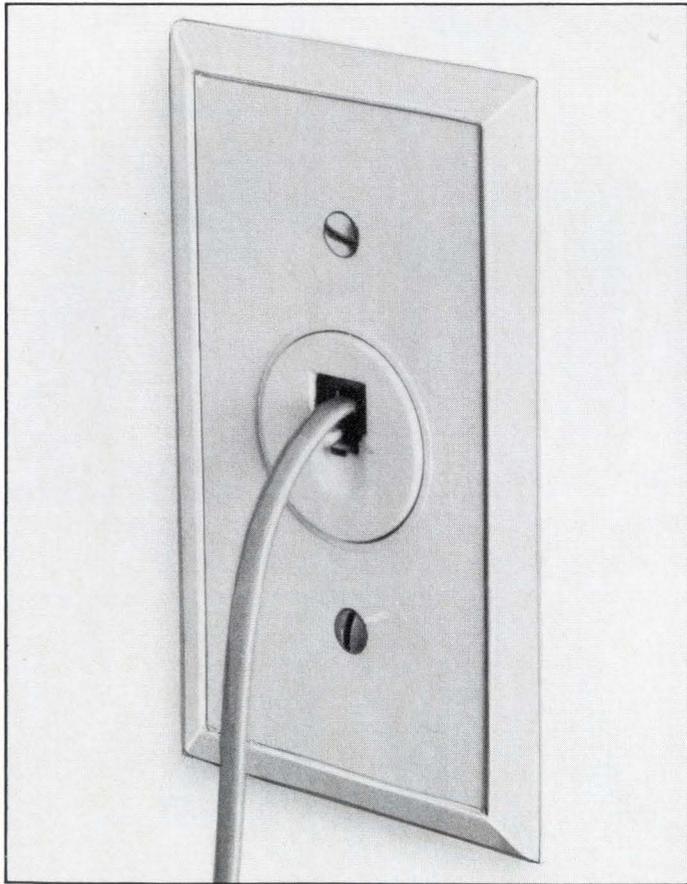
Data General Network

Nippon Telegraph and Telephone Corp. is funding Data General Corp.'s development of an integrated voice and data network. In addition to an unspecified cash contribution, NTT brings to the partnership a knowledge of the Japanese private network market. NTT also receives the rights to sell the network in Japan. The voice and data network will be available there early in 1989, to be followed by a U.S. introduction.

Merger

Informix Corp., the Menlo Park, Calif., database management software company, and Lenexa, Kans.-based Innovative Software Inc., which markets office automation microcomputer software, have announced their intention to merge. Under the terms of the proposed merger, which is a stock trade, Roger J. Sippl, founder of Informix, will become ceo and chairman of the combined company, which has yet to be named. ■

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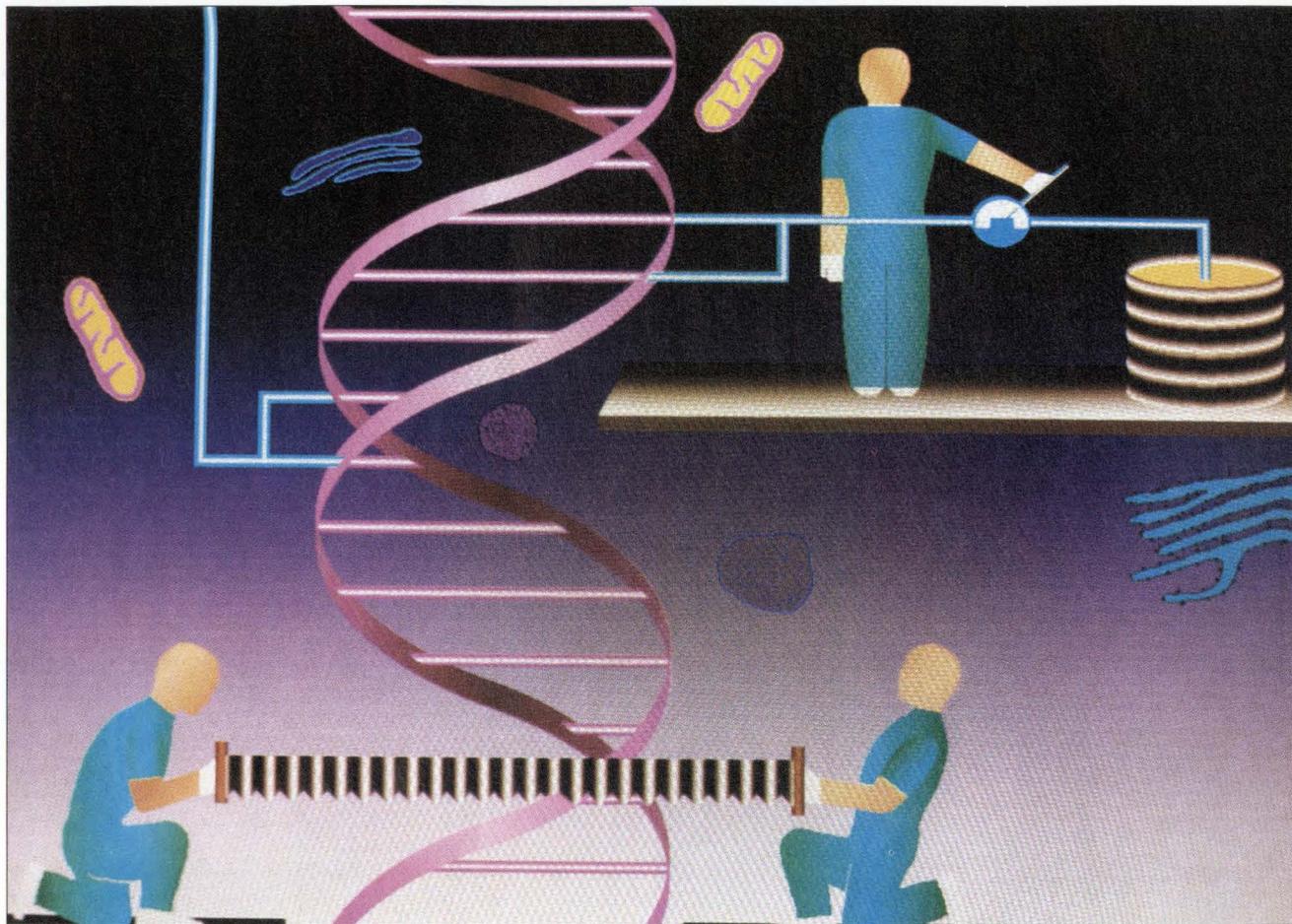
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Behind the News

MEDICINE



Building a Better Life

The era of computer aided molecular modeling dawns on commercial life science research, but obstacles still remain.

BY JEFF MOAD

Earlier this summer, researchers at Novo Industri A/S in Copenhagen, Denmark, announced a breakthrough discovery that could improve the lives of millions of diabetes sufferers around the world. Novo, a major supplier of insulin products, said it had managed to unlock and redesign the basic insulin molecule in a way that could significantly change the way therapeutic insulin acts when it is injected into the human body.

The discovery was important for a couple of reasons. First, the new redesigned, synthetic Novo insulin molecule could help diabetics by making injected insulin act more like the basal insulin secreted by nondiabetics. No longer

would diabetics have to put up with the side effects of injected insulin lingering in the blood too long after meals and continuing to soak up too much blood sugar.

Second, and almost as significant, is the technology used by the Novo researchers to design the new insulin molecule. The discovery was one of the first of its kind to take advantage of an emerging class of commercial computer aided molecular design and molecular modeling hardware and software tools. These tools are increasingly being used by biotechnology and drug companies worldwide not only to save research and development time and dollars but also to gain a better understanding of basic molecular structures.

Encouraged by the availability of

more affordable scientific processing power and commercially supported software, companies involved in everything from polymer-based materials development to recombinant DNA research are investing in in-house molecular modeling capabilities. As a result, computer hardware and software vendors are envisioning a new and potentially very large market. Today, analysts say, spending on so-called life science research reaches about \$23 billion a year. Little of that activity has been automated to date, but some vendors are hoping that once certain obstacles are cleared, the computer aided molecular design market's growth will parallel the computer aided mechanical design and computer aided engineering markets. End users are hoping to

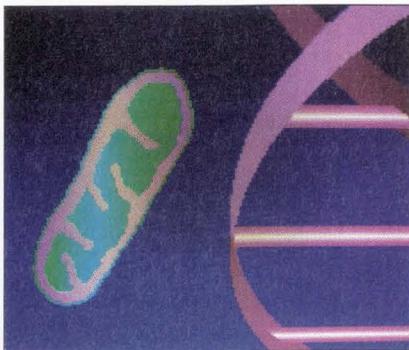
Behind the News

benefit more from new tools that will help them design and develop new drugs and chemicals faster, less expensively, and with more predictable results.

Drug and biotechnology companies actively building in-house computer aided molecular design systems include Cetus Corp. of Emeryville, Calif., Squibb, Upjohn, Merck, Du Pont, Novo, and U.K.-based Glaxo Group Holdings plc.

For the biotech and drug companies, much is at stake. In an industry where stock price-to-corporate earnings ratios of 400 are not unheard of, the discovery of a ground-breaking new drug can produce instant wealth. Thousand Oaks, Calif.-based biotech firm Amgen saw its stock rise over 200% earlier this year when it announced success in the development of a drug called EPO that could alleviate chronic anemia in patients with severe kidney disease.

According to Steffen Petersen, manager of protein engineering at Novo, "Any time you can save in research gives you an edge over the competition and is



tallography. Even with the use of modern 3-D computer graphics, this process can take a year. A series of random changes might be made to the molecule and the more promising new molecules then might be turned into compounds for screening and animal testing, at a cost of between \$5,000 and \$12,000 per compound. Researchers might also have built stick-and-ball models of the molecule to get a more complete three-dimensional idea of how it works. That could take another six months to a year.

Researchers are turning more to computerized molecular modeling and molecular mechanics techniques because they can reduce the randomness of the initial screening process, eliminate the need for ball-and-stick models, and allow researchers to focus expensive research procedures only on the new molecular structures most likely to produce results. According to Richard Feldman, a computer specialist with the National Institutes of Health, "There are lots of protein sequences people would like to know something about. That's what

Researchers then use molecular mechanics software, running on computationally intensive scientific computers, to predict what the molecular or protein reaction might be if a particular atom within the molecule were changed. That takes computing power because many molecular properties must be simulated, and because each molecule and molecular structure is constantly changing, vibrating and migrating at gigahertz speeds in practically infinite degrees of motion. Researchers say it can take hours of Cray supercomputer time just to simulate a few seconds of a molecule's life. The molecular mechanics packages use databases—or what researchers call force fields—of experimental data to simulate and predict how a molecule will respond when it is altered or combined with other molecules.

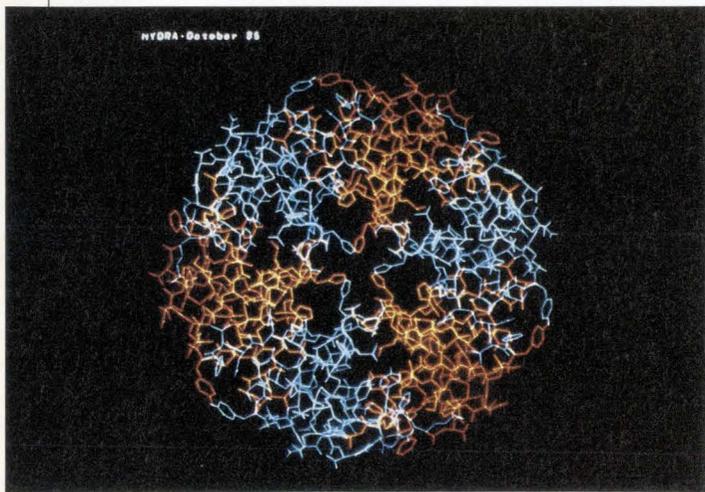
At Novo, the challenge was to change the synthetic insulin molecule so that, when injected, it acts like normal insulin. Both natural and synthetic insulin proteins are bound together in six-molecule clusters. But, while natural insulin is released into the blood one molecule at a time, synthetic insulin is injected into the blood in clusters. That means it takes time to break up, and is often active—soaking up blood sugar—long after it needs to.

The Novo researchers used molecular modeling to study the 51 molecules that make up the insulin protein and to pinpoint the sites on the molecules where changes would not reduce the insulin's effectiveness. Then, after simulating options with a molecular mechanics package running on a Digital Equipment Corp. VAX 11/785, the researchers decided to attach hydrogen atoms to the insulin molecules at key points to keep them from sticking together. It worked, and Novo's new product is now being tested on volunteers in Britain.

According to Novo's Petersen, "We feel our work with molecular modeling was a success. Now we want to see how far we can push it, whether we can have a reasonable degree of success with other proteins and enzymes. If so, we will probably acquire more hardware and software. Right now, we are thinking about upgrading our IBM mainframe to a 3090 with a vector facility to support more internal modeling."

The Era of Commercial Software

Computer aided molecular analysis and design isn't new. Until recently,



A computer-generated model of a human insulin hexamer molecule. Novo used the Hydra molecular modeling software from Polygen Corp. to generate the image.

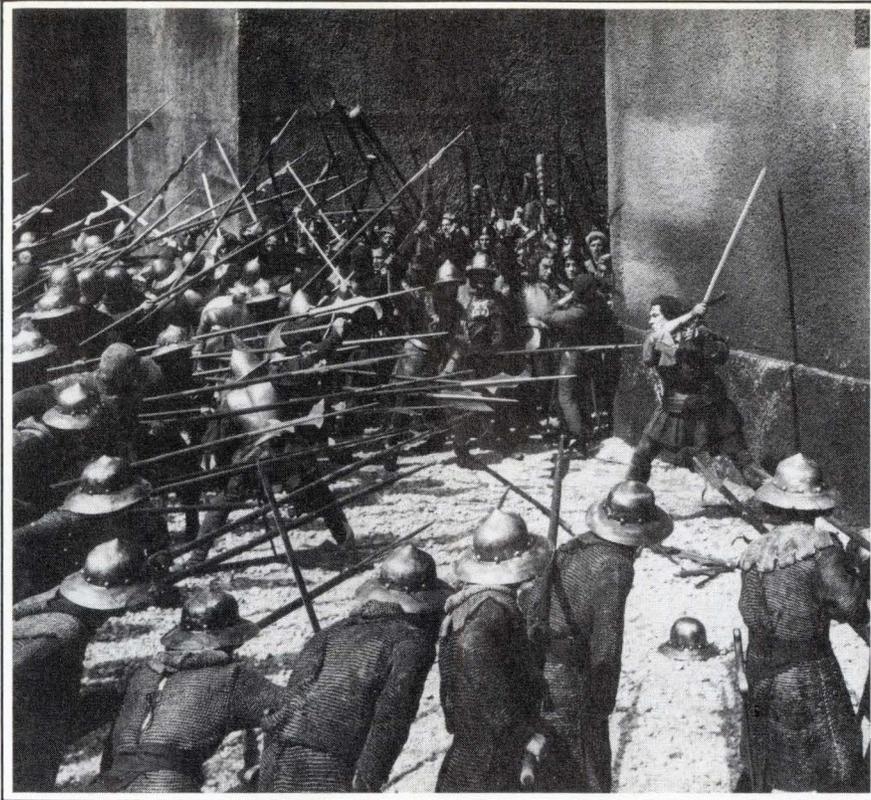
worthwhile achieving. The molecular modeling helps us save time. If we hadn't used it, we would have been operating in the dark in many ways."

Trying To Improve Experimentation

Before turning to computerized molecular modeling and molecular mechanics, Novo, like most drug and biotech companies, relied on tried-and-true experimentation methods. That meant first isolating and examining a molecule through a process known as protein crys-

tallography, rotating and scaling it in real time, attempting to determine by the molecule's structure how it is bound together and at what critical points it might be changed or broken apart.

Molecular modeling software and high-performance graphics systems allow the researcher to examine the picture of the molecule produced by protein crystallography, rotating and scaling it in real time, attempting to determine by the molecule's structure how it is bound together and at what critical points it might be changed or broken apart.



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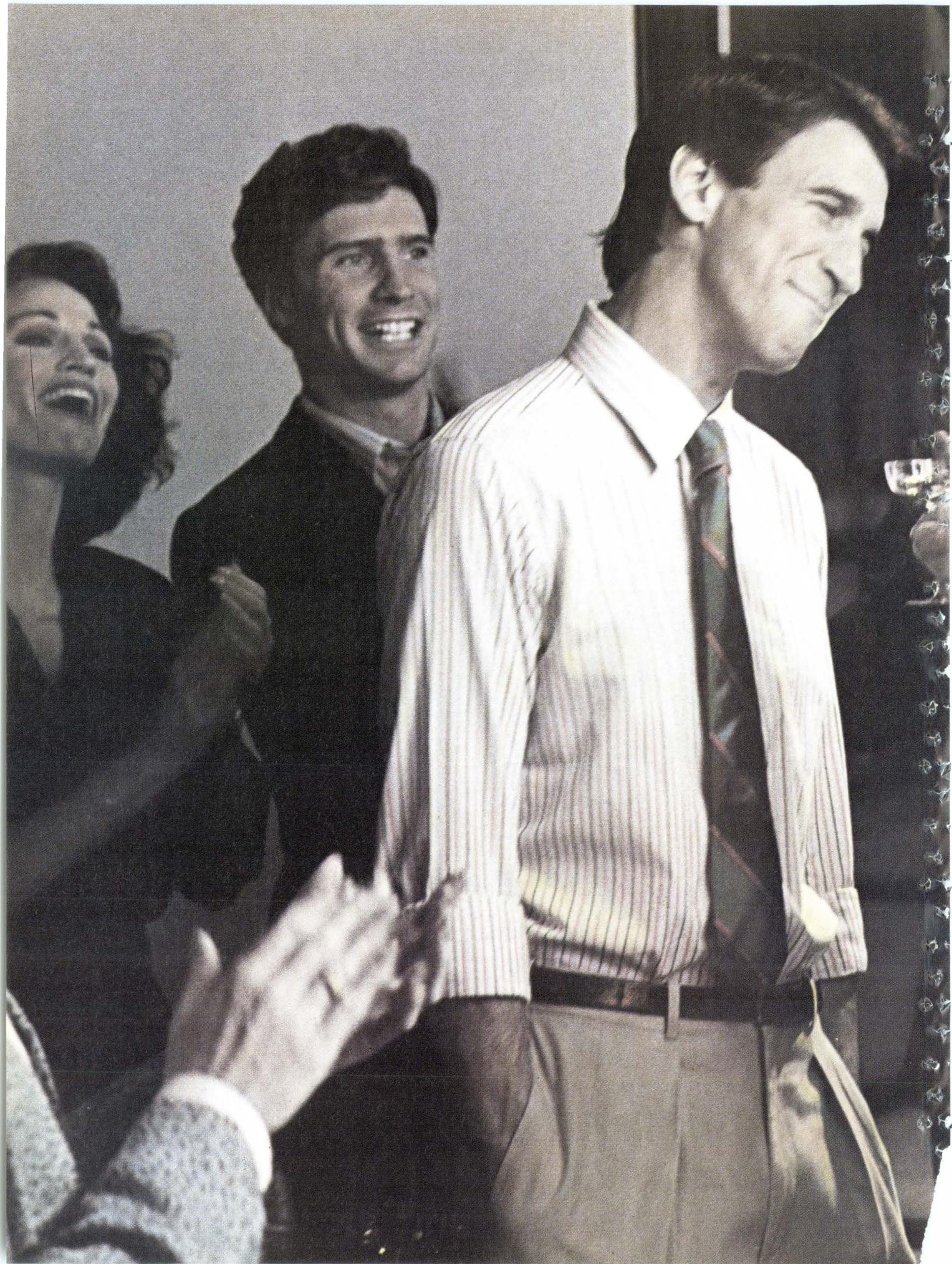
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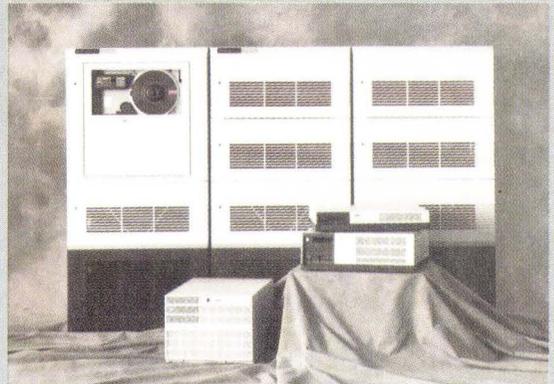




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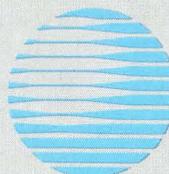
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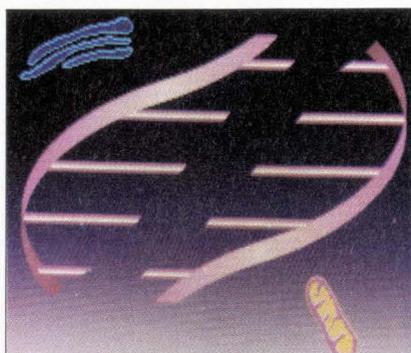
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Behind the News

however, it has been primarily the domain of universities and well-funded research institutes with access to a Cray supercomputer and the local talent to write original software or make use of other university-written software, most of which lacked much documentation, support, or easy-to-use interfaces. That has changed. Not only is high-performance hardware such as the Convex C1 or the DEC VAX cheaper, but raster and vector graphics displays are now better and, most important, molecular modeling software is now being commercially sold, supported, and adapted for the less expensive hardware.

A handful of new molecular modeling and mechanics software companies are leading the way. Polygen Corp., a venture-financed startup composed of biotech and computer industry veterans from DEC and Harris Corp., has licensed and is reselling software developed at the University of York in England. Biosym, a San Diego-based startup, is doing the same with software originally devel-



Most of these new software companies have added easy-to-use icon or menu-driven interfaces to the front ends of the molecular design programs. Their hope is to expand the number of computer aided molecular design system users from a handful of trained computational chemists to include the multitudes of commercial biological researchers. According to Jeffrey Wales, chairman of Polygen, "We figure life science researchers are now spending only about one half of one percent of their budgets to automate with computers. Based on models from other industries like computer aided mechanical design, they could be spending up to 8%. That would produce a very big market." Venture capitalists have invested \$6.5 million in Polygen in anticipation of that growth.

It hasn't happened yet, however. Market participants estimate that between the three top computer aided molecular design value-added resellers, combined annual sales are only about \$10 million. But there are plenty of signs the market could take off. At

Kalamazoo, Mich.-based Upjohn, there are a few researchers doing computer aided molecular design on graphics terminals tied into VAX clusters and an IBM 3090 200 mainframe with a vector facility. Eventually, however, officials at Upjohn hope to expand that. Greg Maggiora, director of computational chemistry, says, "I'm hoping soon to have 50 to 75 active scientific users of computational chemistry systems, including desktop-based systems."

Even some more conservative drug

companies that had previously shied away from computer aided molecular design are now getting involved. Until February of this year, executives at the Merrell Dow Research Institute subsidiary of Dow Chemical had "not been receptive to bringing in computers to do molecular modeling," according to group leader for chemical sciences Hershel Weintraub. But top management turnover and some success with molecular modeling at a Dow subsidiary in France changed all that. Weintraub was hired from Abbott Labs in Chicago to head up a new computer aided molecular design program based on a three-tier hardware approach with a VAX cluster, a MicroVAX, and IBM PCs. Already, Merrell Dow has spent \$1 million on the program, which is currently focused on peptide molecule research that could lead to cancer or blood pressure drug breakthroughs.

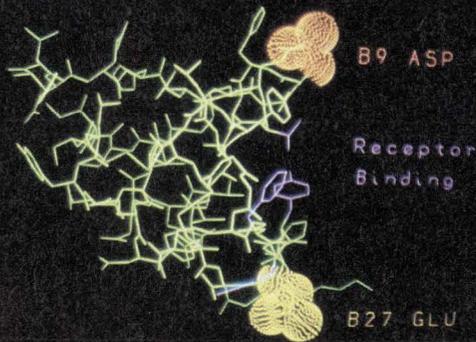
Investment Decisions Outside MIS

The decision by drug and biotech companies to invest in in-house computer aided molecular design is almost always made independent of the corporate MIS department. That is both good and bad news for researchers. The good news is that once the research department has convinced the board of directors to spend \$500,000 to \$1 million on the initial jump into computer aided molecular design, there's no waiting for MIS to sign off on the decision.

The bad news is that the research department is then often on its own in implementing the systems. As a result, says Polygen's Wales, "Researchers often don't feel well-treated by MIS." That is felt in a lack of supporting programming tools, database, e-mail, and text-processing services tailored for researchers, say users. "We're having a problem integrating software and communicating between researchers," says Du Pont's technical computer services manager William Giles. "Right now, we use what we call sneakernet. That's when somebody copies a file to a Macintosh, then hands the disk to somebody else. But we have no way to have researchers work on the same thing at the same time."

Some of the same companies selling computer aided molecular design tools are proposing to solve those research automation problems as well. Polygen recently introduced Centrum, described as an office automation system for chemical and pharmaceutical companies. Cen-

HYDRA-October 86



A computer-generated model showing the sites of chemical changes in new insulin molecules is depicted here. Novo also used the Hydra program to create this model.

oped at the University of California at San Diego. BioDesign Inc., founded in 1984, also is selling UCSD-developed software adapted for hardware from DEC, Alliant Computer Systems Corp. (Littleton, Mass.), Sun Microsystems (Mountain View, Calif.), and Evans & Sutherland (Salt Lake City). Another leading molecular modeling software company is Tripos Associates Inc., St. Louis, which earlier this year was acquired by graphics display vendor Evans & Sutherland for \$5 million.

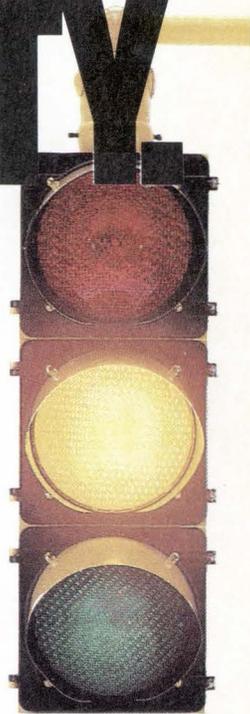
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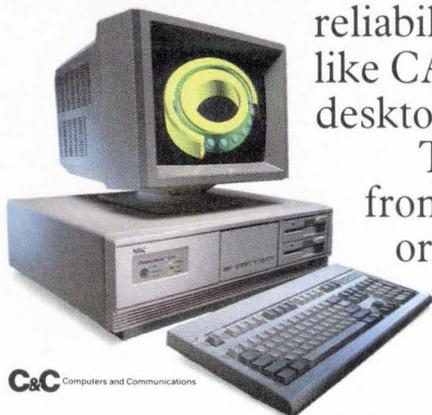
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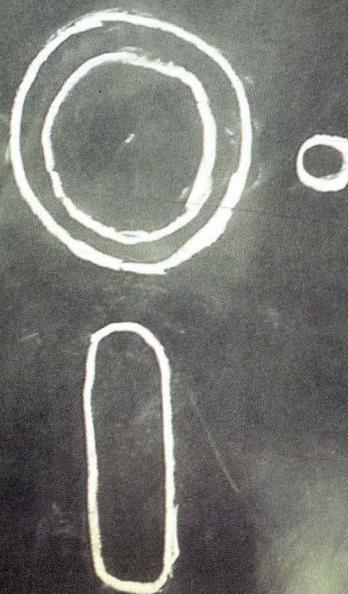
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trum incorporates molecular modeling and molecular mechanics packages in addition to providing common programming and user interfaces and services such as e-mail. Du Pont is currently beta testing Centrum. Molecular Design Ltd., a San Leandro, Calif.-based company, is offering a similar office automation environment for researchers.

It's not just commercially supported, easier-to-use software that's pushing biotech and drug companies to adopt computer aided molecular design systems in-house. The promise of ever-cheaper and easier-to-use scientific hardware is also having an effect. Already, many applications have migrated from supercomputers to VAXs or minisupercomputers like the Alliant, moving computing power a little closer to the user. Many users and software vendors expect that the next step to broaden the use of computer aided molecular design will be to put the compute power on or next to the researcher's desk.

A handful of new scientific workstations promise to do that. Sun Microsystems has introduced its 10MIPS RISC-based Sun 4 workstations for which some molecular modeling software companies are adapting their products. A couple of even more powerful workstations are under development at hardware startups Dana Computers of Sunnyvale, Calif., and Stellar Systems of Newton, Mass. Neither company has announced its product, but Stellar is understood to be working on a 20MIPS high-performance 40MFLOPS raster graphics workstation that will be able to support both molecular modeling and molecular mechanics applications. Dana's system is similar. Polygen has announced a joint development project with Stellar to adapt its software to the Stellar hardware. Dana is understood to be working with BioDesign.

According to Stellar marketing director Ian Reid, "These applications represent a perfect fit for our system, and they were among the key applications we had in mind in designing the product."

Putting Power in Users' Hands

New workstations such as the Stellar and Dana systems promise to improve individual researcher productivity by putting more computing power in the hands of more users. In computer aided molecular design, says Alan Richon, manager of computational chemistry for Glaxo, "These new workstations will

drive the technology out of the hands of technical experts to where it needs to go."

The new workstations should also solve another problem. By combining both graphics and high-speed computing in a single system, they may solve current bandwidth limitations that make life tough for researchers. Today, dedicated graphics terminals communicate with host scientific processors over buses like the VME bus at about 20MBps. The Stellar system will have internal bandwidth of "many hundreds of megabytes per second between all functional parts of the system," says Stellar's Reid.

There are other problems, however, that need to be solved. Researchers complain that in many respects mo-

lecular science has not kept up with scientific computer hardware and software advances. As a result, this is cutting into the usefulness of computer aided molecular design systems. Specifically, the force field databases that scientists need to predict how certain molecules will react when changed are far from complete. While some proteins like insulin are small enough and have been studied enough so that its force fields are well defined, researchers are in the dark when it comes to other more complex and less well-known compounds. Force fields are just now being developed for many very large carbohydrates, for example. The same is true for nucleic acids, the building blocks of the human DNA molecule around which much of the most exciting

And May the Force Fields Be With Them

As the use of commercial computer aided molecular design tools among biotech and pharmaceutical researchers spreads, one positive by-product might be the stimulation of basic biomolecular scientific research.

In order to make productive use of existing molecular modeling and molecular mechanics hardware and software tools, researchers need complete and verified parameters that tell them how molecules might be expected to react when modified or combined with other molecules. Such parameter sets—also known as force fields—predict such factors as the probable geometry of a new molecule and how much energy it might give off. So far, the establishment of such force fields has been the responsibility of universities and research institutions, some of which receive limited grants from the National Institutes of Health and other agencies.

The problem is that while parameters for some simple and well-known molecules have been developed this way, large gaps remain. Researchers know little about how some complex molecules are likely to react to changes or what the result of combining such large molecules might be. Without those force fields, the usefulness of computer aided molecular design tools—and the market for them—is limited.

Some hardware and software vendors as well as computer aided molecular design tool users are trying to fix that. The best-known effort has been organized by Biosym Technologies Inc. of San Diego, a computer-aided molecular design software vendor which a year ago formed a consortium of nine vendors and users to finance private force field development. The group, which includes Cray Research and ETA Systems, is focusing on developing a force field database based on first principles of scientific research and writing new software. Each member paid \$30,000 to finance the consortium, and officials expect the first consortium-developed software to be ready in mid-1988.

Researchers from the University of Houston and elsewhere also are reportedly considering taking their work outside the academic setting and starting commercial force-field development efforts.

The commercial force-field development ideal already has kicked up its share of controversy, however. Critics charge that it is dangerous to limit what had been publicly available research to only those few companies willing or able to pay for it. "The question is whether information of this sort shouldn't be available to all researchers," believes Biosym competitor Jeffrey Wales, who is chairman of Polygen Corp.

Organizers of the Biosym consortium answer that work done by the consortium will be published, but not until about six months after participating members get it. In the fast-moving, highly competitive biotech world, six months can make a big difference.

biotechnology research is centered. For that reason, researchers say, computer aided molecular design tools have made little headway so far in polymer or DNA research.

Some computer aided molecular design hardware and software vendors are attempting to fix that. They are trying to stimulate force-field development in a bid to accelerate the commercial acceptance of their products. Most active in this cause has been Biosym, which earlier this year formed a controversial private consortium to develop and test new force fields. Consortium participants, which pay about \$30,000 each to join, would have first crack at using the new force fields, after which they will be placed in the public domain, Biosym officials say. To date, participants include supercomputer vendors Cray Research and ETA Systems, in addition to users such as Abbott Labs, Du Pont, Merck Sharp, and Upjohn.

Biosym competitor Polygen initially was critical of the consortium, saying it is dangerous to use what should be public research for commercial advantage. Polygen's Wales has since backed away from that argument, saying it is unlikely the consortium will come up with discoveries of any scientific significance. Researchers themselves seem to approve, however. "If that's what it takes to get financing for these projects, then it's a good thing," says Feldman of the National Institutes of Health.

Meanwhile, although a number of researchers seem to be excited about the possible benefits of computer aided molecular design, most of them appear to be cautious when it comes to making promises about the technology when they are talking to upper management or outsiders. Unlike the Novo insulin researchers, most of the biotech and drug scientists who are using computer aided molecular design technology prefer not to give computers too much credit for biotech breakthroughs or to make specific productivity or cost-saving claims for the technology.

"We have to be careful not to oversell the technology," says Upjohn's Maggiora. "We don't want to go around saying, 'If we can just calculate some energy levels, we can design drugs with computers.' The fact is that the researcher is still at the center of the process, and that computers are tools. And those tools are more and more being integrated into the process." ■

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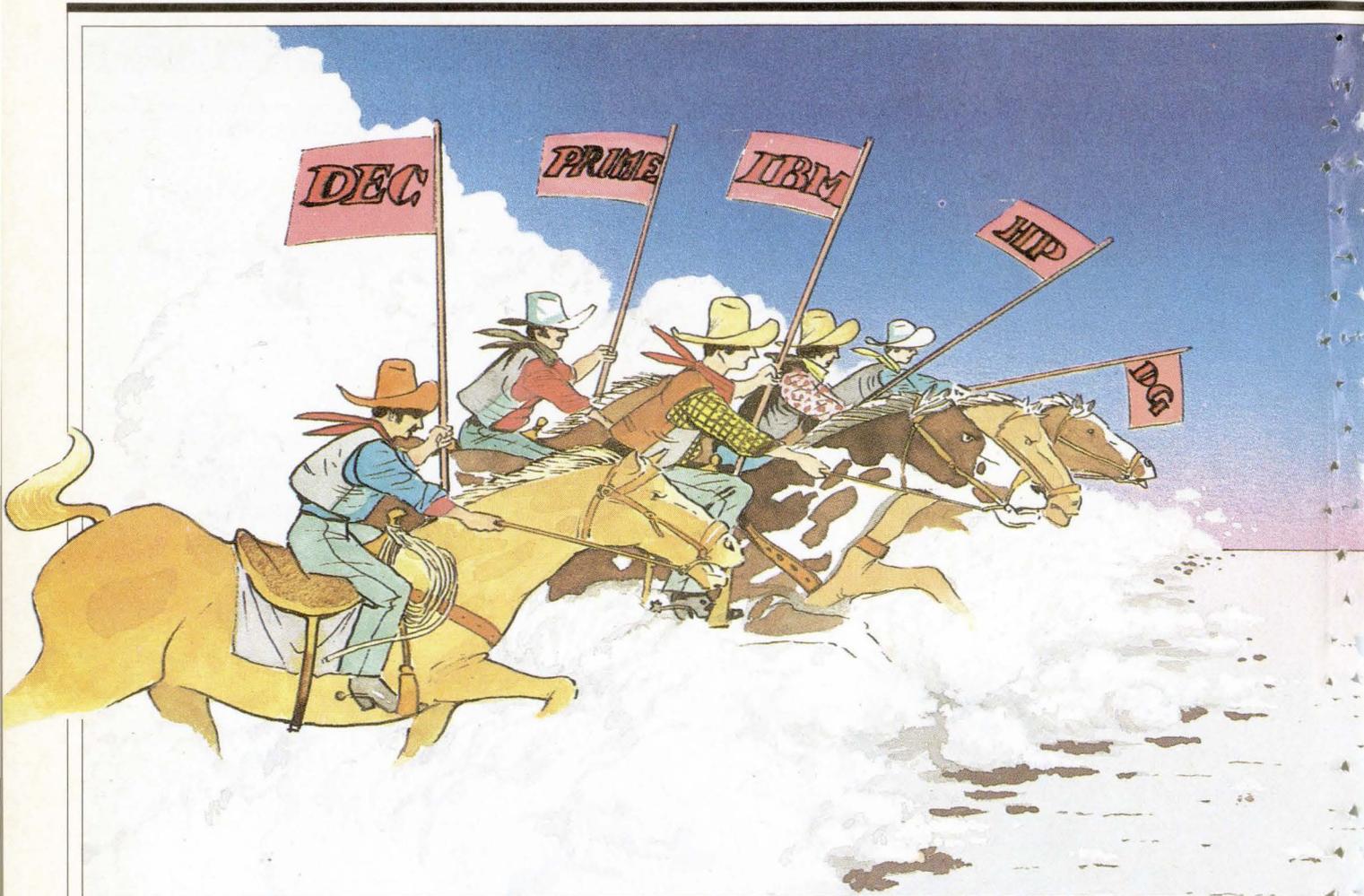
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Midrange Shootout:

A revitalized IBM, the Intel 386 micro, MS/DOS, PS/2, and Unix are the big winners in DATAMATION'S latest mini/micro survey. But the real action could come in a showdown pitting hot new workstations and pcs against minicomputer traditionalists.

BY RALPH EMMETT CARLYLE

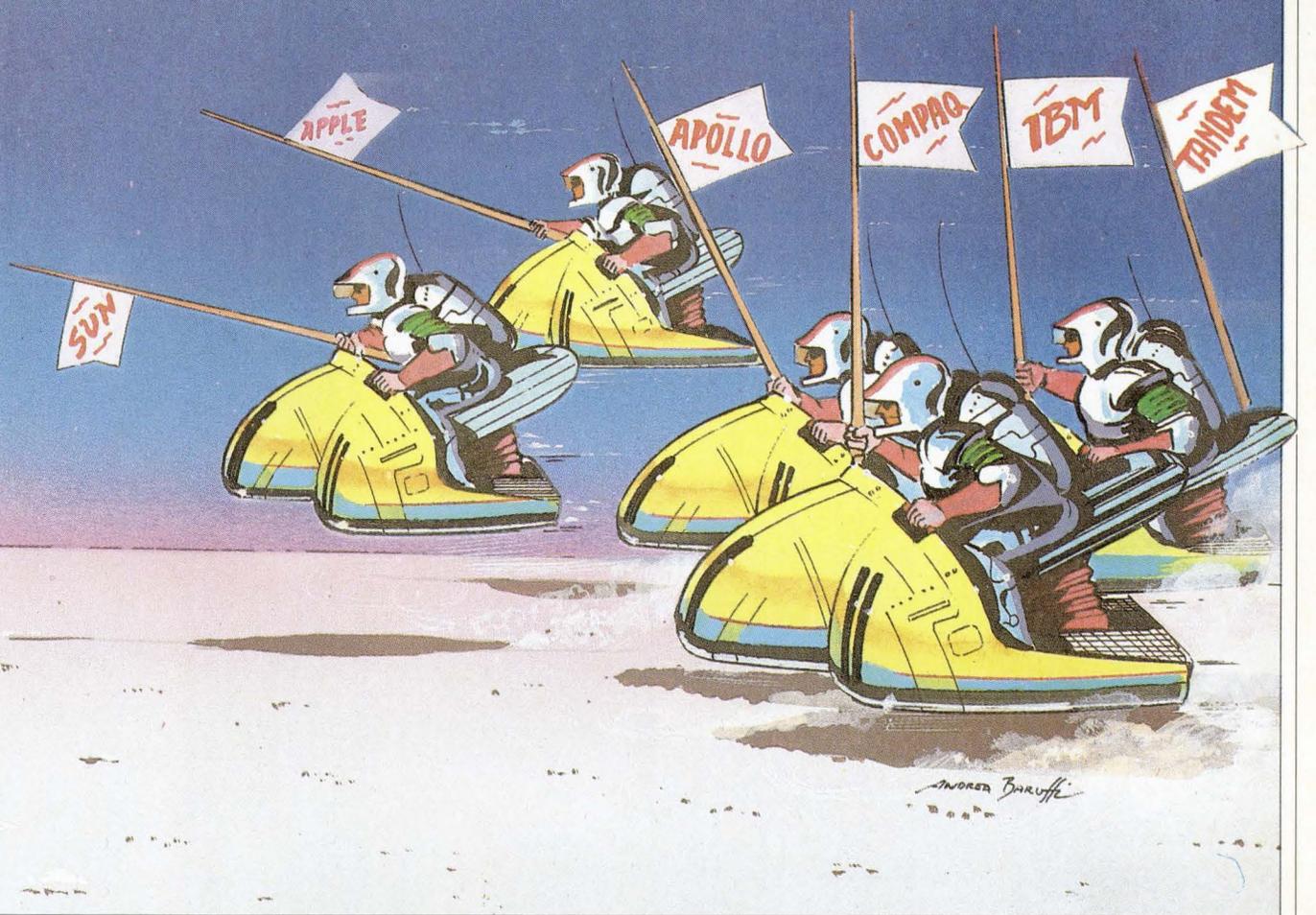
IBM, whose small and midrange systems have been wounded in recent years by clones and VAXs, may be on the mend. Big Blue appears to be the prime beneficiary of a resurgent demand in 1988 for small and mini-based systems. Sun Microsystems and Tandem also stand to grow more formidable next year as customers expand their workstation and on-line transaction processing applications.

These are among the trends that emerge from the 1987-88 DATAMATION/Cowen & Co. Institutional Services mini/micro computer survey, comprised of nearly 7,000 responses from U.S. end-user organizations—the largest known sampling of its kind by any business magazine or brokerage firm.

A number of trends point to a significant event: a showdown pitting workstations and pcs against minis. Projected

workstation shipments alone could grow an impressive 36.3% in dollar value during the 12-month period ending June 1988. (The survey defines workstations as powerful single-user or multiuser desktops, generally selling for over \$5,000 each.) The corporate pc market also will accelerate significantly over the same period, with unit growth climbing 23% during the year—much steeper than last year's 16% trek. The rapidly maturing minicomputer segment—collectively, the small business system, office system, and traditional mini—could experience a growth spurt of just under 10% during this period.

This year's survey sheds some welcome light on many controversial industry topics. Where IBM is the principal pc supplier, the survey finds that over 50% of respondents will embrace the PS/2 family of machines. But it's clear that two software standards, MS/DOS and the PS/2



Mini/Micro Survey

operating system, OS/2, will coexist for many years to come. That's because of the perceived "proprietary" nature of IBM's upcoming version of OS/2 extended edition and its Micro Channel bus.

IBM's new 370-compatible mini, the 9370, has been tagged the "VAX killer," but it has hardly nipped Digital Equipment Corp. to date; only IBM's very largest customers are interested in it so far, and the survey shows that only one of every eight that are evaluating the 9370 currently has plans to buy it. Next year, however, interest in the 9370 is expected to pick up—so much so that it could provide 30% of IBM's midrange revenues in 1988. IBM has begun to ship the machine in volume: 5,000 units worldwide in this quarter alone, insiders say, and considerably more next year. However, the 9370 does not appear to be attractive to more than a small fraction of DEC's customer base at this time.

Other "hot" industry topics are proving more mythic than real at respondent sites. For the second year in a row, the AI language Lisp failed to make any headway. There was also no growth from a year ago in the adoption of multiple or parallel processing machines—the "minisupercomputers." It's not clear whether the absence of a surge in minisupers results from a lack of confidence in the handful of startups, such as Convex and Alliant, that inhabit this sector or from the dearth of compilers that make these new architectures completely transparent to programmers. Once this bottleneck is removed, it would appear likely that this embryonic industry segment will grow rapidly.

Sun, Tandem Receive Good News

Several companies emerge from the survey smelling like roses. In general, Sun Microsystems, based in Mountain

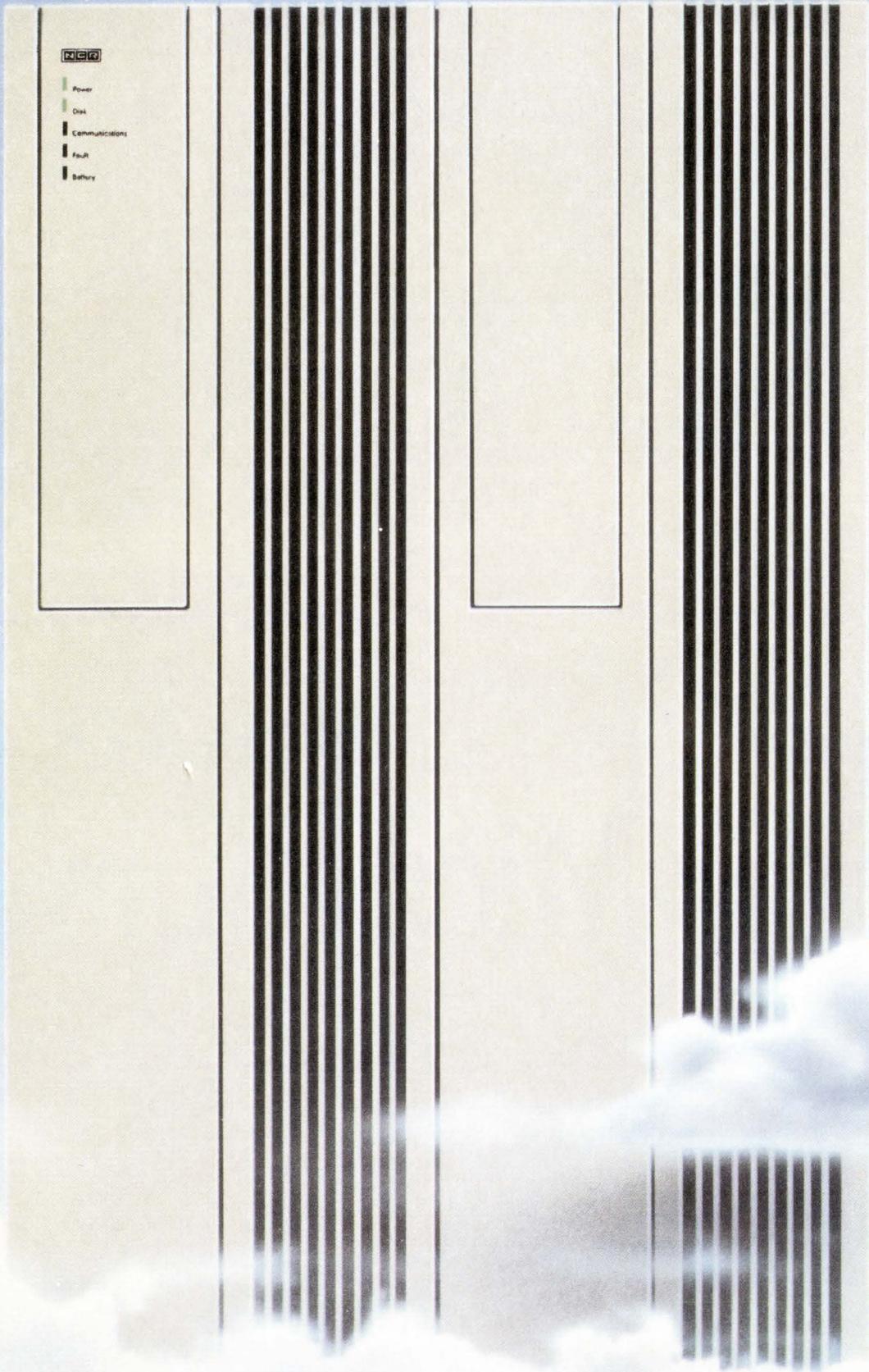
View, Calif., and Tandem, in Cupertino, Calif., seem to be the most improved. DEC was tops in customer satisfaction. In pc market share, Compaq managed to consolidate its strong number two position behind IBM.

Other companies send off mixed scents. Apple, for example, doesn't show any progress in personal computer unit shipments. Its share of the 143,000 machines to be shipped between July 1987 and December 1988 remains at 7%, the same percentage it had of the 123,000 pc shipments between July 1986 and December 1987. In Apple's favor, the number of sites buying its machines is climbing: 7% today compared with 5% a year ago.

Data General, Wang, and AT&T are suffering from severe credibility problems (see "Keeping the Faith"), according to the survey. The trio must reestablish themselves in the market-



- Power
- Disk
- Communications
- Fault
- Battery



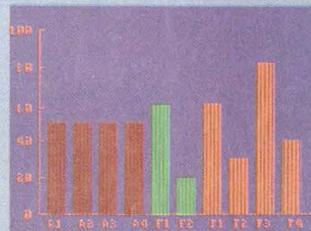
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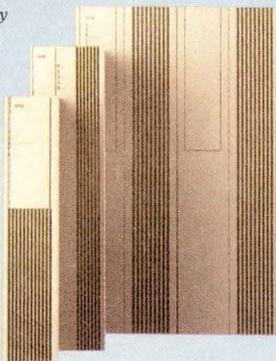
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FIGURE 1 Pcs Edge Out Minis in Small Office Applications

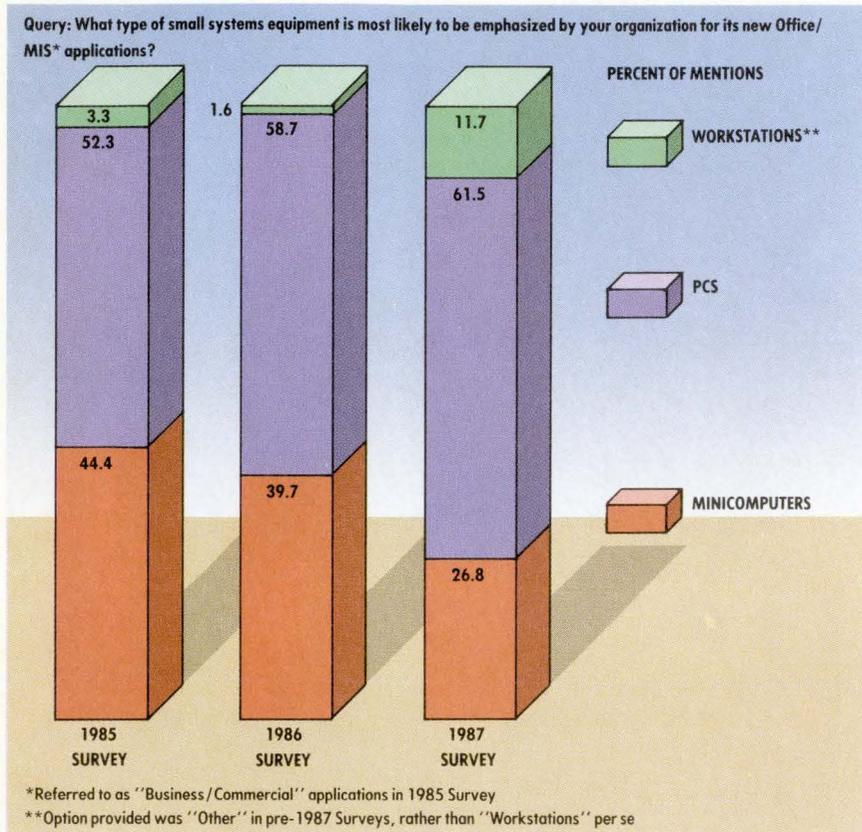
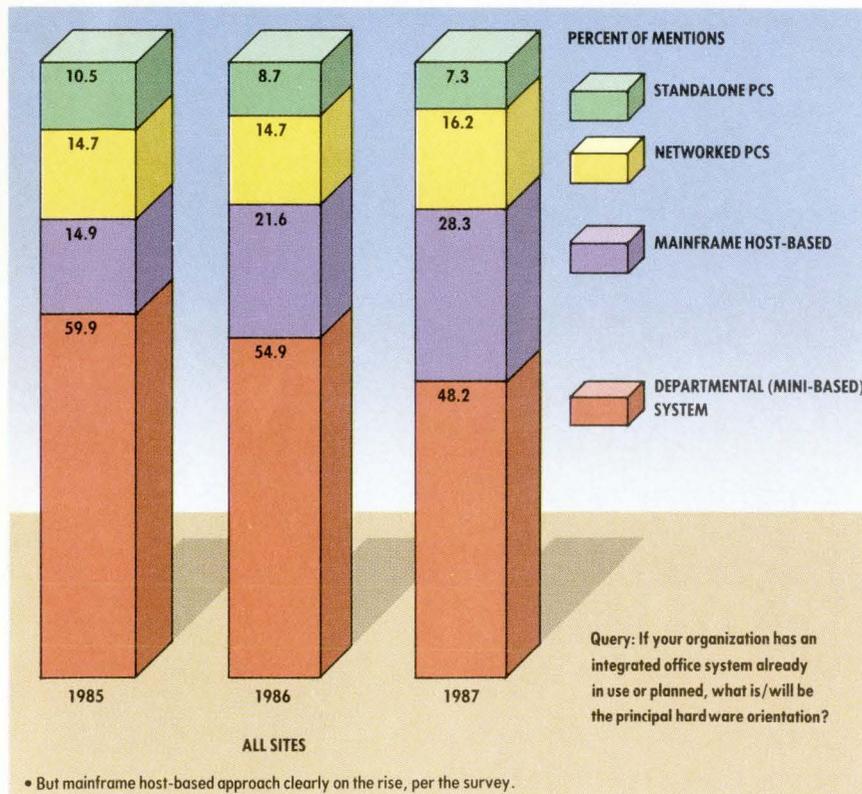


FIGURE 2 Desktop Power Expands at Minis' Expense



place. The same cannot be said of Hewlett-Packard, despite strong public criticism of its ambitious—and delayed—Spectrum program. The company's reputation and customer loyalty are apparently undiminished. Spectrum, especially as a Unix machine, is expected to be a strong player in the market. Hewlett-Packard, like Data General, is going back to its roots—courting oems and vars with aggressive price discounts. HP sees such alternate sales channels as major sources of future growth.

Despite DEC's stellar reputation with customers and its increasing share of the commercial minicomputer market, there are some ominous portents for it in the survey. The mini maker's oems and vars have grown dissatisfied with DEC's discount structure and its insistence on proprietary technology; their loyalty can no longer be taken for granted. DEC's preference for its homegrown VMS operating system is hurting it in workstation markets, in which, as the survey reveals, Unix has become a virtual standard and Sun Microsystems, not Digital, is the new leader.

Overall, there is a sense in the survey that even though DEC is now at the pinnacle of its success and seemingly untouchable, the company may yet become a victim of the pattern of growth and change that helped bring it to such prominence: the evolving trend of distributed processing.

The spending outlook is substantially better for pcs and workstations than it is for minis; DEC, however, has failed to make the transition to mainstream pc supplier. The survey reveals that only 2.7% of its own VAX customers will get their pcs from DEC; over 44% of their pcs will come from IBM during the 18-month period ending December 1988. As DEC continues to lose substantial dollars to noncaptive pcs, two questions arise: how long can DEC continue to forego the revenue opportunity of supplying its customers with attractively priced and featured pcs? (the company's VAXmate clearly doesn't fit the bill—only 35 sites intend to buy DEC's pc-compatible offering next year, whereas 55 sites expressed a willingness to buy it in last year's survey); and how can DEC justify spending heavily to remain compatible with IBM's emerging PS/2 standard—a drain from VAX R&D?

Unfortunately, as DEC prepares to meet this micro challenge, it's clear that the reservoir of new minicomputer users is drying up: there was only a 5% increase in new sites this year compared

with the 12% compound growth rate in the minicomputer population over the past eight years. So, while the shipment outlook for minis has improved in 1988 (and one shouldn't underestimate IBM's contribution), the long-term outlook is not so good.

Pcs Advance in Distributed Processing

Pcs are taking a bigger bite out of declining MIS budgets, and are beginning to replace minis as the preferred small systems vehicle for distributed processing. This trend is most apparent in the commercial arena. Figure 1 shows that the pc, at 61.5% of the sampling compared with the mini's 26.8%, is the overwhelming choice of IS managers and other respondents for their new office and MIS applications.

Figure 2 reveals a picture even more alarming for DEC. At these respondents' sites, pcs are creating an

**WORKSTATION
SHIPMENTS
COULD GROW
36.3% IN
DOLLAR
VALUE.**

increasing demand for mainframe-based services. This is something IBM has hoped for all along but hasn't been able to make happen because of its inability to offer the necessary database and communications links between the two. Now, with the advent of the PS/2, IBM has begun to supply such connectivity as part of its emerging Systems Applications Architecture (SAA) blueprint. IBM's growing network presence points to this trend: Big Blue is expected to double its share of planned LAN installations to 12.4% (see Figure 3).

Some of IBM's largest customers believe that as an increasingly intelligent network emerges between pcs and mainframes, a middle, or third tier, of mini-computers can become superfluous. IBM executives claim that half of the company's customer base has chosen this two-tier route, and this trend is certainly evident in Figure 2, from which it seems apparent that mainframes are beginning

FIGURE 3 Formidable LAN Suppliers Confront the Independents

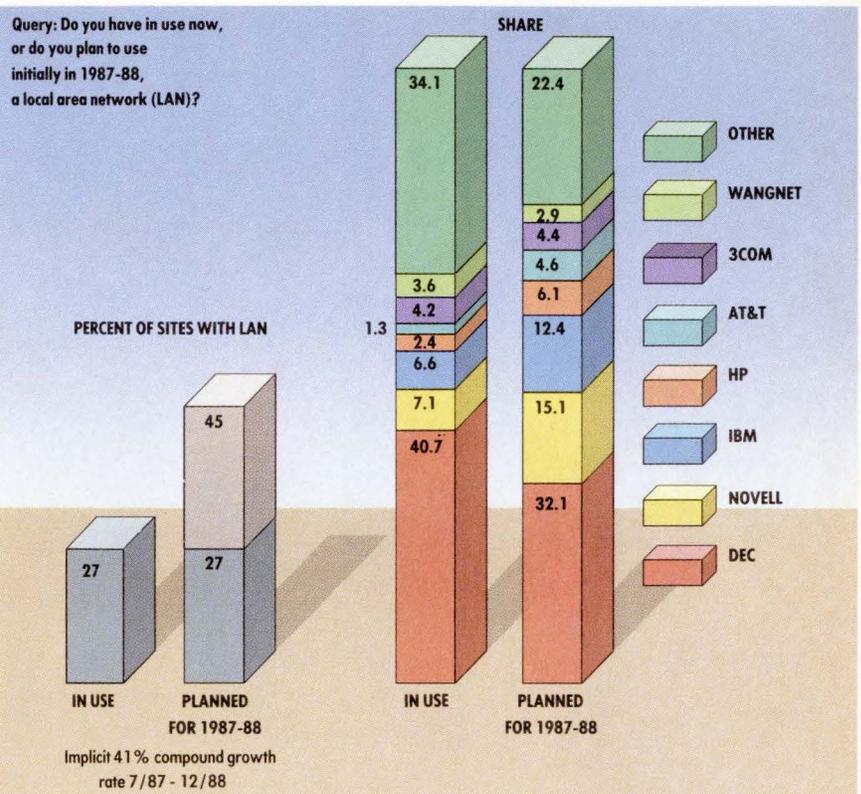


FIGURE 4 Unix Uniformly Gains as Primary, Secondary OS

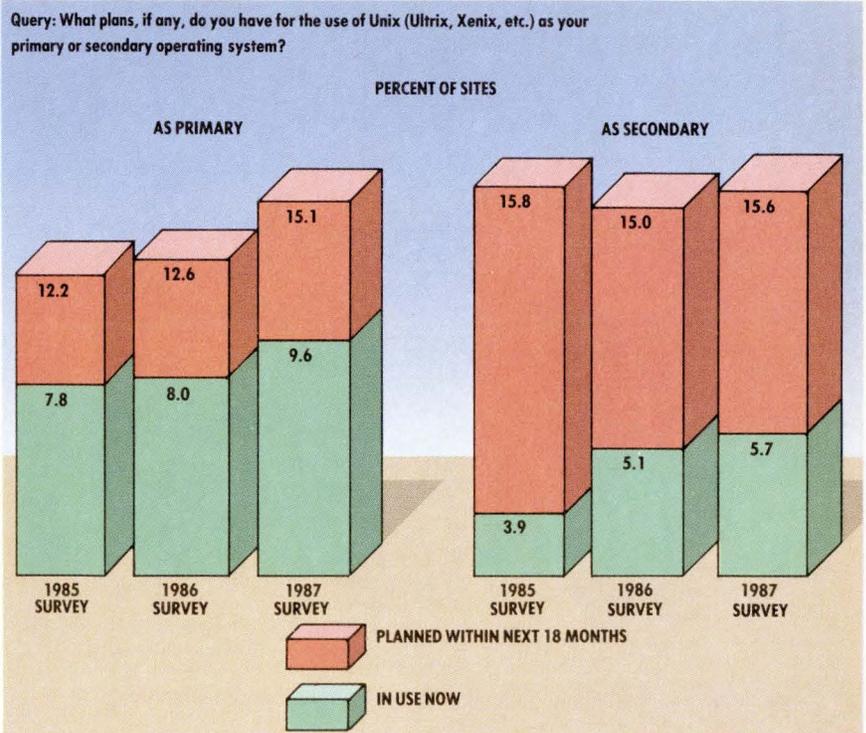
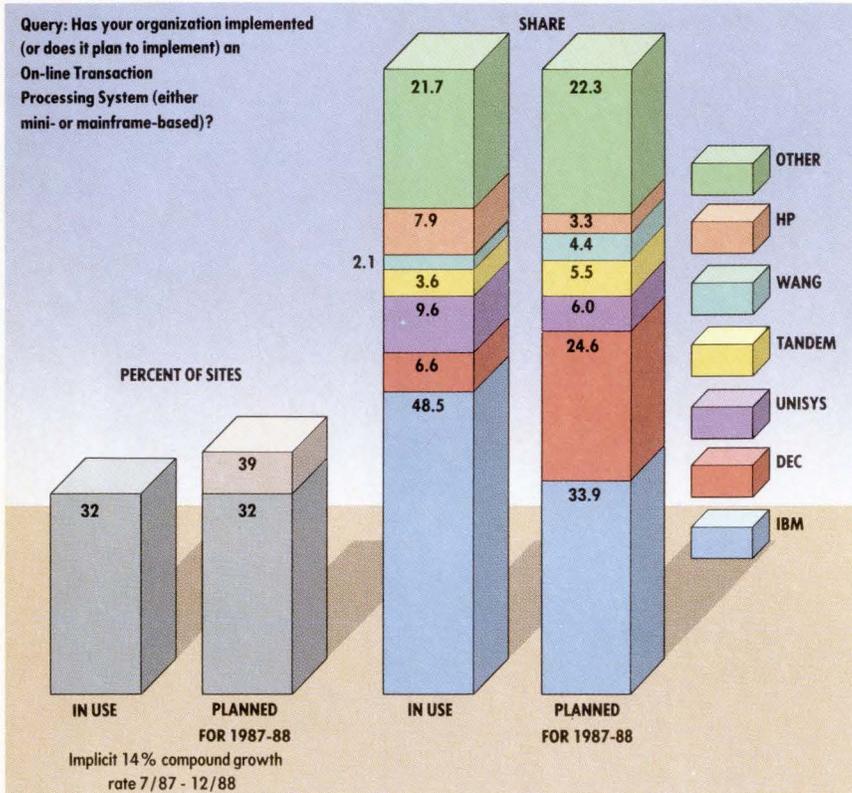


FIGURE 5 DEC Share of On-line Transaction Processing Market Improving Decidedly, Despite Lack of Product



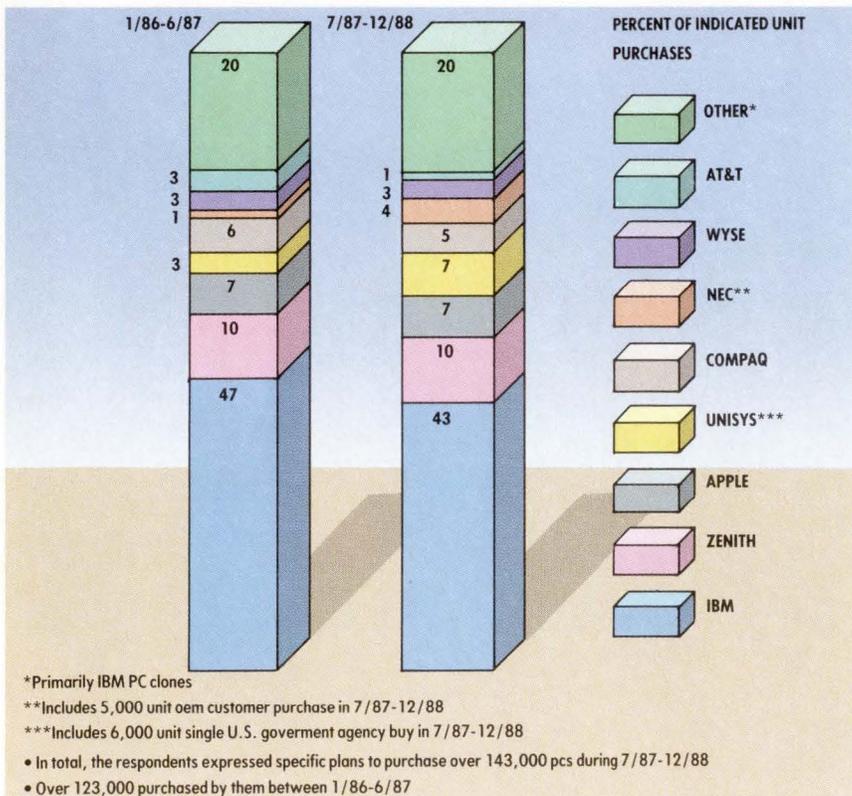
to replace minis as the host vehicle for new integrated office applications.

Future DATAMATION/Cowen & Co. surveys will show whether this two-tier phenomenon spreads beyond new MIS/office applications into technical and scientific markets. While customers in these markets are emphasizing dedicated engineering workstations over minis for new applications, they are also employing pcs to a greater degree than ever before. Compaq, which reinforced its strong number two position behind IBM in the pc survey, is already boasting that its new Intel 386-based machines have been benchmarked at whetstone levels comparable to workstations from Sun, Apollo, and DEC.

The other issue that DEC's management faces is the increasing adoption of Unix as the portable OS standard for

**IT'S CLEAR
THAT MS/DOS
AND OS/2
WILL COEXIST
FOR YEARS TO
COME.**

FIGURE 6 Distribution of Respondent Pc Unit Purchases



small and midrange systems (see Figure 4). By the end of 1988, 14.5% of DEC's customers will have some flavor of Unix as their primary operating system, and 21.2% will have it as their secondary choice. As these customers aren't effectively "locked in" to DEC's proprietary technology, they will provide fair game for competitors. In fact, one major reason for IBM's support of Unix is that it provides an entrée into DEC's technical market and its customers.

DEC, of course, is not sitting still while these threats materialize. If the mini maker is losing its grip in some markets, it can always gain a foothold in new ones; if IBM can gaze hungrily at the VAX world, DEC can in turn target the mainframer's own customers. Tandem, which recently broke through the \$1 billion a year sales barrier by selling distributed on-line transaction processing (OLTP) systems to IBM's customers, has provided DEC with the perfect precedent.

As Figure 5 shows, DEC's customers now are widely anticipating the

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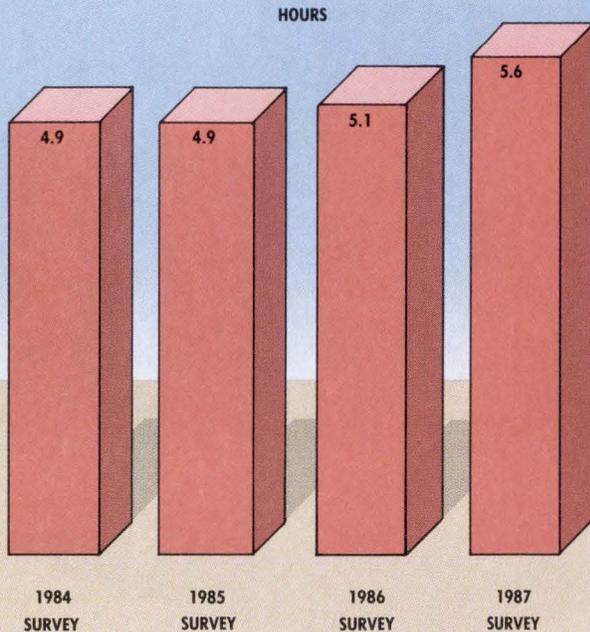
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FIGURE 7 End Users Spending a Half Hour More a Day on Their PCs

Query: How many hours per day, on average, do you make use of your pcs?



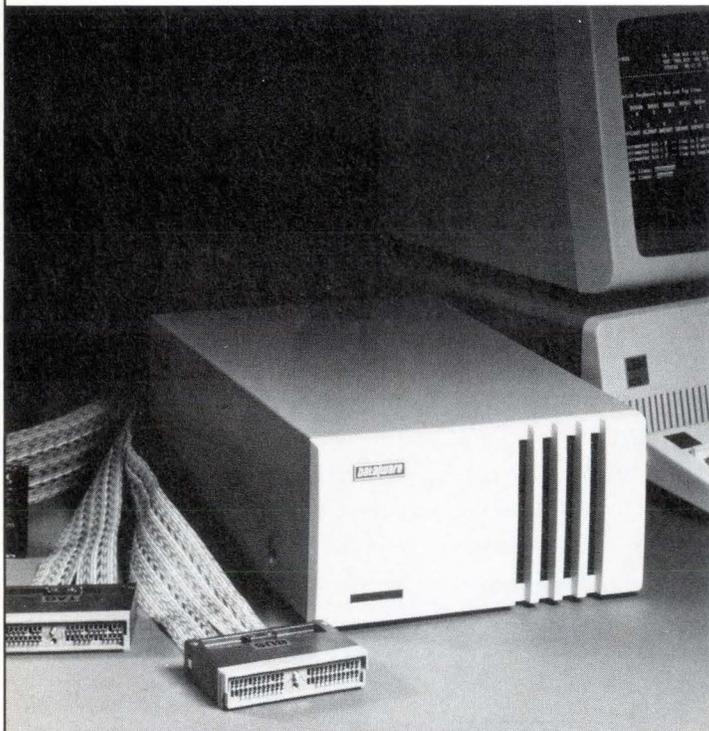
Midrange Shootout

announcement in the near future of a VAX-based OLTP challenger. DEC is expected to capture 24.6% of the respondent sites implementing OLTP systems during the survey period, up substantially from the current 6.6% level. IBM's share is projected to decline to 33.9% of the total from 48.5%, which perhaps explains the company's increasingly aggressive marketing of the Stratus fault tolerant OLTP system, which Big Blue calls the System/88.

DEC sources indicate that the company's creation of a new I/O-intensive VAX architecture for OLTP should result in a product next year. Survey respondents are demanding fault tolerant capabilities on this machine, and one must assume that DEC will accommodate them.

Since DEC's fortunes have soared in recent years while IBM's have declined, it's perhaps to be expected that when the industry leader did make a comeback it would be at DEC's expense. John Akers may, in fact, be taking business from Ken Olsen. Then again, the IBM chairman may be taking it from the likes of Edson de Castro, An Wang, and other executives

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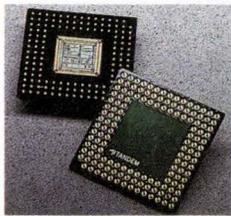
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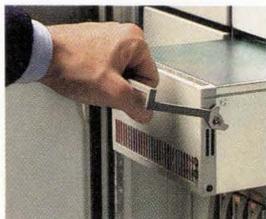
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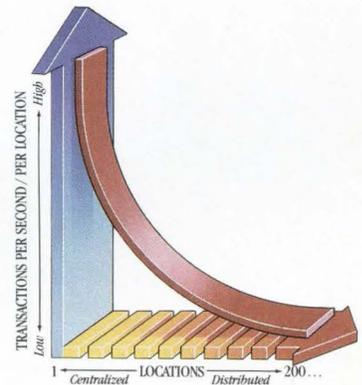
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Midrange Shootout

of second-tier computer vendors. The answer depends on how this year's survey data are interpreted.

IBM's Fortunes Changing in Minis

In recent surveys, IBM has been a poor second to DEC in projected spending for minis and workstations. In stark con-

trast, this year the mainframer could grab the lion's share of all dollars that respondents expect to spend on such systems over the 18-month period ending December 1988—if one counts a humongous IBM mini order from the U.S. Postal Service, one of the respondents to the survey. Including the postage stamp, the

survey projects that IBM's share of total mini/workstation dollars will be 35.6%, compared with DEC's 33.1%. IBM, with its System/88, System/36, and 9370, has three of the top six dollar earners in this category.

If, however, the Postal Service's response is put in the dead letter file, IBM's resurgence in minis will come at the expense of vendors that can least afford competition from Big Blue—Wang Labs, Data General, and others. Excluding the postage stamp, the portion of mini/workstation spending that will go to IBM is expected to increase to 18.2% from 14.7%. But Big Blue's bigger bite clearly won't come out of the hides of DEC, Hewlett-Packard, Sun, Prime, or Tandem.

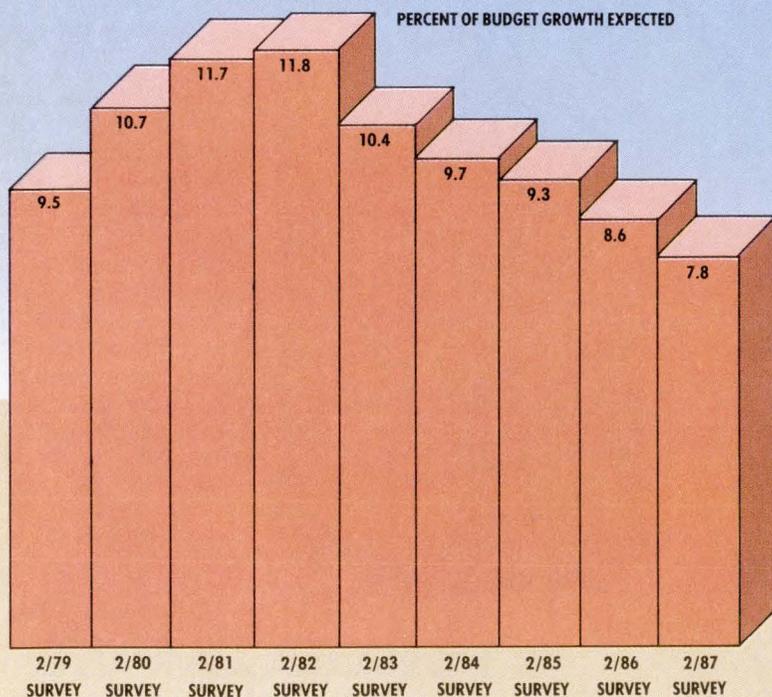
Not surprisingly, IBM's projected share of the pc pie over the same 18-month period is even more pronounced. Of the 143,000 pcs that respondents ex-

FIGURE 8 MicroVAX Leads Top 12 Systems to be Acquired

1/86-6/87	7/87-12/88	CHANGE
IBM System/36	DEC MicroVAX, Unspecified	+
DEC MicroVAX II	DEC MicroVAX II	NC
DEC MicroVAX, Unspecified	IBM System/36	-
HP 3000 Series, Unspecified	DEC VAX, Unspecified	+
DEC VAX 8200/8250	IBM 9370, Unspecified	New
DEC VAX, Unspecified	DEC VAX 8200/8250	-
IBM System/38	IBM System/38	NC
Wang VS/65	HP 3000 Series, Unspecified	-
AT&T 3B2	DEC VAX 8500/8530	+
HP 3000 70	Wang VS/7000	New
DG MV/2000, DC	DEC VAX 8300/8350	New
DEC VAX 8500/8530	DEC VAX 8700	New

FIGURE 9 Continuing Decline in Long-term Hardware Budget Growth Expectations

Query: At what average annual rate do you expect your hardware budget to increase over the next 3 to 5 years?



**DIGITAL CAN
NO LONGER
TAKE OEMS'
AND VARS'
LOYALTY FOR
GRANTED.**

pect to purchase between July 1987 and December 1988, IBM is projected to supply 43% of them (see Figure 6; IBM insiders now claim that there is a 160,000-unit backlog of PS/2 orders from its largest customers, with names such as Ford, United Airlines, Travelers Corp., and Merrill Lynch). The other portions are primarily held by IBM PC clones, with none having a share greater than 10%. DEC, of course, is not a factor in this table.

DEC's share of minis planned for use in scientific, engineering, and factory applications will decline to 53.9% from 59.7%. The big gainers here are Hewlett-Packard, Sun, and IBM, though none had more than 10% of the market.

DEC is still the big winner in office minicomputers. Its share of total dollars over the 18-month survey period is projected to grow to 29.4% from 22.4%, while IBM's share declines to 21.9% from 27.4%. A growing number of respondents are turning away from minis for office/MIS use, preferring instead a com-

Keeping the Faith

Today, minicomputer suppliers are in a situation similar to the one that developed a generation ago in the mainframe industry. Digital Equipment Corp. and IBM are putting distance between themselves and other mini suppliers in the same way that IBM sped away from the mainframe pack in the late 1960s. It's not the BUNCH being left behind in the mini race, but a new cast including Hewlett-Packard, Prime, Wang, Data General, and AT&T.

IBM and DEC are to take almost 70% of the dollars respondents spend on minicomputer and workstation products in the June 1987-December 1988 period, according to DATAMATION/Cowen & Co.'s latest mini/micro survey. Just five years ago, IBM and DEC accounted for 53% of the mini purchasing power of end users surveyed.

The gap between the leaders and the laggards has widened gradually in some cases and precipitously in others. Hewlett-Packard, for instance, shows no erosion in its 5.3% market share between the previous 18-month stretch and the current one. Prime suffers a drop between the two buying periods to 4.7% from 5.3%, Wang tumbles to 3% from 9.2% and Data General slips to 2.3% from 3.4%; AT&T nearly disappears off the horizon. (The telecommunications giant acknowledges that its guns were silent for a 20-month period between 1985 and 1987, but it claims that almost 70% of this year's revenues are from products that are less than a year old. Even so, insiders don't expect AT&T's Data Systems Div. to break even until 1989.)

Tracking the actual models that customers expect to buy, Figure 8 shows this shrinking minicomputer universe in another light. Six vendors supplied the top 12 minis based on the number of respondents acquiring systems in the survey period January 1986 through June 1987. That number is down to four; by dollar value, only IBM and DEC are visible. Almost half of all sites polled say that they now consider only one supplier when making their minicomputer purchase decision.

Add to this the fact that IS budgets continue to grow at ever smaller rates—less than 8% in 1987 compared with the 11.8% reported in 1982 (see Figure 9)—and the mini BUNCH has a major headache.

If you go into greater detail, these companies' outlook is even gloomier. In office/MIS, the biggest market of all for minis, the survey projects Wang's share will decline to 7.6% from 12.1% and Data General's to 4.8% from 7.8%, with Prime's share staying about the same. Other than DEC, only Hewlett-Packard will gain ground, climbing a single percentage point to 6.2%.

In the other large market segment, scientific/engineering/factory, Data General and Wang are nowhere to be seen, and Prime will eke out a tiny 3.1% of the pie, in what is that company's major market segment. Here, all the mini makers are losing out to the workstation and to Unix. Only Hewlett-Packard, with its increased Unix/workstation orientation, is making progress in this sector among the mini BUNCH: its share could rise to 9.7% from the 4.3% in last year's survey.

In the highly competitive and fast-growing workstation sector, again, only Hewlett-Packard is expected to uphold the honor of the mini BUNCH, doubling its share to 10%. The rest are in the category of "other," as Sun, Apollo, and, of course, IBM and DEC, dominate the scene.

If the pc is set to become the workstation of the future in all markets, then once more it's a future in which the mini makers will play little role—if any—building, and here, even the mighty DEC must be included. Only Wang and Hewlett-Packard have had any success in selling homegrown pcs to their own customer base. DEC and Data General (despite the huge marketing push behind its portable computers) have been notable failures.

Even more depressing, in a sense, is the mini makers' performance in the high-growth sector of integrated office automation systems, a segment where so many of the mini BUNCH have tried to make a stand, and which has been the cornerstone of both Data General's and Wang's reputations. All mini makers—including DEC—are losing out to IBM and to an increasing two-tier blend of pcs and mainframes.

The projected erosion of Data General's base is the most spectacular. The company's share could decline to 6.6% from 13.5%; Wang's to 6.8% from 7.9%. Again, only Hewlett-Packard is expected to increase its share a touch. These depressing statistics perhaps explain why Data General seems to be embarking on a new strategy of courting oems, vars, and systems builders, rather than end users—a return to its roots. The survey shows that along with Hewlett-Packard, DG is offering huge price concessions to these middlemen in an attempt to shift its strategic course. Of course, as the survey makes plain, oems are a fickle bunch and are even turning on DEC.

All in all, there is the impression that these companies, with their proprietary technology and large installed bases, are giving way to a new industry standard platform for applications development: a combination of the Intel 386 (the overwhelming first choice micro in the survey), MS/DOS, and, increasingly, OS/2 and Unix—predominantly AT&T's flavor. Prime is trying to meet this trend with its new supermicro, the EXL 316: a combination of the Intel 386, DOS, and Unix. Based on the principle "If you can't beat 'em, join 'em," Hewlett-Packard is primarily succeeding with Spectrum as a Unix machine.

Overall, however, the mini makers, perhaps overwhelmed by the rate of evolution to micros, are seeking the sanctuary of their own base, and of mainstay high-margin products. This is reflected in all of these companies' shipment projections.

Around 47% of Prime's dollars will come from its high-end 6350 (up from 16%), a product that typically sells for an average of \$450,000. Likewise, almost 57% of Wang's dollars will come from a single high-end product—its \$380,000 vs7000. More than 55% of Data General's revenue from respondents will come from its high-end MV 15000, only this time the average purchase price for this machine—\$150,000—is not as high as the other New England challengers' entries. The same principle seems to apply for Hewlett-Packard as Spectrum ramps up. Its aging 16-bit 3000 series family will decline to 42.4% of its total from 72.5% as Spectrum grows to almost 31% from virtually nothing.

To succeed in the future, these companies will have to do more than retrench into their own customer bases, offering products that are increasingly like mainframes. They will have to convince everyone that the mini can play a vital, vibrant role in the industry's evolution. They will have to prove that the hemorrhaging of applications to micros can be checked. Clearly, the jury is still out on the eventual outcome of these efforts.



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Survey Method

The 1987-88 DATAMATION/Cowen & Co. mini/micro computer survey began July 13, 1987, when close to 70,000 questionnaires were mailed to DATAMATION readers throughout the United States. The survey audience was selected on the basis of whether minicomputers, small business systems, or micro-based systems were purchased or in use at a given site.

Replies, collected through Aug. 24, yielded 6,589 qualified, unduplicated responses. Cowen & Co., a Boston brokerage house, tallied results, analyzed data, and presented its findings to institutional investor clients on Sept. 29.

The survey defined minis as including cpus such as the DEC PDP-11, MicroVAX, and VAX 8XXX lines, and comparable systems from Data General, IBM, Hewlett-Packard, Prime, Tandem, etc.; minisupercomputers; mini-based departmental and small business systems; office systems; and workstations. The latter are single-user or multiuser desktop systems, generally priced above \$5,000 each; typical examples are products from Apollo, Sun Microsystems, and the IBM RT PC and PS/2 Model 80. Pcs are single-user systems, desktop or portable, including the Apple II and Macintosh, IBM PC and PS/2, and Compaq. To order the complete survey results, please call Debbie Virtue at (617) 964-3030.

FIGURE 10 Vendor Selection Rests on Quality/Reliability
Responses rank-ordered by frequency selected (1987 Survey ranking/1986 Survey ranking)

FACTOR	END USER, OWN USE
System Quality/Reliability	1/1
Prior System Compatibility	2/2
Vendor Reputation/Financial Strength	3/3
Applications Software Packages	4/4
Price	5/6
Cpu Performance	6/5
Field Maintenance Support	7/7
Operating System Software	8/9
System Modularity/Expandability	9/8
Networking and/or Clustering Capability	10/10
Fully Integrated Systems Line	11/11
Strong Unix Offering/Standards Orientation	12/12

FIGURE 11 Key Criteria For Selecting A Pc Supplier

PERCENT OF MENTIONS*	ALL SUPPLIERS
Price	22.8
Software Availability	7.2
Networking Capability	4.0
Service/Support	10.1
Features	3.1
Product Reputation	16.3
Compatibility	17.4
Speed	2.9
Supplier Viability	5.2
Other†	11.0

*Each respondent asked to specify no more than three criteria.

†Includes hardware availability, ease of use, expandability/upgradability, government/company contract, size/portability, graphics display, memory/disk capacity, etc.

bination of mainframes and pc/workstations.

In the highly competitive workstation business, DEC stands to receive 22.3% of the total dollars, an increase over last year's 18.9%. The big winner in this category, however, is Sun Microsystems; its share could leap to 24% from 15.3%. Other gainers are HP and IBM, while Apollo's share is expected to decline to 10.5% from last year's 12.4%.

Personal computers and workstations are becoming the machines of choice for many applications that were once performed on traditional minicomputers, as previous surveys have shown. Respondents now claim that pc applications packages are of a far higher quality than mini-based equivalents; it should be

**UNIX PRO-
VIDES IBM
WITH AN EN-
TRÉE INTO
DEC'S TECHNI-
CAL MARKET.**

stressed, however, that pcs are still essentially two-application machines—spreadsheets and word processors—and there are no signs in the survey of any revolutionary new applications coming along to drive the market to the triple-digit growth levels that once characterized it. DBMS, cited by nearly 14% of the respondents, is emerging as a major application for the new pcs. Also showing potential is electronic publishing: some 6% of applications packages will be used for this purpose. A significant “other” is computer aided design.

One of the most interesting statistics unearthed by the survey is shown in Figure 7: the increasing amount of time that people are spending in front of their pc screens. Since 1984, the average has grown to 5.6 hours a day from 4.9. With such habitual use of a crt, one has to wonder whether a resurgence of demand for home computers is just around the corner. Clearly, if some innovator can come up with exactly the right blend of price, function, and friendliness, what is potentially the biggest small systems market of all is ripe for the plucking. ■

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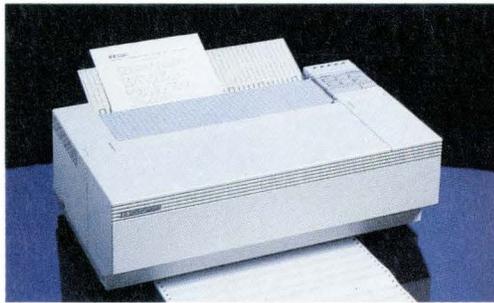
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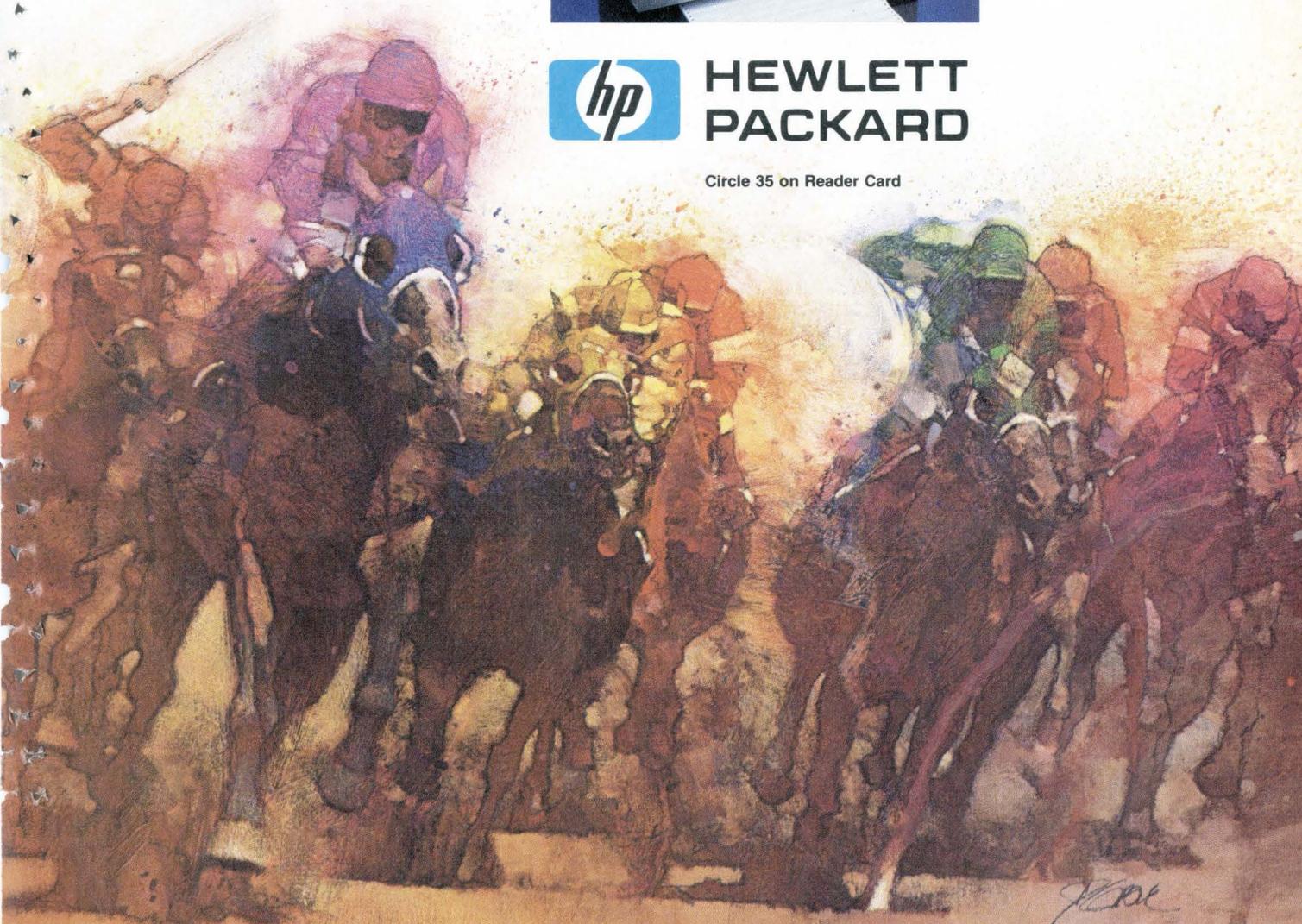


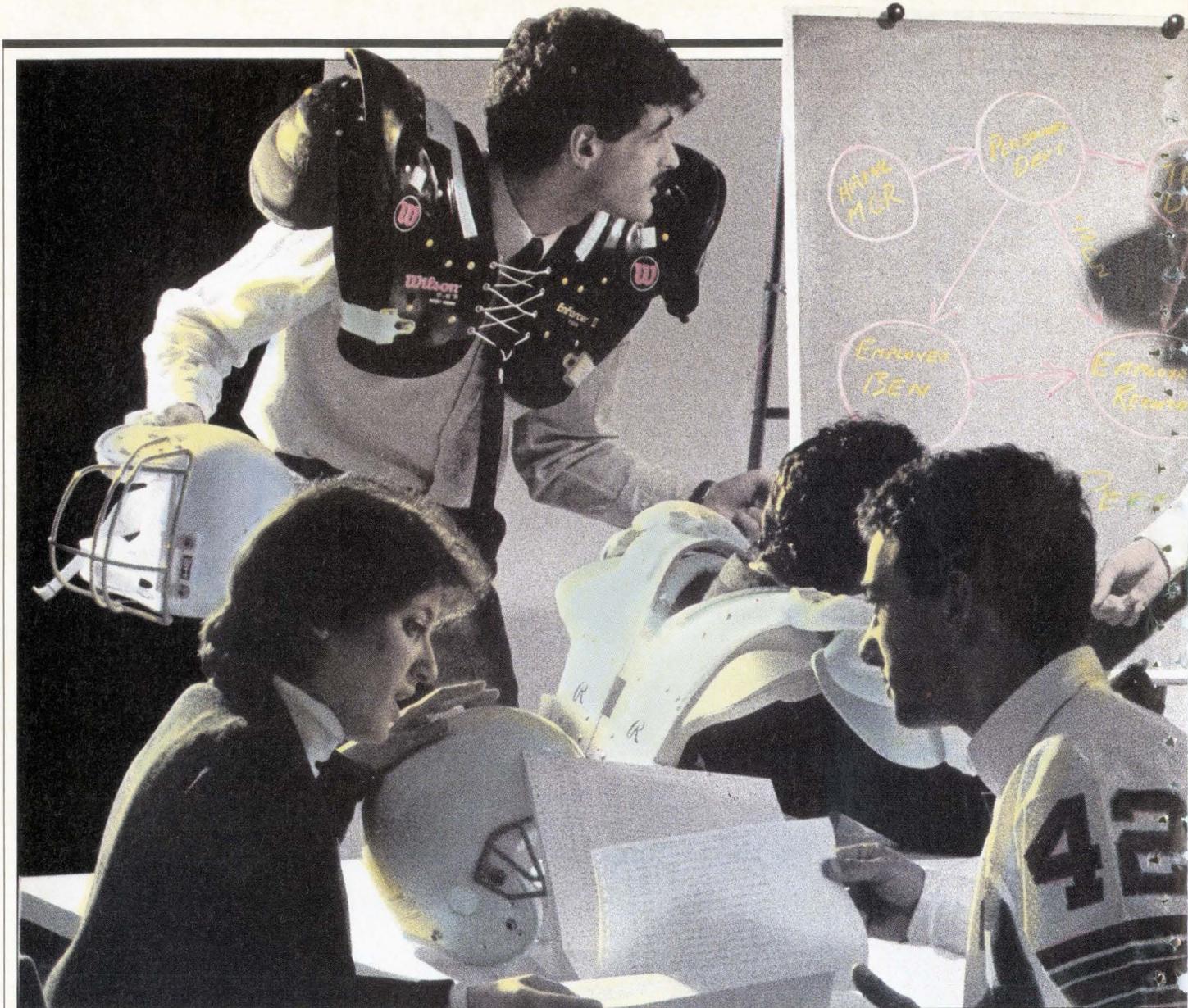
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What if...





Team Techniques in

BY DON LEAVITT

Sometimes, technology works best if you take a team approach. Indeed, managers and the organizations they work for are beginning to understand that good systems are conceived, designed, and sometimes even built by people who work together to figure out what they want right from the start.

Group design techniques provide orderly ways for business professionals to work together in small groups with the IS department in order to decide upon and understand the scope and content of a proposed system. While many focus on the design phase of the development cycle, a few start even earlier by attempting

to bring structure and teamwork to strategic planning.

Actually, "facilitated team techniques" is a more useful and accurate term for these methods, since in every case, specially trained leaders are used to encourage and shape the work of the group formed to meet a perceived need. During group sessions, nontechnical end users and information systems staff meet on a common ground to gather information and hammer out system solutions that truly meet the needs of everyone—especially the needs of end-user management.

Cigna Co. in Philadelphia is reaching that goal with group design techniques. Robert Gackenbach, vice president in



System Development

charge of personnel management at the insurance company, explains why it is important that these techniques can be used by technically unsophisticated users like himself: "I have never worked in the systems area. I know how to spell systems, but I don't know why we have input and output and bits and bytes. I do understand people, however. They get sick, they get disabled, they retire, and they die. And it's my job to make sure we have good benefit plans for them and that when one of those events actually happens, that they get what we've promised to give them."

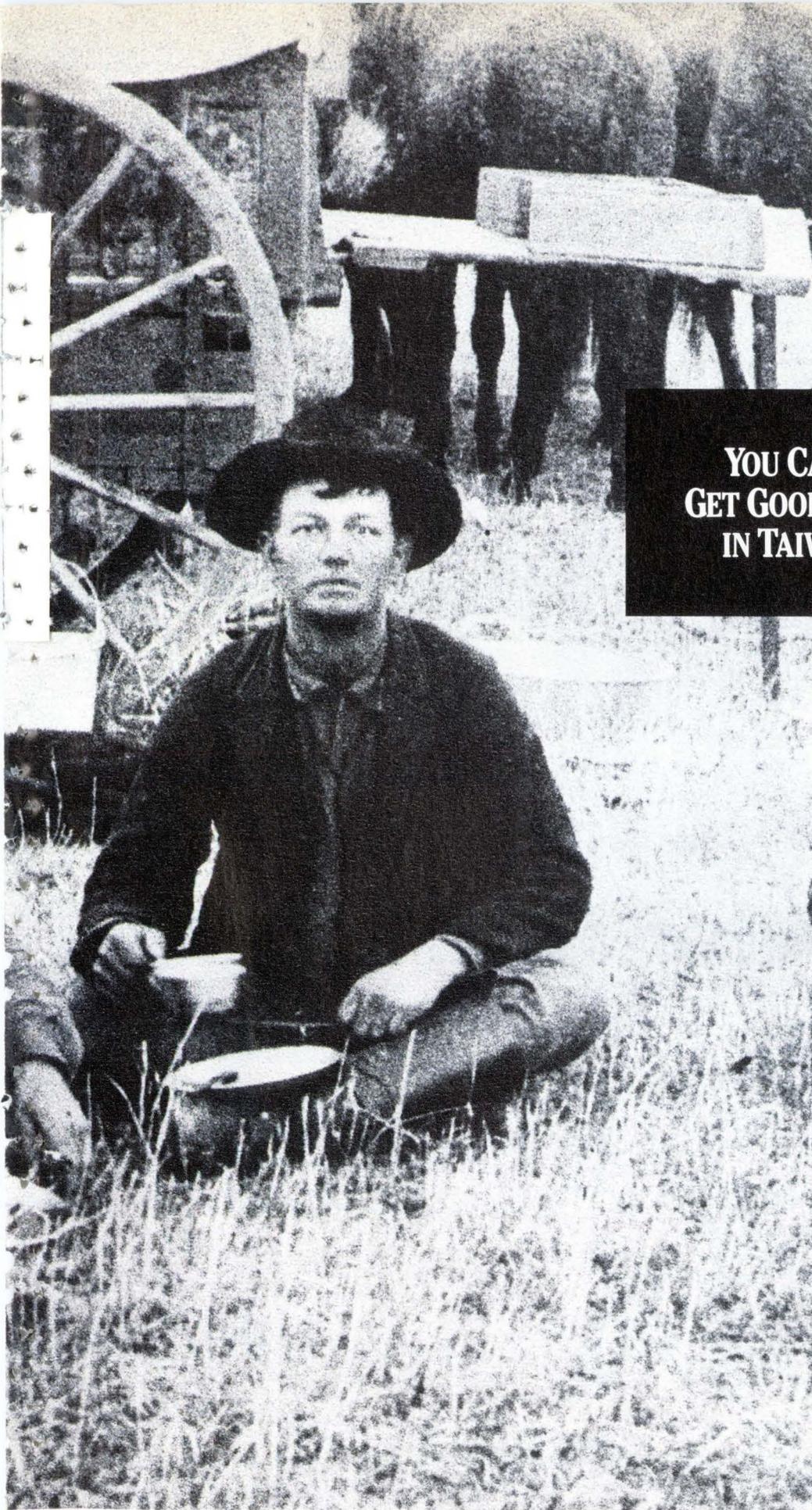
Another important promise the company has made to itself is to have a new benefits system up and running by

Jan. 1, 1989. That's a tall order considering the benefits plan currently covers some 30,000 employees, 35,000 dependents, and 10,000 retirees. To satisfy such large and complex requirements, says Gackenbach, Cigna "realized it made better sense to identify what we need for that new operation, rather than rehash what's wrong with our present system."

To help in that identification process, Cigna turned to Western Institute of Systems Engineering Corp. in Bellevue, Wash., and its WISE Integrated System Development Method (WISDM). "We had to understand all the things we must do for our employees and what we had to do to get those things done," ex-

Before you build, design, or even think about your next system, you might consider using group design techniques to help ensure that end users and the organization get the proper technological solutions. Team techniques provide systematic ways for your business pros to work with IS to determine a system's scope and content. The session leader, who helps everyone see how proposed systems mesh with organizational goals, plays a key role.





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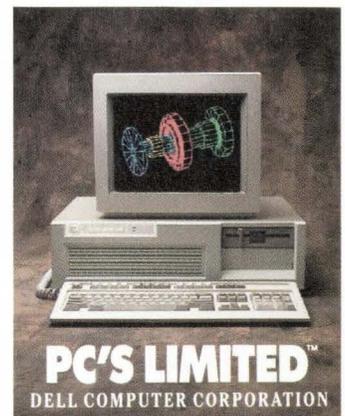
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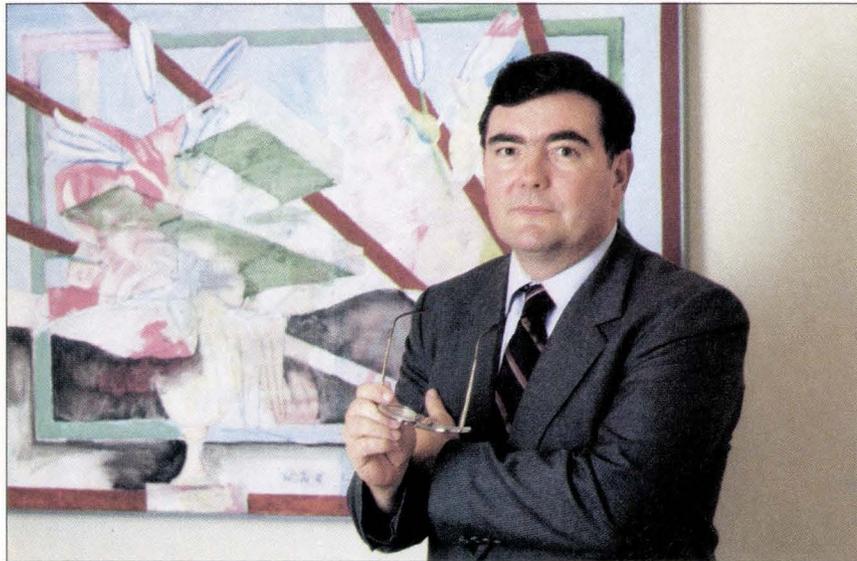
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Team Techniques

plains Gackenbach. That snapshot view of the situation sounds simple, but, as Gackenbach recalls, it actually took longer than he expected to set up the framework for the new system.

The whole process began with two weeks of day-long meetings in November of last year. Following this, additional time was spent reevaluating and searching for more details. After three days of meetings to compare notes in January, still more digging and reviewing was done. All of this finally culminated in the creation last May of a loose-leaf binder that contained the system requirements.



CHASE'S DEVENNEY: "Some people respond better in the smaller groups."

It took so long, Gackenbach says, because there were no systems people in the 100-person personnel department. "I had to involve all my department heads in the process and we had to fit our regular work in around the WISDM meetings," he recalls.

Those meetings to define requirements proved worthwhile, however. As a result of these sessions, Gackenbach says, his personnel department was able to prioritize its workload and to establish what tasks needed to be done immediately and what could be accomplished over the long term.

The Joint Application Design (JAD) approach from IBM begins much later in the development cycle than WISDM. Originally suggested for the development of distributed processing systems, the process-oriented JAD has been on the market for almost a decade. One of the earliest JAD users was CNA Insurance Cos. in Chicago (see "Setting Up Your Own Group Design Session," p. 88).

Allen Gill, manager of facilitated product support at CNA, says JAD presupposes that users know the business functions they need. It therefore casts group discussions around such process steps as planning for the work, receiving the work, doing the work, monitoring the work, and sending the work elsewhere.

JAD carries design work right down to such details as the format and language of screens. That level of detail was not required by the Chicago-based insurance company, notes Gill, who explains that "most CNA analysts would say, 'Show us the data elements you want displayed

and we can figure out the edit rules and the layouts. We don't need to burden the users, taking time for that in a workshop.'"

CNA found that the Method, from Performance Resources Inc., Falls Church, Va., suited its purposes. "It helps users say what they need and helps us gather all the data elements and develop the entry screens, the outputs, and the edits," explains Gill. "Then we show them to the users and they can review the results rather than designing them."

WISDM, which starts even earlier in the development cycle, is aimed at helping users understand what the organization needs in broad-brush strategic terms. With WISDM, there is no attempt made to pin down how those needs will actually be met.

The overriding criterion in choosing a group design methodology should always be the organization's particular operating culture, stresses Gill. The different team techniques, which range

from JAD to WISDM, serve a broad spectrum of purposes. The costs for the various group design services also vary. A spokesperson for Computers & Engineering Consultants (C&EC) in Southfield, Mich., pegs costs for sessions under its Rapid Analysis method at \$35,000, which does not include in-house expenses.

Marcia Hansen, WISE marketing director, estimates that the typical cost of a midsize Fortune 500 application under WISDM is \$34,000. The in-house costs for 14 days of workshops for a panel of 12 to 14 participants would be roughly \$50,000.

Most companies feel that the substantial front-end investment in group design ultimately pays rich dividends. WISE's Hansen claims that companies can

**INTERACTION
TRIGGERED BY
GROUP DESIGN
CAN BE "VERY
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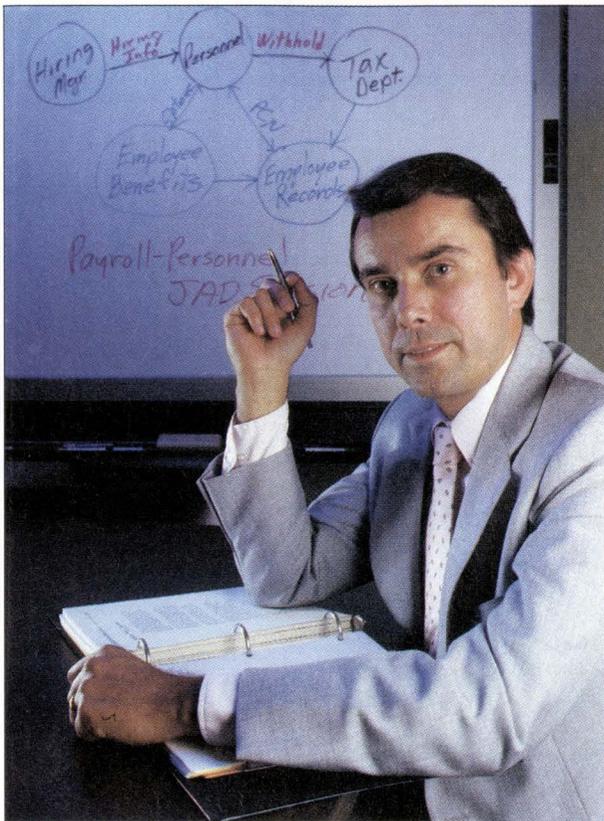
cut their application development cycle in half. "A study we conducted among our bank and insurance clients," Hansen adds, "shows an overall return on investment of 10% to 15%."

Facilitating Development

No matter what team technique is used, facilitators play a crucial role. These people, CNA's Gill points out, have to be very good at group dynamics. "They have got to be able to listen. That's probably the most important characteristic of the good facilitator," says Gill.

Session results should be recorded by a scribe, a secretary, or a design analyst. These note-takers have to be experienced enough so that they can report the workshops intelligently and can extrapolate, if necessary, from the raw comments.

In New York, Chase Manhattan Bank began to look at various group design methodologies three or four years ago. "We wanted to improve both the productivity of our people and the quality of the systems they were developing," reports Michael Devenney, vice presi-



CNA'S GILL: "Group design techniques boosted productivity."

dent for systems in Chase's global custody section.

"Chase already had a standard approach to its system development life cycle. We were looking for something to bolster the front end of the process," recalls Devenney. The bank's evaluation team considered JAD as well as several other offerings before finally deciding to go with Performance Resources' Method.

Like Gill, Devenney also strongly believes that the group design methodology chosen must be based upon "the culture and the environment" of the organization. "Something that is very structured and very behaviorally oriented that works well in some environments such as ours, wouldn't work at all in others," asserts Devenney. In fact, Chase has not established the Method as a corporate standard. Various groups within the bank are trying different approaches.

Nevertheless, in his area, Devenney has found the Method to be an effective tool in assessing the real size of an application—a task that he says the more traditional methods handle poorly. They "almost universally underestimate" the scope of a proposed project, he insists. Those faulty calculations are probably due to the fact that each participant—analyst and user—sees the project from a single perspective.

Devenney likes the amount and the quality of the interaction triggered by the

group sessions. The process of sharing ideas is "very healthy" and "very structured . . . and that's good," he says.

What isn't so ideal is the size of the workshops at Chase. The bank often uses groups that are much larger than the 15 to 18 participants that the Method recommends as the optimum number. Devenney says he has led sessions with as many as 30 people. Typically, the larger groups will work together and will form smaller breakout panels as well, explains Devenney, "because some people respond better in the smaller groups."

Each of the small teams, Devenney says,

can be focused on the same point to elicit a variety of ideas. Or, to make as much progress as possible, they can concentrate on separate pieces of the application. He says that the basic Method session usually lasts four days, with shorter review workshops held later.

Although participants are expected to devote themselves full time to the project while the sessions are under way, they are not relieved of their normal business duties. That's a burden, Devenney admits, but "generally it's worth it

because we know the systems coming out of the sessions are going to be done the way we want them."

Devenney is clearly impressed with the team-building aspects of the Method. He believes it works much better for Chase than the JAD let's-get-to-work approach to problem definition. The Method session takes a little bit longer than JAD, however, because there's a lot of interaction and effort on the part of the facilitator to create a team that will stay together, psychologically at least, throughout the life of the project.

Conclusions reached in the Method sessions are reported in English so that participants, who generally are nontechnical end users, can easily understand them. There are a number of tools available to convert the English into diagrams and other documentation needed by the IS staff who are responsible for developing the actual system.

A Heavy User of Group Design

Ford Motor Co. in Dearborn, Mich., is a heavy user of group design methods. The company has used the Method for developing systems for parts design, purchasing and receiving, wholesale accounts receivables, and computerized shipping support.

Maureen Augustine, a systems analyst with Ford, reports that once the company knew it wanted more help in the development arena, it acquired rights to the Method as well as to JAD and C&E's Rapid Analysis, a consultative approach that is based on the computer aided software engineering products from KnowledgeWare Inc. in Atlanta.



FORD'S AUGUSTINE: "Outsiders won't get involved in company politics."

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Team Techniques

Augustine admits to having a slight bias toward the Method since she was trained to lead sessions under it. But she speaks equally well of the work done by C&EC. She says that JAD isn't being used much at Ford.

Augustine reports that nontechnical business people at Ford seem very comfortable working to solve their problems in English, despite its potential for ambiguity. These same people, she notes, seem less sure of themselves if the discussion goes too far into "systemese." On the other hand, she says, once these end users gain some experience, they can deal adequately with the diagram-oriented method supported by the C&EC team.

Ford has an accelerated analysis and design users group that evaluates the different products and approaches. Augustine says that this group has found that all three methodologies "have pluses and minuses on both sides. We can't always say that one is better than the other."

Selection of a team technique should be done on a case-by-case basis,

recommends Augustine. "If you are involved with a user group that has a good understanding of data and how elements are related and those sorts of system things, and they're not so much just trying to reach a compromise on how they want to do things, then you can get into diagrams and approach the problem from a more systematic point of view. In effect," she concludes, "we've come pretty close to recognizing that the choice of tools is situational."

Augustine also feels that "it's very important that the facilitators be neutral in terms of the business ideas. That may mean," she concedes, "that it makes sense to bring outside consultants in to run the sessions. These outsiders won't get involved in company politics."

Leaders Need Systems Knowledge

Different methods require different sets of skills on the part of the session coordinators. "I think leaders of sessions using the Method must have some systems knowledge," Augustine says, "but it doesn't need to be an intense background." Facilitators under the Rapid

Analysis approach, however, should have a very strong systems background.

Rapid Analysis, which structures its workshops with seven to nine people, is based upon the facilitator leading the sessions. The technique downplays the human interaction skills of facilitators—their ability, for example, to garner a consensus.

The Method takes a different tack. "Workshops under the Method are larger," Augustine explains, "and the need to reach a clear consensus is more important. Method workshops may include 15 to 22 people. They break into smaller groups for discussion, and it's up to the

**GROUP DESIGN
HELPS ENSURE
THAT USERS
GET THE RIGHT
SYSTEM.**

facilitator to find points of consensus among the groups."

The executive leader or sponsor of these group sessions, Augustine stresses, must make it clear what the scope of the undertaking is. The leaders must also be aware of the position of the participants in the development process and let these people know exactly what is expected of them.

"Unless the sponsor and other leaders are that involved," insists Augustine, "the whole effort is probably doomed to failure. I recall one Rapid Analysis workshop that was canceled by the facilitator as soon as he realized there was no basis for defining even the scope of its work."

By bringing together interested people before development or even design starts, facilitators help everyone see how well their visions of the proposed system fit with each other and with the goals of the organization. Group design methodologies put structure into the process, enabling both the good and bad points to be considered objectively. Such objectivity helps ensure that end users are asking for the right system right from the beginning. ■

Don Leavitt, a freelance writer based in Southboro, Mass., has covered the software industry for the last 17 years.

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While group design techniques can't totally break the applications logjam, they can enhance systems usability by decreasing maintenance costs and improving productivity. Adopting the following recommendations can ensure that you get the most out of team techniques when forming your own group design workshops.

Setting Up Your Own Group Design Session

G

BY ALLEN GILL

Group design sessions are not the single solution to application development backlogs, but they can have a significant impact on enhancing systems usability by decreasing maintenance costs and improving productivity.

Vendors of group design methodologies all claim they offer high-speed development techniques. The increase in the speed of the development process is matched by the ease and speed with which the results can be introduced into your organization.

My company, CNA Insurance Cos. in Chicago, was one of the first organizations to use group design sessions. CNA began using IBM's Joint Application Design (JAD) technique in the early '80s. In 1983, we conducted a study that showed the JAD group design technique had boosted productivity at CNA by more than 50%.

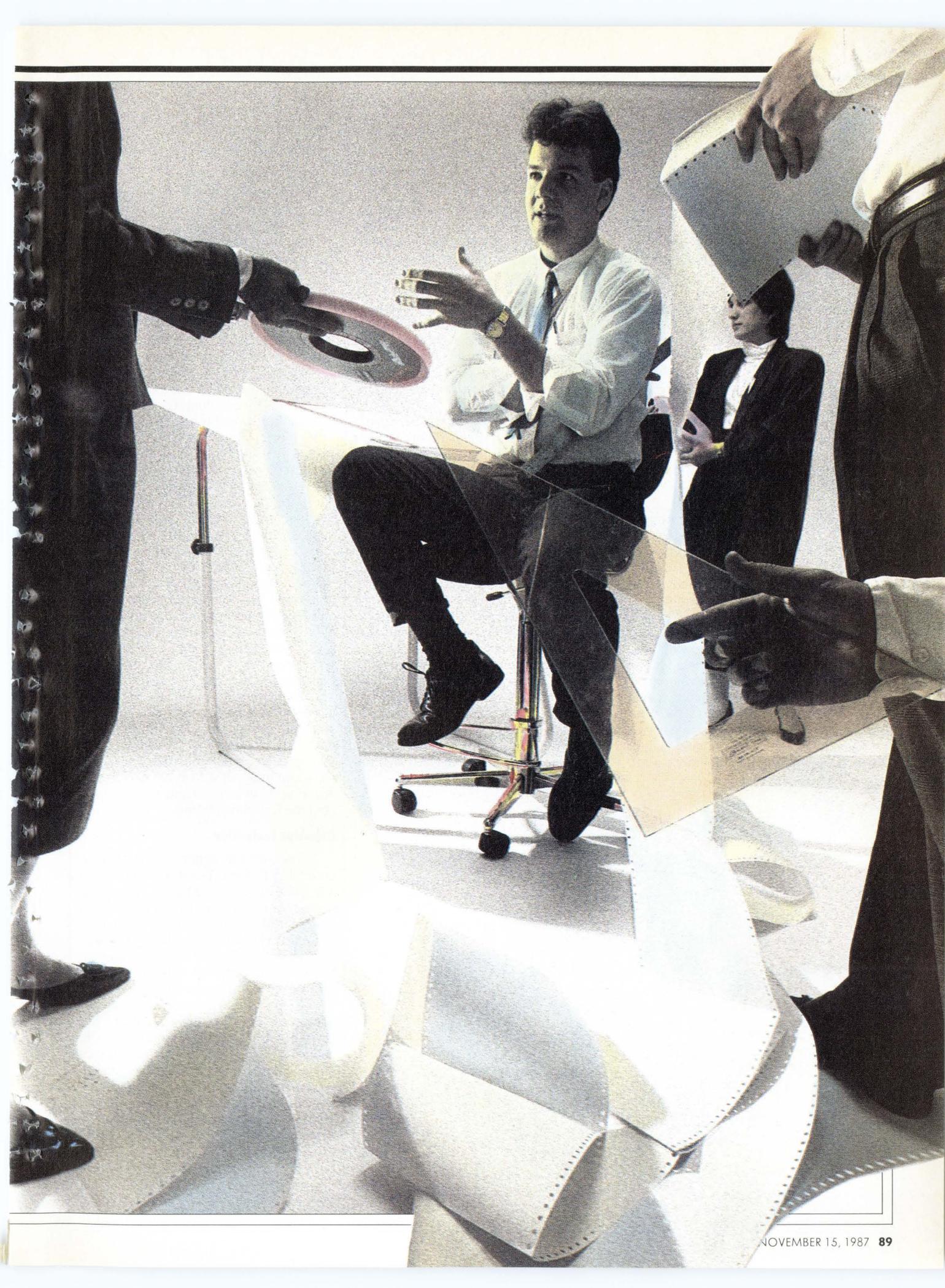
Information systems execs who are interested in reaping similar productivity rewards should consider implementing team techniques for applications development. The following steps are designed to help IS managers select the group design methodology that best suits their computing and corporate needs.

The first step is to familiarize yourself with the vendors of group design techniques. Have each firm visit your company and explain the process to your development support staff and a select group of your best project managers. In order to introduce group design to your company, you will need the support of several people in the project manager ranks. Always remember that these people are your clients and your job is to assist them in developing quality systems in a more productive manner. Group design can facilitate this.

After sitting through three or four vendor presentations, your group of advisory project managers will be ready to make a quick decision. They will either have no interest or will want to start implementing the techniques tomorrow to help them meet their project deadlines. If they okay the team approach, then you had better be prepared to move into high gear to accomplish the next steps, several of which may occur simultaneously.

Have each vendor give you a list of references. Contact at least two from each list, asking them if you can stop by for a short visit to discuss how they are using the vendor's group design technique at their site. When you make your trip, be sure you ask to review the group design documentation or session leader's guide. Companies are usually quite willing to allow outsiders to examine these materials in depth.

Also, ask to see the documentation that was produced from some of the acceler-



Setting Up a Group Design Session

ated design workshop sessions. This is the "raw" documentation that was handwritten on scribe forms and flip charts during the actual session. The raw documentation is usually much different from the final documentation that is neatly typed and formatted for presentation to management as a permanent record of the requirements of the project. The raw documentation enumerates all issues that need to be resolved by the project team either through follow-up activities or through additional small workshops.

Make sure that during or after these company tours you get in touch with user organizations that have been using group design techniques for several years. Some of them may have even customized group design techniques for in-house use.

Companies that fit into this category include American Airlines, Texas Instruments, Carrier Corp., AT&T, Travelers Insurance, and CNA. All these pioneers began using group design methods when JAD was the only known technique.

Fired-up Focus

While you're out interviewing user companies, the home fires should be blazing. Members of the development center staff should be conducting a systems methodology survey (SMS). The SMS is developed by conducting a series of focus group sessions to gather input from your systems development staff.

The survey should bring out several key facts: the current methods used to develop systems, who controls projects, who participates in projects, how projects are approved and funded, and what type of politics surround the projects.

Once you have gathered this information, you will be able to document your systems development culture. By analyzing your culture and comparing it to the group design techniques offered by various vendors, you will be able to select the technique most appropriate for your environment.

Some group design techniques stress detail screen and report design, some are process driven, some are data driven. Some use 10-hour workdays, some use structured agendas, while others are tailored around structured exercise modules. Your "cultural" study will enable you to select the methodology that best fits your organization.

Several vendors can analyze which methodology is best for you. In fact, it may be a wise investment to hire a third party, because someone else may be able to provide you with valuable insights that you are unable to see because of your closeness to your own company.

The focus group sessions should prompt the interest and curiosity of your development staff to seek more information about group design techniques. This is a good time to pick one or two project managers who will be willing to pilot the

group design technique that you have selected.

It would be a good idea to go with a smaller, low-visibility project at first. The project should involve from two to five functional areas and have the potential of developing a database of 100 to 200 data elements.

It is also smart to put together a control project against which you can measure the progress of your pilot project. A control project, which is similar to a pilot, will not use the group design technique. By carefully recording the amount of hours and costs on both the pilot and control projects, you will be able to measure results by using function points or other measurement techniques.

For example, when we conducted our trial of IBM's JAD in 1983, we used the function point productivity measurement technique from IBM to evaluate JAD's effectiveness. A control project that did not use JAD was compared with the pilot test. The control averaged 5.2 hours per function point during the requirements and external design phases of development. The pilot, on the other hand, averaged 2.5 hours per point, which equates to more than a 50% increase in productivity.

After these busy weeks have passed and you have accomplished all the steps discussed above, it's time to conduct your actual pilot. To ensure that your group design technique workshop runs smoothly, it's best to use a seasoned session leader from the vendor's staff the first time around.

Objective Evaluation

The outside expert tends to lend credibility to the process and eliminates any political entanglements you might encounter if you were to run the session yourself. Also, you can observe the process and evaluate it objectively. The session leader is usually too busy making the workshop run smoothly to be able to evaluate what takes place objectively.

Next, you must develop an implementation plan. The plan should address three things—staffing, communication, and training. Group design techniques should be supported by full-time personnel. Since the session leaders are members of the development support staff who do not report to the project manager, they can be objective assistants to the project manager.

The session leader's main interest is in conducting a successful session that truly uncovers all the issues and that documents all the known requirements. Be-



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	107584948	MINNIAP	XVZCORP				07/85	MINNSTPAUL	MINNIAP	TRUCKER	
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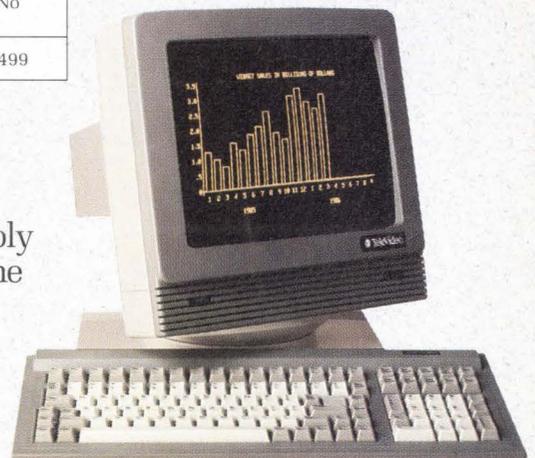
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Setting Up a Group Design Session

cause of this unique role, your session leaders must be able to work with all levels of staff, from programmers to vice presidents.

People skills are most important. Session leaders must be able to direct the group design process without encroaching on authority levels. In addition, they should be able to stand in front of a group of people and direct discussions. The best session leaders have typically developed these skills from some other discipline, such as sales or teaching.

Once a beginning cadre of two or three session leaders is in place, the next step is to communicate the benefits of using group design techniques to the entire development staff. At CNA, we distributed an eight-page glossy brochure throughout the development divisions. In addition, the systems development vice president invited members of the development staff to attend an overview presentation on the group design process. At this presentation, participants learned about the advantages of using group design. This process should gen-

erate interest among the development community so that you can begin working with your first customers.

In order to have your group design technique assimilated into your development culture, a session leader training program should be established. By train-



GROUP DESIGN IS A VALUABLE PRODUCTIVITY TOOL.

ing members of your development staff either in-house or through your group design vendor, you will reap two benefits.

First, the concepts and techniques taught during the class, such as group dynamics, planning, and the group design

techniques themselves, will enhance the productivity of workers once they return to their development units. They can share these skills with their peers and even use them in a limited fashion on their own projects.

Second, out of each training class will emerge one or two individuals who could become certified session leaders. As certified session leaders, these individuals will be capable of conducting group design workshops and mastering the group design process. These individuals will then form your cadre of in-house session leaders.

Our experience at CNA has shown that group design is a valuable productivity tool. While it does not capture all the system requirements in a project, group design will help you produce higher-quality system requirements, and to do so in a much shorter time. It is this speed that is the real strength of team techniques in applications development. ■

Allen Gill is manager of facilitated product support at CNA Insurance Cos. in Chicago.

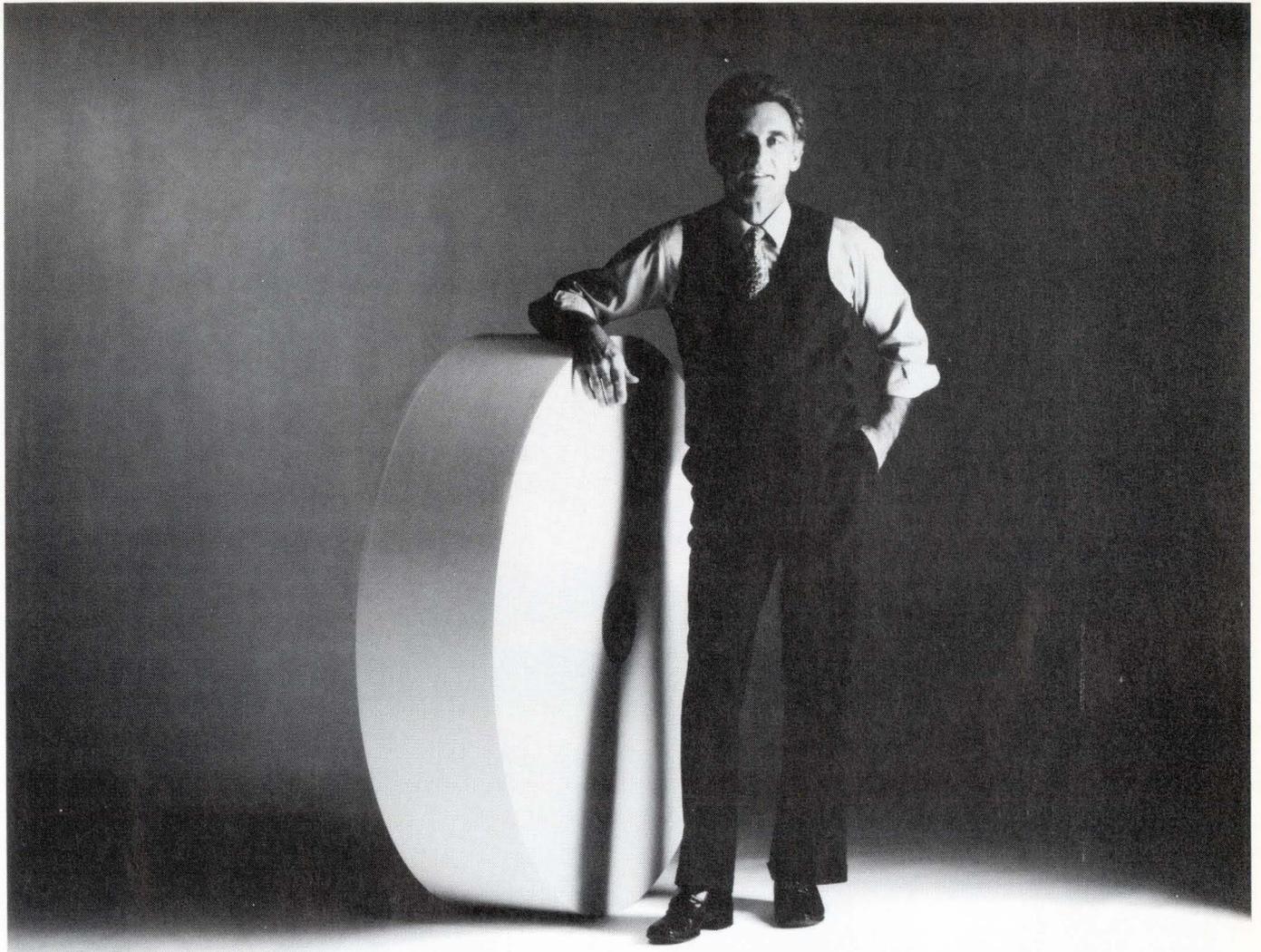
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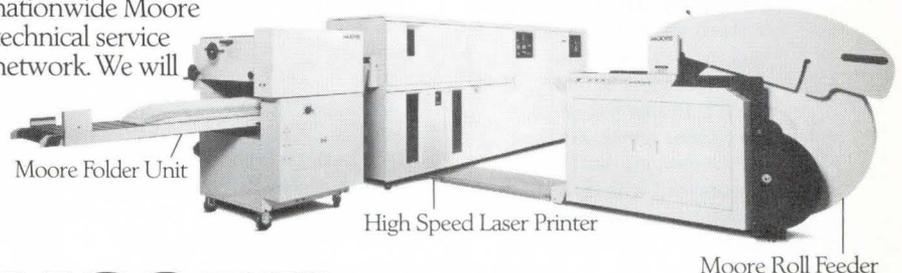
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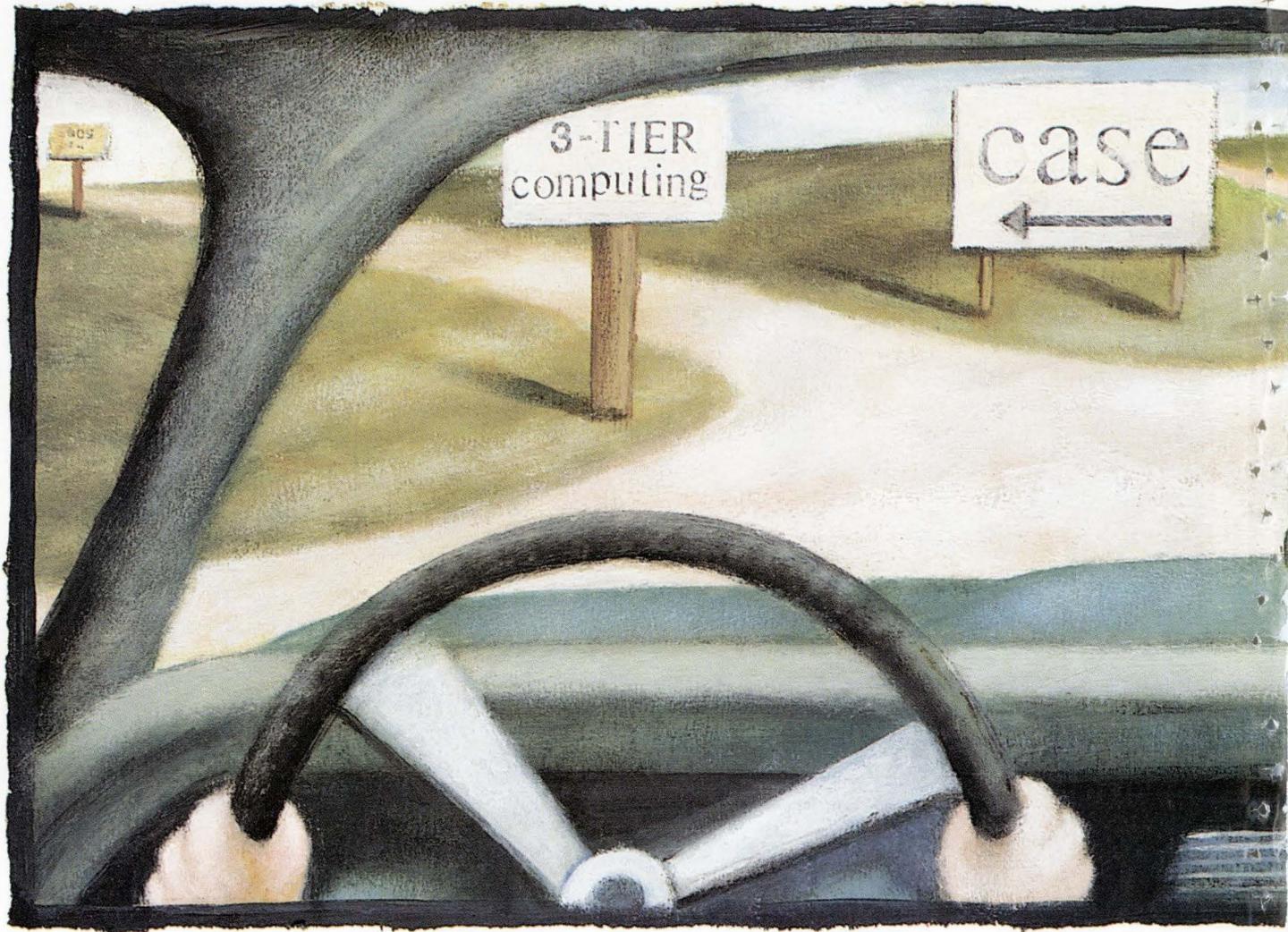
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Application Development

In the 1990s, building applications software should be a lot simpler thanks to technologies that are in place today. But before that promised processing land can be reached, today's technologies must reach maturity. Only then can smaller companies reap the advantages that big firms gained with their megabuck and megaMIPS machines of the '80s.

BY GEORGE SCHUSSEL

The framework for the 1990s' style of applications development is being formed by the movement toward three-tiered computing architectures, SQL-based distributed database systems, computer aided software engineering (CASE) code generators, and expert system techniques. Using the capabilities provided by these technologies, most applications of the '90s will be built on the descendants of today's microcomputers. Applications development during the next decade will also be made easier by outside software that can be readily customized.

Although some may argue that three-tiered computing exists today, it has only been in the last five years that companies have put the essential infor-

mation processing ingredients together. In most firms, computing is still based on mainframes with terminals. PCs operate primarily on a standalone basis, and minicomputers or departmental systems are just beginning to reach a critical mass.

In contrast, true three-tiered computing is an architecture with connectivity as its basis. Mainframes are typically used as database machines and network servers, while minicomputers function as departmental systems. From workstations to mainframes, all will be operating in an integrated fashion.

The economics behind this type of architecture dictate that the processing load be distributed. The cost of processing logic on workstations is only about one tenth of the cost of executing the same instructions on a minicomputer. Likewise, processing an application on a



in the 5th Generation

minicomputer costs only one third of what it costs on a mainframe.

This provides enormous economic incentive for distributing the computing work load over several machines and away from central hosts. By distributing processing power, you also gain the advantages of parallel processing and better system degradation in the case of failure.

The economics also favor building applications on these smaller systems. Instruction cycles on workstations are much cheaper than on mainframes (\$4,000 per MIPS versus \$160,000 per MIPS). In addition, the microprocessors can hold their own when it comes to speed. Even in the development of straight COBOL applications, PC AT compilers are comparable in speed to an IBM 3083, and COBOL execution speeds are

similar to an IBM 370/158 with databases of under 50,000 records.

Given all these benefits, you'd expect a massive migration to three-tiered computing. The movement toward distributed processing over a three-tiered architecture, however, is not going to be very rapid if it presents a more difficult programming environment. There are two software answers to this issue: distributed database technology and cooperative processing.

These two technologies should reach the point where they can provide solid support for fifth generation application development by the early '90s. Today, most of the products for distributed database technology and cooperative processing are in their first year of use and are not mature enough. It traditionally takes software about five years from

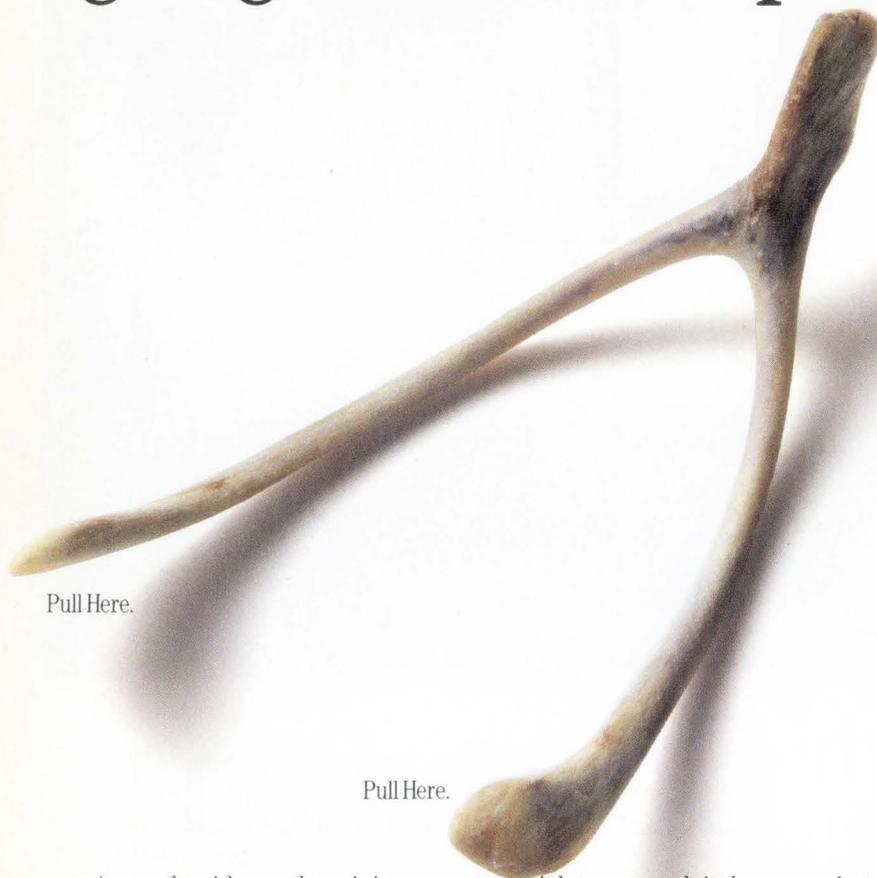
its initial introduction to reach maturity, a timetable that should also hold true for this technology.

Hitting Their Stride

That means that distributed database technology and cooperative processing will hit their stride about 1992. By then, more of the standards needed in these areas also will be falling into place. Look for standards for local area networks (LANs), user interfaces, and database access in the next five years.

The idea behind distributed databases is to have a single logical database implemented over diverse machines. Early incarnations of distributed database software are now available from such vendors as Relational Technology Inc., Oracle Corp., and Applied Data Research.

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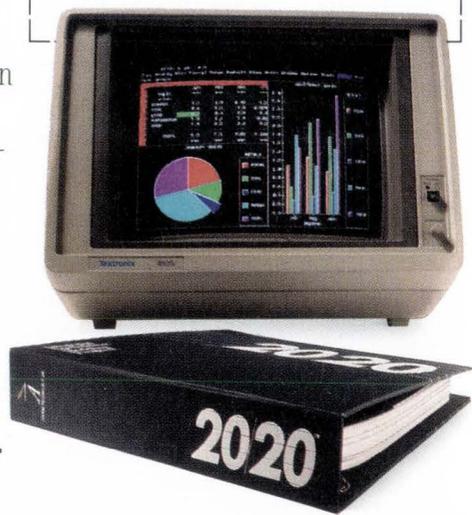
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Applications Development

By 1990, many companies will be providing distributed database software with both read and write capabilities. In some cases, this software will support a distributed database over multiple machines and different operating system environments. Even different DBMS engines probably will be able to partake, at some level, in a distributed database architecture by the early '90s.

An alternative technology approach to building distributed applications is cooperative processing. Among the systems that are on that market today are PC/SQL-link from Micro DecisionWare, Synergist from Gateway Systems, and Super-Link from Multisoft. These systems provide 4GL application development on a workstation, coupled with an active data dictionary on a central mini-computer or mainframe. The dictionary power allows reusable functions to be built into the system. The logic of its architecture also supports both development and execution on a distributed basis.

Distributed and relational are the key words when it comes to database management systems (DBMSs) of the fifth generation. Vendors of Codasyl, network, and hierarchically structured DBMSs are rapidly adding relational capability to their product lines. The whole software industry is rushing to market a variety of tools for relational systems (see "DBMS: Adding Value to Vanilla," March 1, p. 50).

Relational systems, which were introduced to the market in 1980, are just now beginning to dominate sales of new DBMSs. Still, it will be well into the '90s before the majority of installed database systems are RDBMSs. As for postrelational DBMSs, that technology seems impossible within the next two to five years and unlikely even within the next 10.

Since the relational model is a logical view of data, it allows for an unlimited number of physical implementations. The advantage of the relational model's mathematical underpinnings and the promised wide adoption of the ANSI standard SQL make it highly unlikely that some other logical view of data for commercial processing will be widely adopted within the next 10 years. The fact that most research in commercial DBMS is focused on enhancing the relational model also will help ensure its dominance through most of the next decade.

Relational technology has well-documented weaknesses—weaknesses that many people currently are trying to eliminate. Various semantic modeling

extensions to the relational model, for example, are likely to be proposed to capture the meaning of data in the same way that network-oriented views can. One or more of these extensions may actually achieve widespread adoption. The ability to capture more meaning in a database structure can result in significant additional savings at the programming level and superior control for data administration.

Transaction processing is another trouble spot in relational technology. The penetration of the RDBMS into the transaction processing world has been inconsequential, despite the increasingly important nature of these applications. The high overhead of relational systems has made RDBMSs questionable in tough applications that generate 20 to 200 or more transactions per second. It's here that network data structures have proven their capability to handle such loads.

A number of new RDBMSs from companies such as Sybase, Tandem, and Interbase are now targeted at this market. These vendors claim distributed ca-



IBM WILL NOT OFFER A BACK- END DATABASE MACHINE.

pabilities and significantly increased transaction processing potential. Meanwhile, vendors of established relational systems such as Oracle, Ingres, and Informix maintain that they are improving their transaction processing power by an average of 30% per year.

These software improvements, combined with the rapidly dropping cost of hardware, will have a major impact. For the next few years, however, network-oriented data views are likely to remain superior for difficult transaction processing applications. After that, a growing number of transaction processing applications will be handled by relational systems.

Moving In on Mainframes

One important approach to high-volume transaction processing with relational technology is database machines. The two principal database machine ven-

dors, Teradata of Los Angeles and Britton Lee of Los Gatos, Calif., offer some significant improvements. Teradata, for example, has benchmarks that in certain situations show a tenfold price/performance improvement over the use of a software-only DB2/SQL implementation.

If one factor mitigates against widespread adoption of the back-end database machine, it is IBM. There are both business and technical reasons why the company won't introduce one. In a distributed environment, much processing and application development will be offloaded to smaller machines. Architecturally, mainframes could evolve into database machines and network servers. Teradata's and Britton Lee's concept is to offload the database accessing and control from the mainframe to a parallel processing, microcomputer architecture. That leaves little for the mainframe. No mainframe vendor, particularly IBM, would want to trade the \$160,000 per MIPS it gets from big machines for the \$4,000 per MIPS it gets from micros.

Right now, Teradata and Britton Lee share a small marketplace that's growing at a moderate pace. No doubt IBM would like to keep it that way. Big Blue's blessing on their approach would lead to a market explosion, altruism at its extreme.

Technically, the hardware and software of a database machine is nontrivial, and even with unlimited funding, any development effort would take four years. IBM does not appear to be working on this technology, so if it decided to take the database machine plunge it would have to go for a licensing pact with an outside company.

No discussion in the relational realm would be complete without a look at SQL, the relational data access from IBM. The standardization of this language will provide enormous benefits in communications between systems and in adaptability of both software and people skills. In theory at least, SQL will give users an open architecture for database management for the first time. They can plug in whatever engine they need, as long as it supports that language.

There are many forces behind SQL. IBM, which developed SQL in the late '70s, has based its two main DBMS products, DB2 and SQL/DS, on the language. Both ANSI and the International Standards Organization have adopted SQL as the standard language for relational database systems access. The Department of Defense has also thrown its weight behind SQL, mandating the language's inclusion

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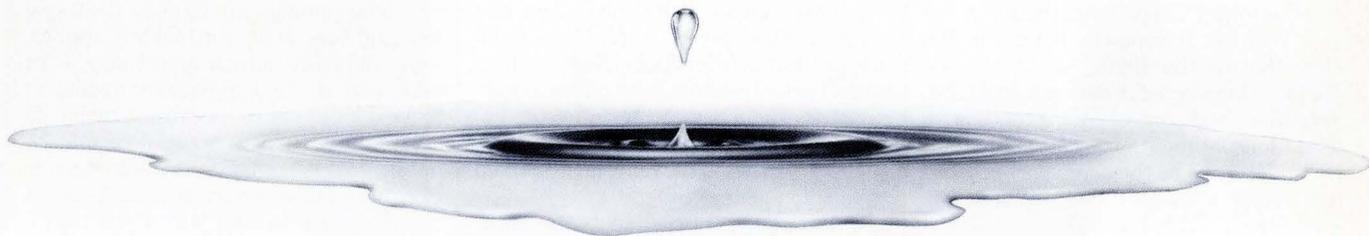
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Applications Development

in future procurements.

The most successful independent relational DBMS vendor, Belmont, Calif.-based Oracle, offers SQL support. Relational but non-SQL vendors, such as Relational Technology Inc. of Alameda, Calif., and Computer Associates Int'l. Inc. of Garden City, N.Y., have quickly introduced SQL implementations to the market. Major nonrelational vendors have announced support for SQL, including Cullinet Software Inc., Software AG, and Computer Corp. of America.

With all this power behind it, it's clear that by the 1990s SQL will be the standard language for data manipulation, definition, and control. But it too has its limitations—limitations that will be better understood as the language becomes more widely adopted (see "Where SQL Falls Short," May 1, p. 83).

How To Breed SQL Masters

SQL is like playing chess. You can learn all the basic moves in half an hour. But it takes practice for the rest of your life to become any good. SQL is not suitable as an end-user language. For any but trivial uses, it should be handled by programmers, not end users. In fact, proficiency with SQL is best achieved when the user has some academic background in set theory and propositional logic.

Therefore, expect SQL generators to become more important in the applications development environment. When SQL becomes the generated rather than the written language, users can generate applications that are portable from one database engine to another, while keeping the familiar interfaces such as spreadsheets.

SQL ultimately is more important as a software interface than it is as a human interface. Within the next few years, it will be the standard language for data access communications from one software system to another.

Obviously, passing data between software systems is particularly vital in a distributed environment. Many forms of standards and interfaces are needed for that transfer. The emergence of standard languages such as C, which many software developers are using to write new tools and to rewrite old packages, are enhancing portability.

While there is no single operating system environment, there are six that are so widely used that they're almost considered standards and no doubt will be just that by the early '90s. The familiar six are IBM's MVS and VM, Digital Equipment Corp.'s VMS, AT&T's Unix, Micro-

soft's MS/DOS, and OS/2 from IBM and Microsoft.

Successful software products will be running on most or all of these operating systems. In fact, for the last 10 years, there has been a secular movement among software vendors to build more and more interfaces to diverse access modes, hardware and operating system environments, and proprietary software systems. You can expect that trend to continue into the '90s.

One vendor that's given the end user the most choices of interfaces to its 4GL product is Information Builders Inc., New York. The company offers a wide range of products that interface to its Focus language, from the Focalc spreadsheet to the TableTalk menu-driven application generator.

Internally, Focus supports interfaces to various databases and other software systems. It runs under most of the standard operating environments, from



CASE WILL DEFINE APPLICATIONS DEVELOPMENT IN THE 1990s.

mainframe to micro. A number of other vendors, most notably Oracle and Relational Technology, also provide diversified product interfaces.

The one technology that will truly define fifth generation application development is CASE. These tools are evolving analogously to CAD/CAM tools for engineering. During the next few years, many companies will be experimenting with CASE technology. By the '90s, many companies will already be building applications without programmers. And by the middle of the decade, business analysts will be using CASE techniques routinely to build their applications.

Much of the power and potential of CASE products come from their repositories/dictionaries. The idea of the repository is somewhat similar to the concept of the integrated data dictionary that gained currency during the '80s. The repository, however, not only stores data about data, but it also contains information on screens, reports, and processing.

By storing information on these entities in the dictionary rather than in programs, reusability and, therefore, productivity is increased.

The repository is an active controlling environment, not simply a passive store of information. It is integrated with other systems-building tools such as DBMS, query language, and transaction monitors.

Total Commitment Is Necessary

The commitment to use a CASE system and repository for building applications should be a total one. Using it for only one or two applications doesn't make a lot of sense, because a major investment in training is usually required before companies can take full advantage of either of these technologies. As users become more familiar with CASE, they'll find that the power of these systems increases exponentially as a larger percentage of applications are generated and controlled by this system and its repository.

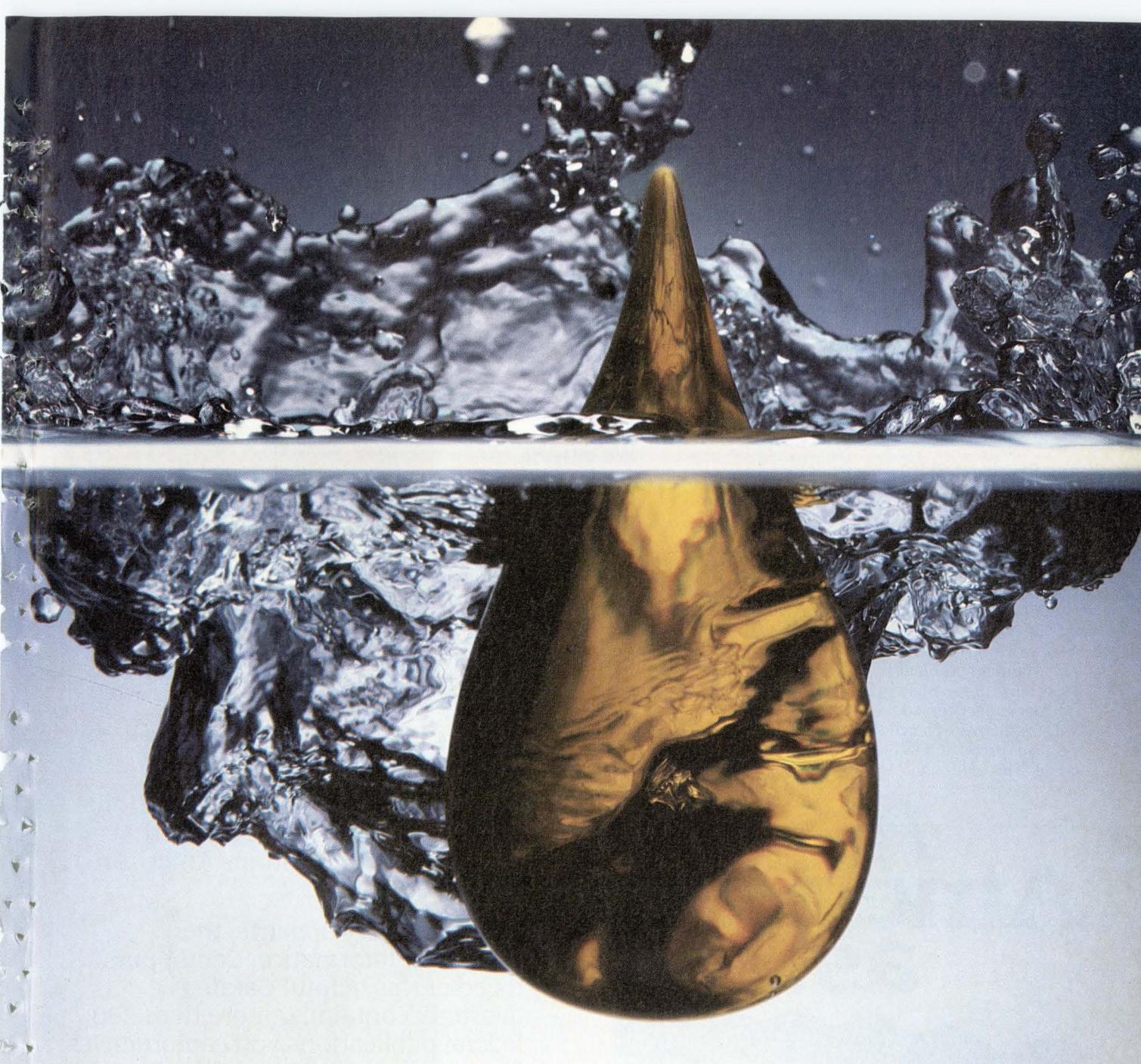
CASE technologies also will alter significantly the application software business before this century is out. Currently, most application software products are delivered as code generated with fourth generation techniques and with interfaces to a data or file management system.

That means that users often have to go through the difficult process of customizing the canned application. As vendors redevelop the bulk of their standard applications over the next few years, however, they will use CASE technologies to generate them.

By the mid-1990s, it should be possible for users to go to these same vendors to license application system generators. During the installation process, the necessary specifications will be generated for the software system to create a finished, customized application.

Expert systems will be another tool in the application builders' tool chest in the 1990s. As currently defined by the industry, expert systems are rule-based programming environments accompanied by inference engines that apply those rules to real problems after the relevant data are added. When human expertise in a narrow area can be distilled into logical rules, the expert systems programming paradigm is the best way to automate such decision functions.

Rule-based programming will give systems developers a relatively simple technique for incorporating expert advice modules into commercial systems.



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Applications Development

Of course, those who are successful will use the expert system paradigm only when it's appropriate, and it won't always be appropriate.

In fact, expert systems as stand-alone applications will have only a limited market. Of broader appeal will be expert systems that are embedded in full-blown applications. Expert systems availability in existing DBMS, 4GLs, and CASE products will increase greatly over the next several years.

Running completed expert systems is usually a very costly business. The average price for a complete, fielded expert system has been over \$250,000. The much cheaper computing offered by micros based on the new 32-bit chip sets from Motorola and Intel will diminish the need for expensive, specialized artificial intelligence processors and will help lower this overall cost.

Another problem today for expert systems is the scarcity of the knowledge engineers needed to develop them. This will make writing such systems an expensive proposition for some time to come. This skills shortage will be gradu-

ally alleviated as more college students who have been exposed to expert system technology enter the job market.

Expert systems and knowledge engineers, three-tiered computing, distributed databases, cooperative processing,



**IMPORTANT
APPLICATIONS
GENERATED
WILL BE
STRATEGIC.**

relational models, SQL, CASE—these are some of the key elements in the applications development world of the fifth generation. In one way, the fifth generation will be revolutionary because systems will be generated using concepts such as embedded expert systems and distrib-

uted databases—concepts never before used in commercial applications. Finally, after years of promise and effort, truly sophisticated application system generators will hit the marketplace thanks to CASE.

This coming generation will be revolutionary in another way. The most important applications generated will be strategic information systems, systems that cost leading-edge companies hundreds of millions of dollars in the '60s, '70s, and '80s. In the next decade, smaller companies will also be able to afford their own blockbuster systems. So, what micros did for the processing power of smaller companies in the '80s, the new software tools will do for their application power in the '90s. ■

George Schussel is president of Digital Consulting Inc., Andover, Mass.

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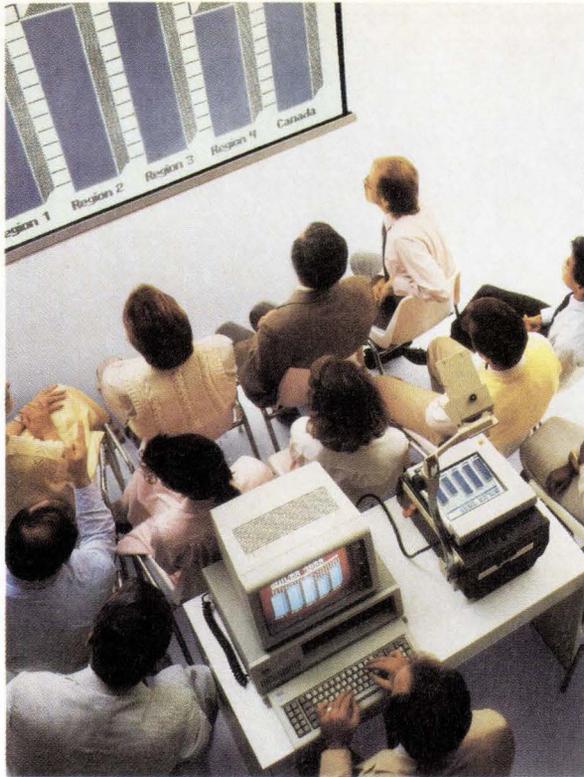
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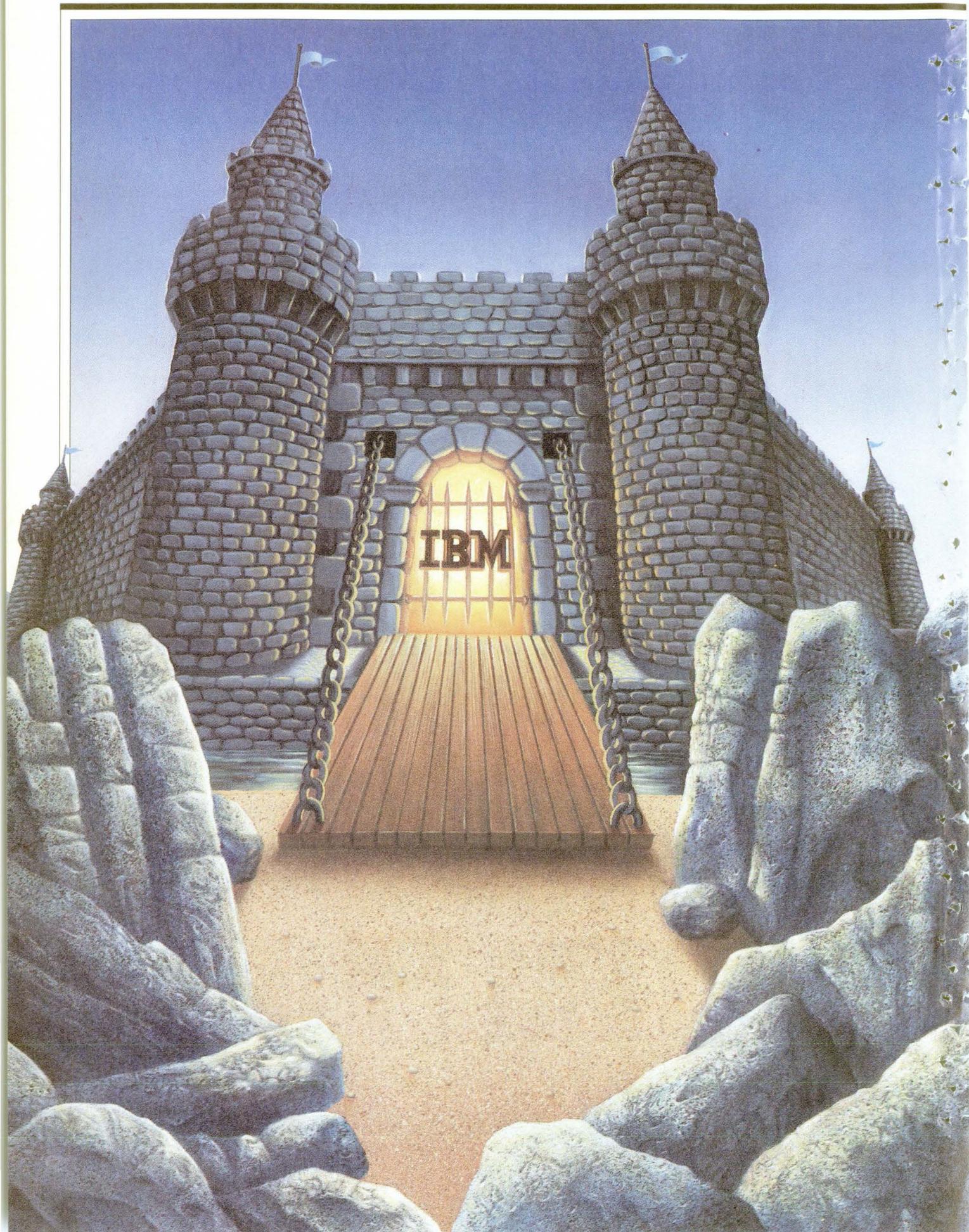
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The Big Blue empire has struck back, capturing 85% of the front-end communications market. It doesn't mean, however, that IBM will be the force in user networks, which are becoming more distributed and influenced by Digital. While IBM fights DEC for network control, it must also bolster its position in the SNA front-end processor market.

Where IBM Reigns: The SNA Front-End Market

IBM

BY LAMONT WOOD

's strategy and tactics in the \$1 billion front-end communications processor market over the last few years have worked like a charm. The company has seen its share of the installed base grow to a whopping 85% as of mid-1987 from 72% in 1984; it literally owns the SNA front-end processor market.

That growth is expected to continue, according to Hartford, Conn.-based Focus Research Group Inc., which predicts that 89% of users with plans to buy front-end communications processors over the next year will go with Big Blue.

IBM has fashioned the game plan it will use to produce those market share gains around mixed messages and maneuvering to close out the compatibles and the clones. Publicly, the company has been proclaiming open systems for connectivity. In the marketplace, however, it has been moving to shut out the compatibles and clones.

IBM's strength in the front-end processor arena doesn't mean it has the users' networks in its pocket, however. What that newfound strength really indicates is that the giant has been tying up loose ends in preparation for bigger battles—battles necessitated by the inexorable movement toward distributed networks. It's in this area that IBM has been facing the most serious challenges to its dominance. Its greatest rival is the Significant Other, Digital Equipment Corp., which has risen to new heights on the backbone of DECnet. And DECnet could break the back of SNA.

"SNA was good for the '70s," declares George F. Colony, president of Forrester Research in Cambridge, Mass., but, he says, "DECnet is better for the '80s." Colony feels that DECnet is more in tune with the distributed and smaller-sized computer networks that so many users today want to implement. "DEC-

net is more suited for flat peer-to-peer connections, more flexible, easier to expand, better suited to departmental systems and pcs," observes Colony.

"Due to its reliance on hierarchical protocols, IBM, with its old SNA, was not matched to that market," says Colony, explaining that "one of the reasons DEC has been able to get the ear of large IBM users is that its networking better answers their needs. DEC's networking has been the engine for its resurgence."

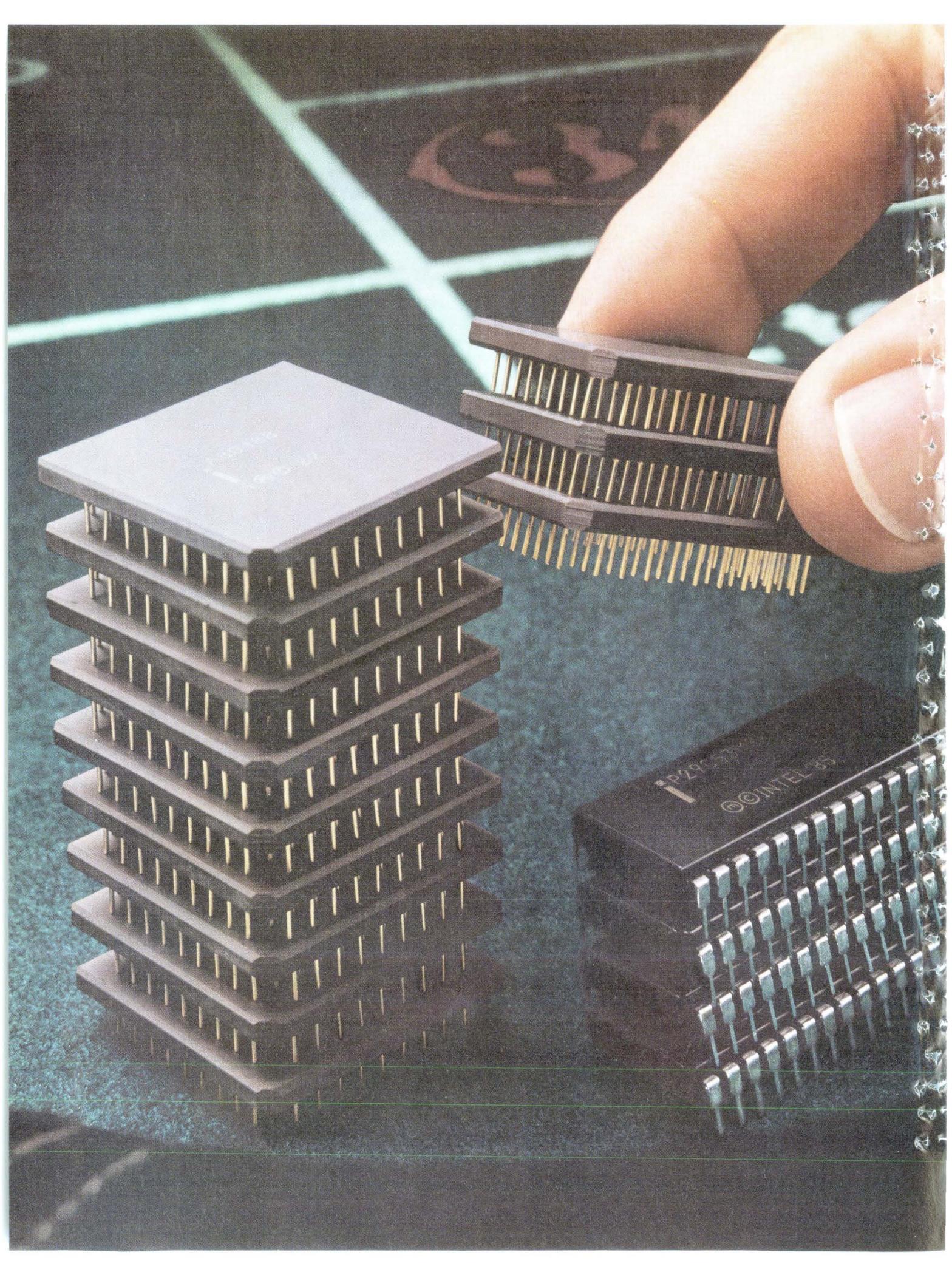
IBM Moves To Maintain Control

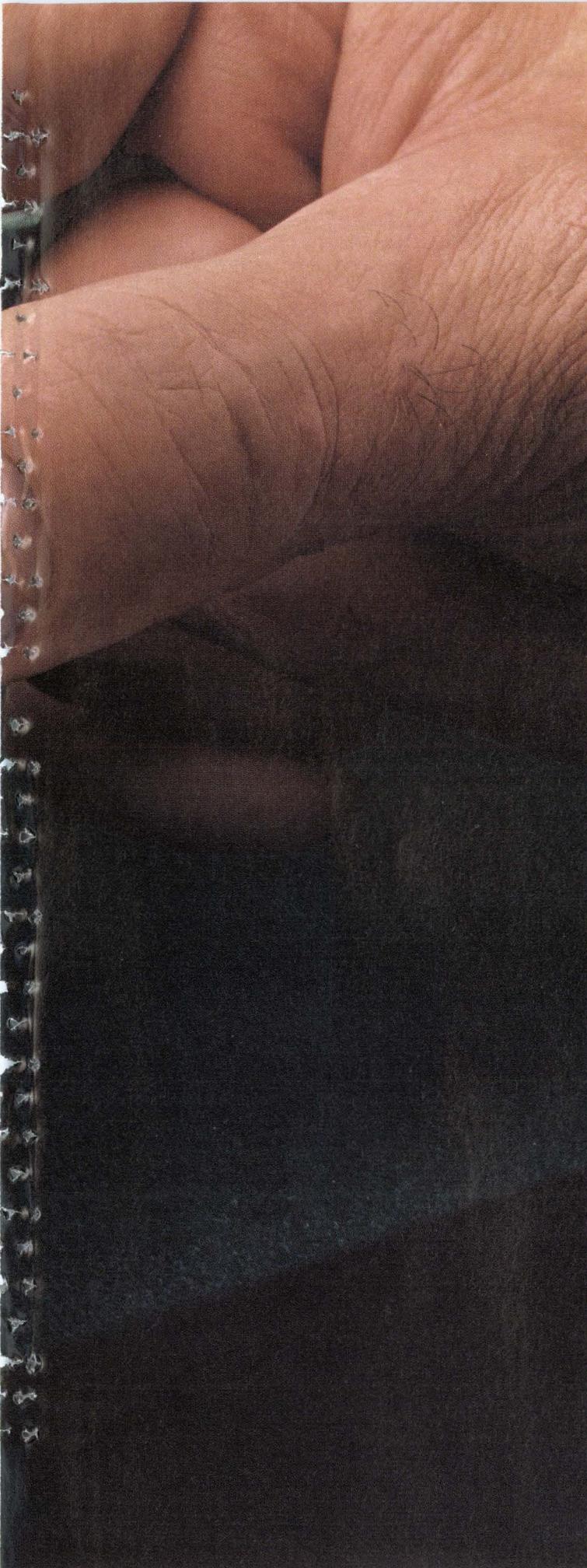
Networking is the source of IBM's current dilemma. How does it resolve its weaknesses in handling distributed networks while protecting the revenues that accrue from the big mainframe-based network? One obvious way is to maintain control over users' network architecture. That means adapting SNA and its component software and communications products to handle horizontal networks.

IBM's announcements in the past 12 months indicate that it is trying to do just that. Among those announcements were the PU 2.1 peer-to-peer communications interface; changes in VTAM and the front-end processor's Network Control Program (NCP) that will support PU 2.1; and communications enhancements to the architecture of the 9370 departmental system.

On the one hand, these new features and enhancements free the distributed network from excessive mainframe involvement. The network, distributed or not, nevertheless remains entwined with the host as well as its trusty front-end processors.

Colony says that IBM's announcements "marked a revolutionary change in SNA. What IBM is doing is fundamentally changing the structure of SNA and the way it will be implemented in the future to make it competitive with DECnet and systems based on OSI. This has made IBM much more formidable in the marketplace."





Three years ago Intel was so excited about ISDN, they bet their chips on it.

In 1984, the technology for ISDN wasn't yet available. And Intel's customer application of ISDN, through Mountain Bell—a US WEST Company—and AT&T Network Systems, wasn't even slated to begin until February, 1987.

But one of the world's leading microchip manufacturers saw the potential of ISDN to link its offices in California, Oregon and Arizona at higher levels and economies of integration. To handle data traffic from a variety of networks and computers at each site.

So Intel, which already supported ISDN as an industry standard with a special set of semiconductor chips, decided to emulate ISDN on its existing networks, and made an early corporate commitment to migrate towards ISDN.

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"Combining the bulk of our voice and data traffic on the same twisted pair wiring will save us considerable money because we do not need to run coax cable through the plenums, buildings and corridors," said Don Melvin, Intel corporate telecommunications manager.

"The ISDN network we're building today will allow us to integrate voice and data, not only in our T1 network, but also in our digital switches right to the desk, and extend switched data routes to the computer host," he added.

"We need to have the global digital connectivity end-to-end which ISDN brings us, and we want to be able to make use of its shared bandwidth on demand without having to do manual patching."

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The SNA Front-End Market

Maybe so, but IBM has yet to deliver on its promises. In fact, the company won't be shipping implementations of many of the communications features until the third quarter of 1988. This is in contrast to DEC, which has been proclaiming, "Digital has it now."

But IBM will be getting it. That message began to do some damage to its challengers from the time most of the major SNA announcements were made last June. DECnet was blunted as a weapon for replacing IBM's architecture, concepts, and products. It matters not that the tiger is made of paper. IBM tells the SNA-bound world it will compete on Digital's terms—and that world wants to listen.

IBM Compatibles Trying To Keep Up

The other competitors caught in the melee are the producers of compatible IBM front-end processors. These represent loose ends that the giant is trying to tie up.

While IBM fights the DEC threat and the monumental war over network control, it needs to capture all the revenue possible from the markets it already owns. The front-end communications processor is one of those critical markets.

Consider the effect of the June announcement. The changes to VTAM, due later next year, will be supported only by the "then-current" Network Control Program. The "then-current" NCP will be supported only on the "new" (1984) 3725 front-end processor. That means the old 3705s and compatibles will not be able to handle the peer-to-peer interface, PU 2.1, because it will be supported only by the enhanced VTAM and the "then-current" NCP.

This means that customers desiring the new features and capabilities will be forced to migrate to 3725-type machines, a move that Northwestern Mutual Life Insurance Co. in Milwaukee, will soon be making. George MacDonald, a systems analyst at Northwestern, remembers when his company replaced its four 3705s with three 4705s (Amdahl's clone of the 3705) a few years ago. The 4705, he says, "was a faster, solid box, and very price-competitive."

MacDonald bemoans "that the code for the 3705 has been functionally stabilized so that there will be no changes." The features promised on the new 3725 are certainly ones that his company wants—features that will not be available on 3705 machines.

It has not been easy for IBM rivals

such as Amdahl Corp., Sunnyvale, Calif., and NCR Comten, St. Paul, to come up with competitive front-end communications products. It wasn't until September that Amdahl introduced its version of the 3725, which has been on the market for three years.

The compatible companies have had a hard time keeping up with IBM changes in microcode and other proprietary features of the 3725. Obviously, the greater a jump IBM gets on them, and the more uncertainty there is about software enhancements due out a year from now, the less of the market they can capture.

Just a few years ago, IBM's competition had captured nearly 30% of the 3705 market. The reason for this success was that the 3705 was different in more than price and technology. Dave McCormick, vice president of marketing at Netlink



**IBM HAS
85.2% OF
THE SNA
FRONT-END
PROCESSOR
MARKET.**

Inc., an SNA peripherals maker in Raleigh, N.C., is very familiar with those differences. McCormick was IBM's product planning manager for the front-end processor when the 3705 was announced in 1972.

In those days, McCormick remembers, "IBM would supply program logic diagrams of the guts of the machine, so you could literally go out and copy it. And that's what people did to the 3705, just as they did with things like disk and tape drives. Now, IBM only releases documentation on how to fix hardware."

The 3705 used hardwired scanners (the circuits that processed incoming data) and since IBM was also releasing source code for NCP, it was possible to completely reverse-engineer the product, McCormick explains.

During the next 12 years, IBM gradually stopped releasing logic diagrams and source code. Then, around 1984, it came out with the 3725, which, McCormick says, "used microprocessors to

control the scanners, so that control is a combination of high-speed microprocessors and control codes running the scanners. The microcode is proprietary, so it's hard to figure out what the scanners are doing. In fact, to reverse-engineer the product seems virtually impossible. And I believe the problem is reflected in the competition's market penetration. As late as 1983, IBM had only 70% of the market."

McCormick's 70% figure is corroborated by International Data Corp., Framingham, Mass., which estimates that in 1984, IBM had 71.9% of the front-end processor market, while NCR Comten had 10.3%, Amdahl had 4.6%, and others, including Memorex, which is now out of that business, had 13.2%. Focus Research Systems, offering the latest tally by value of the installed base, puts IBM at 85.2%, NCR Comten at 5.1%, Amdahl at 2.3%, and Memorex, with its lingering presence, at 3.8%. Nobody else has even a 1% stake.

IBM's opponents are clearly having trouble keeping up. At Amdahl, where the philosophy is to produce a better box that will use IBM software, it has been tough to get beyond the 3725.

"With the 3725 you have the microcoding to contend with," explains Wil Marshman, Amdahl's manager of future product requirements, "but copying it is not as much a problem as leapfrogging it. We could have brought out something with the same capacity as the 3725, but we wanted to offer better technology for the price."

The three-year lag between the introduction of the 3725 and the appearance of the 4725, Amdahl's answer to IBM's offering, hurt Amdahl, Marshman concedes. During that interval, Amdahl had to get by selling its 4705, which runs IBM's NCP.

"Our market share has been shrinking," admits Marshman, "because people want to have the most current system, rather than trying to fill any particular need." Marshman maintains, however, that there's not much functional difference between the 3705 and the 3725 anyway. "Ninety percent of 3705 software is the same as the functions in the 3725," he says. "IBM just added a few things like satellite communications and Extended Network Architecture. If you're not into that market and your communications are stable, you're probably not moving to the 3725, so the [Amdahl] 4705 can compete."

NCR Comten, which produces its own functional equivalents to both the IBM



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The SNA Front-End Market

front-end processors and the NCP software, has a more pronounced problem than Amdahl. While it picks up additional revenue from software, it must also keep up with all of IBM's software changes, which occur more frequently than hardware changes.

Tracking IBM's Software Changes

"IBM," comments Eric Birkeland, director of product marketing at Comten, "has done about 12 or 14 versions of NCP so far—about once every 14 months—and how long it takes us to catch up each time varies a lot. We try to be within one release of what IBM is offering at the moment."

This one-release difference is no problem, Birkeland claims. "IBM has to make some concessions to the users and not migrate them very fast. You can't expect every user to migrate everything at once. So VTAM and NCP," he says, "will be typically forward and backward compatible with each other."

Birkeland says Comten competes on functions, not price. He also believes that the company's experience in writing

"IBM
DOESN'T
WANT PEER-
TO-PEER
COMMUNI-
CATIONS."

SNA software will allow it to keep up, largely by anticipating what IBM will do next.

David Passmore of Network Strategies Inc., a Fairfax, Va.-based telecommunications consulting firm, believes that Comten has the technology to match both the 3705 and the 3725. Passmore points out that the company can support four times as many ports as IBM—1,024, compared with Big Blue's 256. "And be-

cause [Comten] has their own box," he adds, "they can supply value-added features, like better handling of bisync terminals."

The task of competing with those three magic initials is still a formidable one, however, as the recent face-off at Anheuser-Busch, St. Louis, shows. Dennis Turek, a software analyst at the company, explains how the confrontation went: "We had 3705s and converted to 3725s. During the process, we did an evaluation of Comten, which was, for me, an interesting evaluation since I used to work for Comten."

"My impression was that since we were a plain vanilla SNA shop and not doing anything fancy like interconnected networks, IBM and Comten came out pretty close in functions and price. In other words, we didn't need any of the advantages that Comten offered. And I think it's true in most places, that if the vendors come out fairly close in the evaluation, you go with IBM. And," sums up Turek, "that's what we did."

With attitudes like that to contend with, it's no wonder that other front-end



processor vendors have just about conceded the field. There are other companies that claim to sell SNA front-end processors, but when you actually go to them, you find out that they are selling SNA environments, not code-compatible boxes.

One of those "environmentalists" is Unisys Corp. Explains Glenn Maxwell, program development manager for cooperative interfaces at Unisys, "While our front-end processor could compete with the 3725 under special circumstances, it's not code-compatible with the 3725. That's a special market and we don't go after it. We go after large networks."

Computer Consoles is in a similar position. "We don't replace individual boxes and we're not directly plug-compatible," notes Reg Broughton, vice president of marketing at Computer Consoles Inc. in Irvine, Calif. "We would emulate the whole environment. Some compete directly with IBM, but most vendors emulate the whole environment. As for the changes that IBM makes to VTAM," Broughton claims, "we don't have much problem."

COMPATIBLE COMPETITORS ARE FINDING IT HARD TO KEEP UP.

Declares Jerry Meyer, product marketing manager for Control Data Corp.'s front-end processors, "Our product is sold primarily to enhance SNA environments. In some cases, we could replace a 3725. But we don't emulate NCP—we're a PU 5 interface and appear to the host as another host, rather than as an NCP processor."

Meyer maintains that CDC's approach "makes us less susceptible to IBM's whims and allows us more creativity to make things happen. In a VTAM-

SNA-NCP environment, you have strict hierarchy. But in multiprocessor environments, you have VTAM-to-VTAM connections, which are less restrictive."

Mixed Signals Coming from IBM

In addition to moving to microcode and making upgrades to VTAM and NCP, IBM has done other things in the SNA realm. "IBM is sending mixed signals regarding the openness of its architectures," complains John Pickens, director of communications architecture at Communications Solutions Inc., San Jose. "Anytime you see the word 'open' in IBM literature, you find the word 'interface' right beside it."

Earlier this year, IBM also eliminated from its latest SNA reference manual the format protocols between two NCP machines, the PU 4 interface. The new versions of the manual don't contain this information. Sources speculate that IBM plans to revamp PU 4, presumably adding peer-to-peer facilities and making it proprietary.

IBM denies a proprietary push on PU 4. John Mountain, IBM's product adminis-

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The SNA Front-End Market

trator for VTAM and NCP in White Plains, N.Y., says that PU 4 "was left out in an attempt to simplify the manual, since the material did appear in other publications. This caused some concern, so we have made the old version available again—we have reversed ourselves. I don't know what the future will hold for PU 4, but I am not really aware of any attempt to make it proprietary."

Those who believe that PU 4 is closing also assume that PU 2.1 is the wave of the future. "It's a published interface, and IBM's touting it all over the place," points out Netlink's McCormick. "And in fact, if you look at the rest of the IBM product line, you can see that PU 2.1 was the architecture of choice largely because small systems like the System/36 and System/38 could not handle the complexity of the PU 4 type of interface."

PU 2.1 will also, not incidentally, help IBM in its campaign to compete in a world that's moving to distributed networks. Bob Anderson, IBM's product line planning manager for SNA and network management software in White Plains, says that PU 2.1 and related announce-

FRONT-END VENDORS HAVE JUST ABOUT CONCEDED.

ments result from "our trying to meet the demands of customers. We are seeing more and more demand for distributed computing." He says a good example of the new interface would be to attach multiple System/36s to an existing SNA backbone.

While Anderson says that peer-to-peer is a strategic direction for IBM, others are skeptical. "IBM doesn't want people to do things the peer-to-peer way," says one industry analyst. "They want people to go through mainframes.

Everything they do is geared to building demand for mainframes."

Everything that IBM usually does is also geared toward knocking out the clones and compatibles. Not this time, according to Forrester Research's Colony, who thinks, "The clone makers will be able to keep up. Even if the trend is toward large PU 2.1 networks, there will still be requirements to go to the host for database queries, if nothing else. It may even stimulate the front-end communications processor market and bring new opportunities, although only after some initial confusion."

Once that confusion clears, users will know what they want. "Users won't let IBM close anyone out anymore," declares Colony. "The market has spoken, and the market wants open systems."

Even though the market is doing some tough talking, when it comes to front-end processors, the market's still buying IBM. ■

Lamont Wood is a San Antonio-based freelance writer specializing in computer technology.

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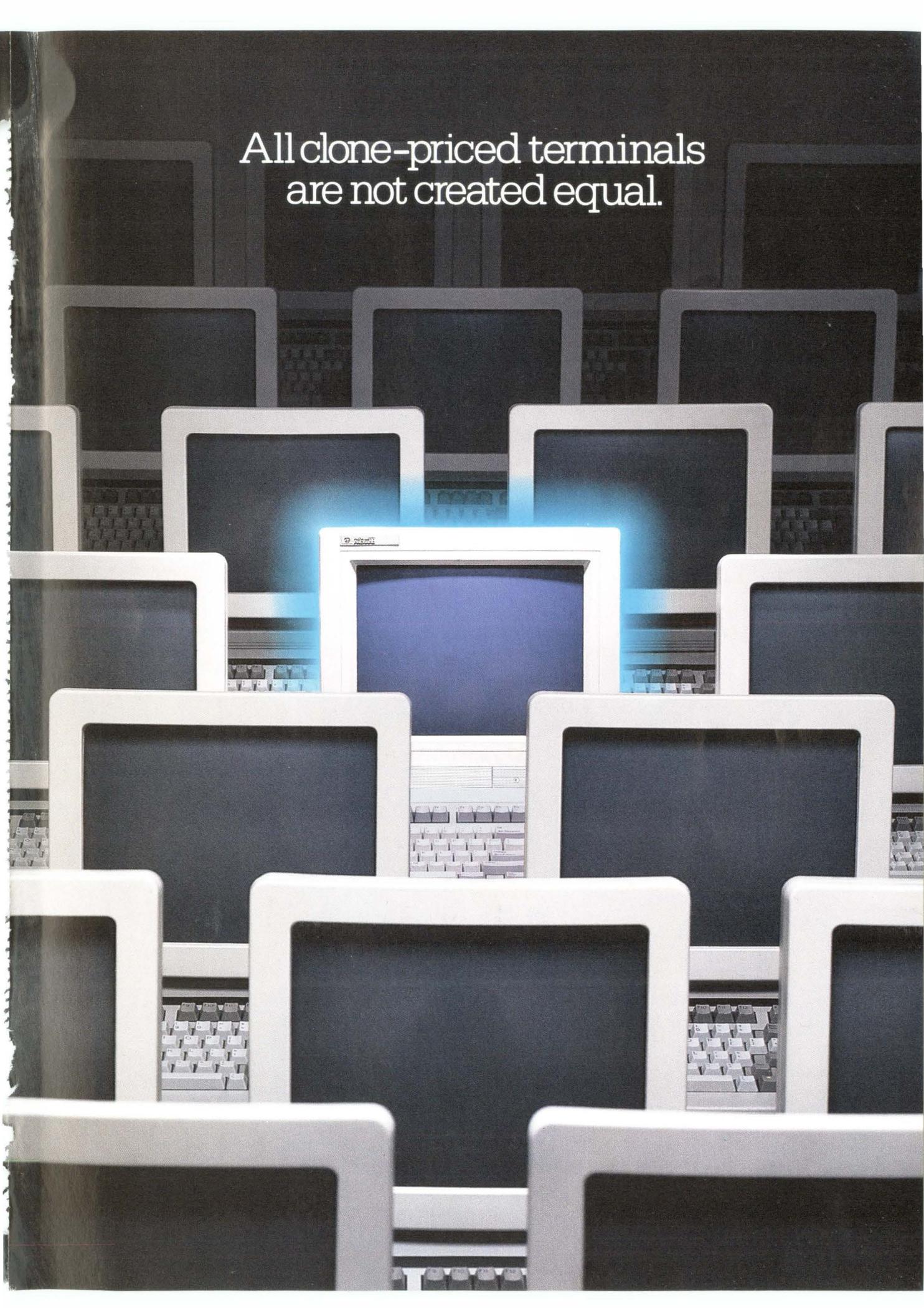
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Software Customization

Configurable software packages usually consist of a secure, unmodifiable kernel or core system that provides strategic services and capabilities. This is supplemented by features and functions that can be tailored, within broad limits, to an application or environment. As with all internally developed software, configurable systems must be maintainable and verifiable.

BY DANIEL E. KLINGLER

Application software that allows customization without compromising the integrity of the system kernel is making its way into more and more information processing environments.

But as with all internally developed software, configurable systems must be maintainable and verifiable. They must pass muster with end users as well as with configuration management and quality assurance personnel in the IS department. In other words, configurable software has to be controlled and documented.

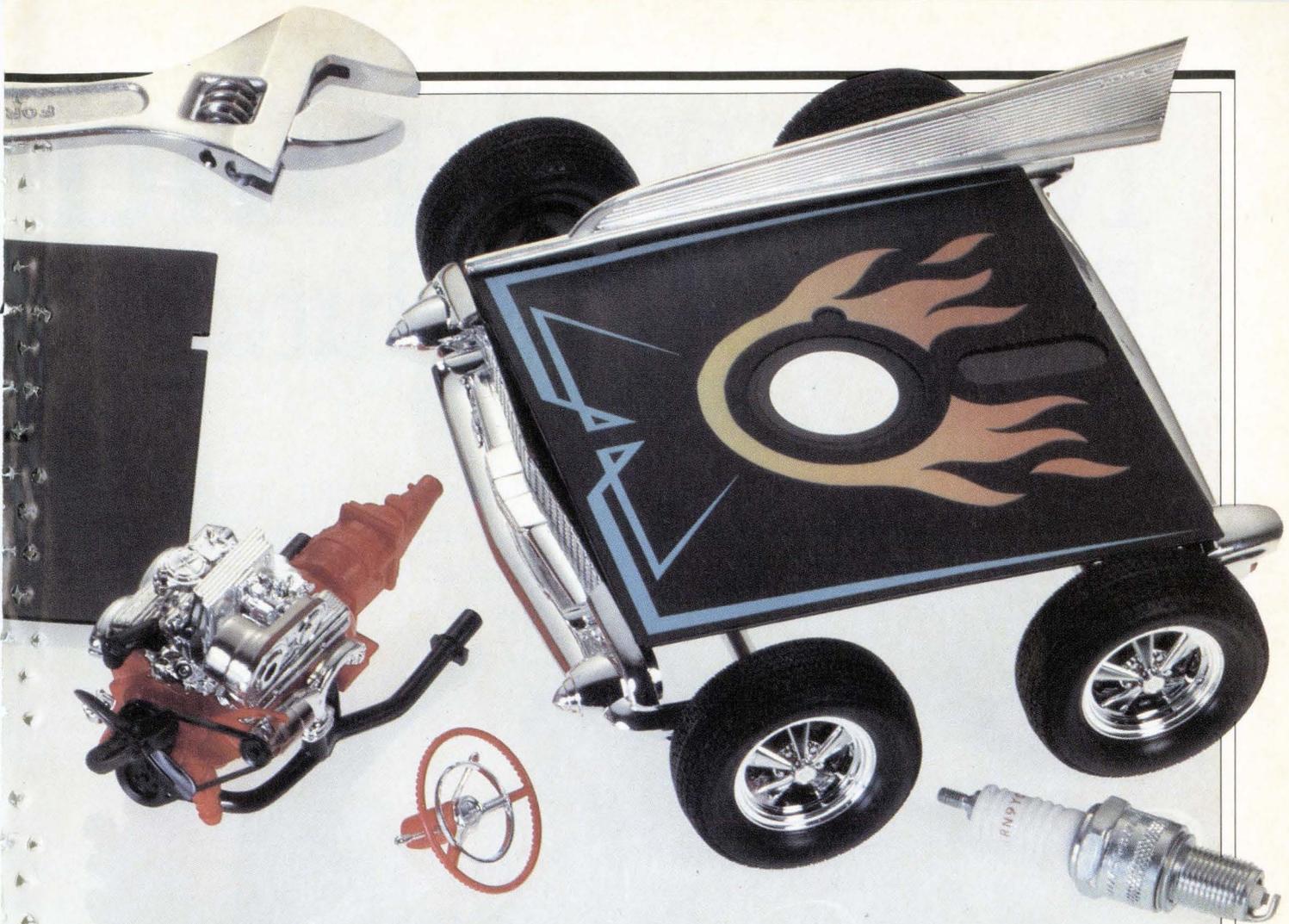
That documentation task can be tricky since the design of these systems is normally proprietary. Functional specifications, implementation specifications, or architectural/system design specifications usually are not appropriate.

Many vendors offer modifiable or configurable software packages that usually consist of a secure, unmodifiable ker-

nel or core system. That core system, which provides required strategic services and capabilities, is supplemented by a set of features and functions that can be tailored within broad limits to an application or environment.

At one rather remote end of the configurable spectrum are pc spreadsheet products. Closer to the norm in the modifiable software realm are the MRP packages in the manufacturing arena. For R&D applications, integrated laboratory data management systems are good examples of configurable software.

The vendor generally provides the core set of features along with a set of software tools and functions that enable either the systems staff or sophisticated end users to tailor the package to fit the customer's native application environment. Most configurables allow modification of databases, either through the use of aliases for required data items or through the addition of special data sets or elements. Screen generators/maintainers also usually allow the user inter-



Without Compromise

face to be customized to a particular facility.

In addition, functions can sometimes be restructured so that a manual processing sequence can be modeled. Flexible security schemes also can be overlaid on available system features/functions, so that access to sensitive data can be controlled, usually through the data entry/modification/approval capabilities. Finally, many configurable systems provide a plethora of reports that can be augmented by an ad hoc query capability or a report generator supplied by the vendor.

The R&D division of Ortho Pharmaceutical Corp. in Raritan, N.J., found that a system configuration specification (SCS) documentation format met its needs. The SCS allows modifications to configurable software systems to be captured for the benefit of the software maintenance staff and configuration managers. In many circumstances, the spec can be applied to purchased packages that consist of a core or base system re-

quiring further detailed customization to address end-user needs. Such customization does not usually entail actual coding, but instead makes use of the configuration tools supplied by the vendor. The SCS can thus be used to document the manner in which the configuration of the base system is accomplished as well as the end result of that customization.

Most configurable software runs standalone, serving the needs of a single monolithic application. No external interfaces are needed. Less frequently, configurable software is incorporated as a system, subsystem, or component of a larger system. In this case, the configurable software may be surrounded by and tailored to the major internally developed requirements, to the architectural or system-level design, and to the implementation constraints/strategies.

The SCS is applicable in both the embedded and standalone scenarios. In an embedded approach, however, the system requirements are typically captured

in a global system requirements specification (SRS) and the architectural or system-level design is also documented via a system design specification (SDS).

The hallmark of the SCS is its versatility. Standalone requirements specifications, design directives/constraints, and configuration information can be captured within its framework.

On the other hand, if configurable software forms a component of a larger system, the SCS can be used to document requirements via upward (nonredundant) references to the SRS. Architectural design parameters also can be specified referentially to the SDS. In such circumstances, higher-level documents are used to capture global requirements and design criteria, while the SCS is used to take a snapshot of the internal design considerations and configuration information.

Nine Major Sections

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Software Customization

purpose, functional definition, configuration information, test plan and procedures, operational/support information, and revision history. Each of these sections—all of which provide information about system configuration—is required in one or more of the phases of configuration development, software control, and SCS documentation, which shall be discussed later.

In the identification area are the system or subsystem name and number, project name, date, author, target machine, software tools, and references. This last section includes upward references to requirements specifications and the appropriate system-level (architectural) design specifications, along with relevant materials such as software package reference manuals and user manuals.

The audience section defines whom the document is intended for. In this case, it's primarily for the software maintenance, configuration management, and quality assurance staffs. The secondary audience is the end-user community. Moving on to the next item, the scope area is used to describe the purpose, required functionality, organization, and configuration of the particular software system or subsystem.

Under purpose, the objectives of the software are described and an explanation is given of what it does and why it is needed. This is followed by the functional definition, which includes a statement of requirements that outlines what is needed to accomplish the task. This identifies the necessary information, such as input from a user or a data structure and what the software will do with it. If the software described by the SCS is a component of a larger system, this section may simply reference appropriate areas in the requirements specification.

Discussion of the user interface may also be part of the requirements section. This outlines the interaction between the software and the user. Where necessary, this may take the form of a step-by-step, user/machine dialogue. Next, samples of the proposed screen formats may be provided. Last, but not least, under the requirements heading may come a list and explanation of prompts and advisory, help, and error messages.

Other messages provided in the base system that require explanation are also defined here. Normally, resolution of errors is discussed in the users manual. It should also be noted that the user-interface step, along with the screen

samples and message summary, may all be covered adequately in the vendor literature.

What clearly isn't covered in that literature is configuration information. The configuration definition describes how the software is physically or logically configured at implementation. For integrated systems, it shows the processing flow of the system or subsystem with respect to physical data structures. This flow of information provides more detail than is presented in the requirements or architectural design specifications. The configuration definition also, where applicable, enumerates the methods of control transfer to and from the system or subsystem.

May Need Structure Chart

The configuration information may also consist of a structure chart or a local data dictionary that identifies pertinent local data items or configuration parameters. For integrated systems or subsystems, the global data dictionary is usually documented in the architectural or system-level design specification.

Various routines and commands also should be spelled out here. Any ex-



**MAINTAIN-
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THE KEY TO
SUCCESS OF
MODIFIABLE
SOFTWARE.**

ternal (application vendor-supplied or standard host) routines that reside in the system library and are accessed by the software system or subsystem should be identified. Next, system-specific commands and procedures that must be used in executing the software should be listed and described. What also may be needed is a description of the job control language sequences necessary for normal installation or configuration of the software.

The seventh section of the SCS pertains to the test plan and procedures. This is where the methods that will be used by the systems staff in testing the software are defined. The level of detail

provided is up to the project management staff. After that comes the operational/support information. This section spells out all specific operational procedures, data file handling, periodic file/database maintenance requirements, or other processing duties needed to maintain normal processing, system security, and data integrity.

The last section, revision history, catalogues the modifications made to the system or subsystem and document from one version to the next. This is actually a summary of changes.

The SCS is developed in three phases. There's a review and approval cycle in each phase. The Phase I document consists of sections one through five—identification, audience, scope, purpose, and functional definition. Under most circumstances, review and approval of the Phase I document must be done by IS management and a user representative. However, if the system or subsystem contains no user interface and performs a function that's transparent to the user, such as data preprocessing as input to another system, then approval is only required from the software development staff. Also, no user involvement or review is needed for systems software or operations/support software.

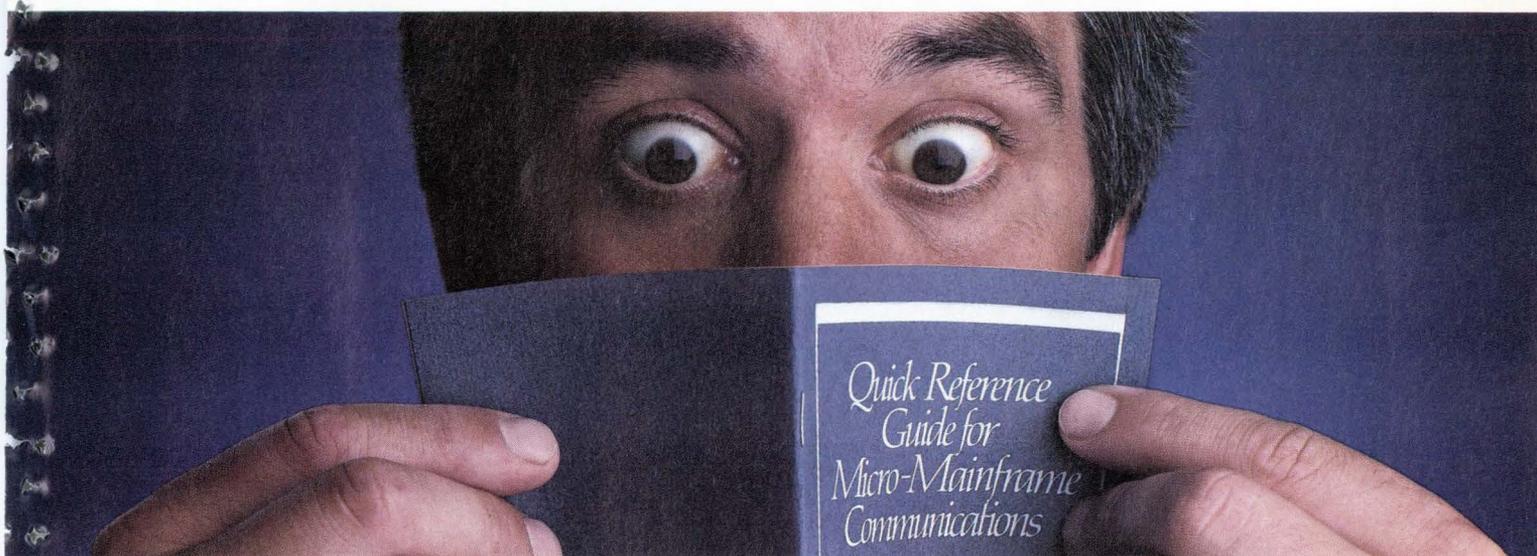
The Phase II document additionally encompasses section six, configuration information, along with the test plan portion of section seven, and section eight, operational/support information. The Phase II document must be reviewed and approved prior to the start of the implementation/configuration effort.

The Phase III document, which completes the specification, is reviewed and approved at the completion of system-level testing. Review and approval of the Phase II and Phase III documents are performed by the appropriate IS staffers.

In practice, no system—whether configurable, turnkey, or internally developed—should be released for production use until the end users validate it by conducting extensive acceptance tests. Standards for these tests have been developed by the IS departments in most companies. Such testing is crucial for configurable software that must undergo scrutiny by both the IS and end-user communities if it is to be truly successful. ■

Daniel E. Klingler is manager of laboratory systems and programming at Ortho Pharmaceutical Corp., a Johnson & Johnson operating company in Raritan, N.J.

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The more you know about the reasons for program changes and defects, the better is your position to control them. By collecting and merging program information data usually maintained by various department divisions, you can develop a modification and defect reporting system like the one used at the Federal Reserve Bank of Dallas. This consolidated information will enable you to identify the types of program changes and the problems associated with them. Armed with this knowledge, you can make more intelligent decisions about productivity tools, program specifications, and training. Rather than expending energy reacting to problems and crises, your resources are conserved for active, productive campaigns.

Scoring With Software Fixes



BY ANTHONY R. REED

In the struggle for programming productivity, knowledge is power. Most likely you are bombarded with offers for new programming tools and methodologies that supposedly will increase productivity, improve quality, lower development and maintenance costs, and reduce backlogs. But as any experienced strategist knows, without good intelligence, fancy weapons are useless.

Without historical data that highlight the types and causes of program defects, it is impossible to select the tools and methodologies that will give you the greatest return on your investment, nor can you measure any productivity improvements. To make better software decisions and systems life cycle modifications, program changes and defects need to be monitored and measured.

Measuring program changes and defects also provides you with a greater ability to control changes and defects, an important advantage since programs are the most frequently changed modules in a system. And since more time is spent in the program specifications and coding phases of most systems



development life cycles, there is a great potential for savings by using code generators, fourth generation languages, and testing/debugging tools, provided they address the real problem areas.

Maintaining programs after they are moved into production takes more time than correcting JCL and other modules. If you know why production programs are changing, what is causing them to change, and what price you are paying for the changes, you can focus your efforts on solving specific problems instead of taking scattershots in the dark.

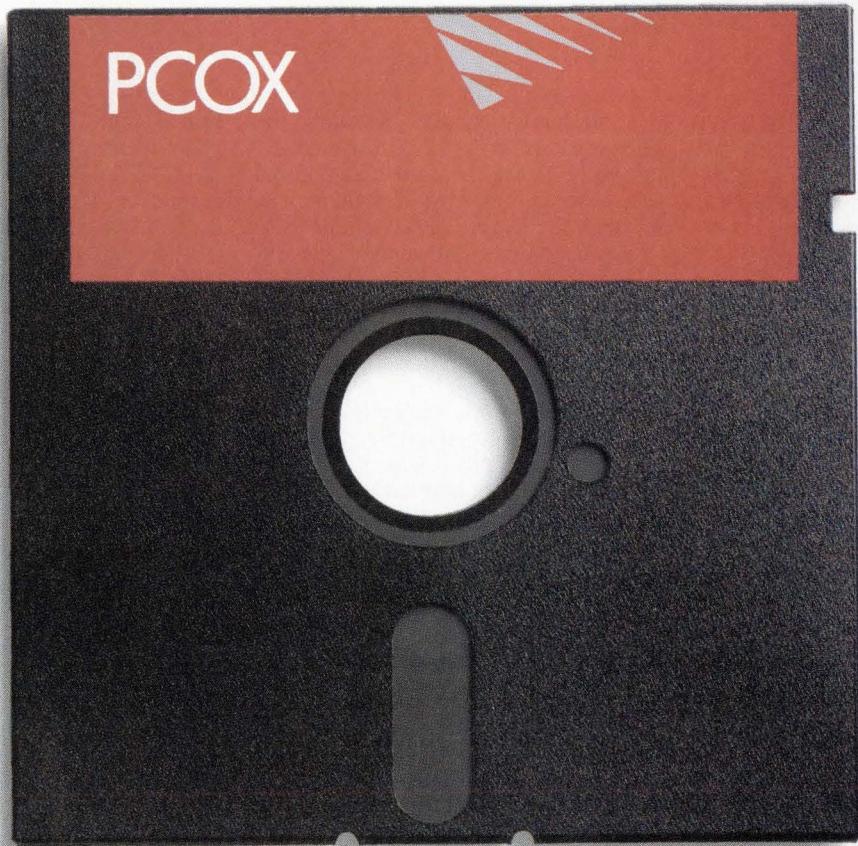
Most companies capture very basic information about program changes, such as the program's name, the change date, abend information, the time spent correcting the program, and the name of the maintenance programmer, but rarely is this information consolidated to make program defect reports.

At the Federal Reserve Bank of Dallas, we knew data were already being collected that taken together would delineate valuable information about the nature of our programs. During our initial search for this data, we discovered that several different areas within our data processing department were capturing

this information. Our financial area kept track of the time spent on maintenance projects and tasks. Production control retained abend and job rerun information. Operations maintained logs of any production problems. The librarian stored data associated with production changes implemented by the programmers. The project teams and individual programmers maintained detailed problem logs and records of their system and program changes. And the user departments kept records of the production changes for which they were billed.

We realized that if we were to merge these data with information gathered concerning the type of defect, the reason the change was initiated, and the type of productivity tools used to resolve the problem, we would have the beginnings of a continuous program modification and defect reporting system.

Rather than generate more paperwork, we formed a quality circle to make our production change form more user friendly and informative. The form is filled out by the maintenance programmer and copies are distributed to the various departmental sections and user departments. After redesigning the form, an on-line data collection and reporting system was designed and installed.



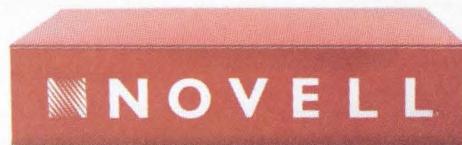
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Categorizing Program Changes

Most programmers take great pride in their work, reviewing and testing their programs as much as possible. If programmers are given a week to change or write a program, they will be finished in a week. If, however, a program abends at 3 a.m. and the reports are due out by 6 a.m., programmers will try to resolve the problem as quickly as possible. Since different programs are moved into production and are modified for different reasons, and since these determine the amount of time needed to effect the changes, we identified five production change categories to monitor.

- A planned, user-requested change, such as new system installations or updates.
- A change that originated because the computer hardware, an interfacing system, or the vendor software was altered.
- An unplanned, user-requested non-emergency change.
- A change initiated by the dp area in order to improve the efficiency of a program.
- An unplanned, emergency change usually resulting from a system or user abend.

Since planned, user-requested changes were primarily development projects and did not involve correcting defects, we did not capture the time associated with writing the programs. Our primary focus was on capturing defects after the programs were in production.

When we decided to measure unplanned program changes, we reviewed over 120 production change forms and noticed that certain types of problems were chronic. For example, file processing, table handling, internal sorting and merging, database, data communications, and general logic were recurring problem areas for unplanned/unscheduled/emergency changes. The general logic defects usually involved changing program logic for which there were no established coding rules. For instance, while there are set rules on how to make a database call or how to add data to a table, there are no predetermined rules on how to write a mathematical equation or how to validate data fields. This is where good programmers show their creative programming skills.

After reviewing over 250 general

logic production changes, we added the following kinds of logic: cyclical processing, data initialization, data validation and edit, error processing, computational, and data formatting. This was done to further decompose the general logic category, which accounted for over 80% of the program defects.

Of all the defect types we identified, more than half—all of which were the rule-oriented logic types—could be reduced by various fourth generation languages and code generators. The time spent correcting these defects, however, accounted for less than 20% of our un-



PROGRAM CHANGES AND DEFECTS NEED TO BE MONI- TORED AND MEASURED.

planned program changes. Another investigation showed that less than 20% of our time was spent correcting production abends, but it took 50% longer to correct programs with abends than it took to correct programs without them.

After cross-referencing the abend codes and the defect types, it became apparent that the code generators and fourth generation languages would not have been effective in preventing the abends. This is not to say that these tools do not improve productivity. But what they may save in actual programming and testing time could better be spent preparing more thorough program specifications and test plans and conducting specification walkthroughs and code reviews, which would have a greater impact on reducing the nonrule-oriented defect type.

Producing Different Reports

Using the data, we generated four basic cross-reference or correlation reports. They involved cross-referencing various factors, such as program names, defect types, abend codes, program characteristics, and maintenance programmer, with the number of hours, frequency of change, number of hours per change factor, and time trend changes.

For example, a quarterly defect report might identify the number of programs, the total time spent correcting the programs, and the average time spent per program for each defect type.

By multiplying the total correction time by your programmers' average hourly rate, and by estimating the average costs for compiles, timesharing, re-run resources, and production control, you can determine your maintenance costs by defect type. These include database call, data format, data initialization, date/cyclical logic, data edit and validation, error handling, file handling, general logic, tabling handling, and telecommunications calls. The cost per defect was highest for report format modification and was lowest for computational. You can also include the user costs, such as idle time, overtime, and possible loss of business.

This information could be used to alter your standards or system life cycle, or to determine the break-even point or return on investment for a productivity tool.

If you have historical data about how a system was developed, such as the type of design methodology, level of user involvement, type of programming specifications, or coding methodology, you can correlate this information with the cost of defect types and compare the effects of these factors on design methodology.

It is also possible to project the cost of correcting programs or systems that do not follow standards based on this historical data. For example, an unstructured program may take 50% longer to correct and is corrected more frequently than a structured program. These types of in-house data might be used to justify a structured programming class or a software tool that could convert your unstructured programs into structured programs. The results of the reports may lead you to develop a modified program development cycle that can be used whenever time and resources become critical.

The program development cycle usually consists of five steps: writing the program specification, walking through the specification, writing the program, reviewing it, and testing it. Because of deadlines and lack of resources, many programming managers concentrate on the program writing and testing phases, giving only token effort to the other three stages. But in skipping those steps, managers miss the boat, because they thereby miss the opportunity to identify

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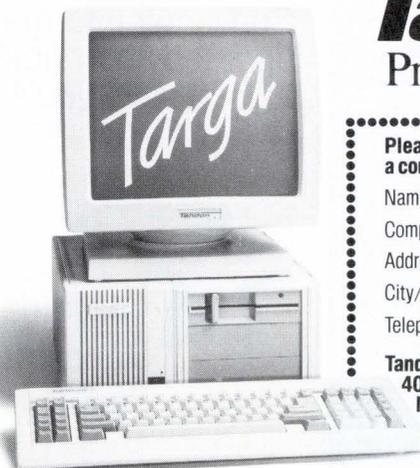
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the most frequently occurring defects in programs.

The modified program development cycle also consists of the same five steps. The program specification and review stages, however, focus more on defects that were identified from the historical database of defects. Since most of these defects are nonrule-oriented, this development cycle can also be used for programs that were written by code generators and later modified by your staff.

Other reports can also be generated from the collected data:

- *Frequency of change report.* Shows how frequently a program was changed over a period of time and the type of maintenance that was performed. This is an excellent report for identifying programs that should be rewritten.
- *Maintenance programmer report.* Shows the number of modules changed by a programmer. This could also be called the programmer "burnout" report.
- *System modification report.* Shows how frequently the programs in a system

were changed and who initiated the change. Should a user scream about the high cost of maintenance, this report can be very helpful in demonstrating that more time was spent making unplanned,

MEASURING DEFECTS CAN HELP TAKE YOU OFF THE DEFENSIVE.

user-requested changes than in making emergency changes.

- *Productivity tool usage report.* Shows the number of times that a productivity tool, such as one for testing/debugging, was used, and shows its actual effectiveness in improving productivity. You may be surprised to find out that you are pay-

ing for a tool that nobody really is using. It may mean that your staff needs to be trained in its use, or that the tool is not effective under your current operating system.

Measuring defects provides you with strategic knowledge that can make the difference between being on the defensive and being on the offensive. While a good defense can hold off your adversaries, you may find that you have to fight forever. A good offense can disable your opponents and halt the fight. If you find yourself constantly fixing programs, but not gaining any ground on your backlog, then no doubt you are an excellent defender. But if you learn to identify the types of defects that sneak into your production, and then cut them off at the program development pass, you can free up your energies and your resources for more fruitful tasks. ■

Anthony R. Reed, a quality assurance consultant at the Federal Reserve Bank of Dallas, designed and wrote the program modification and defect reporting system described in this article.

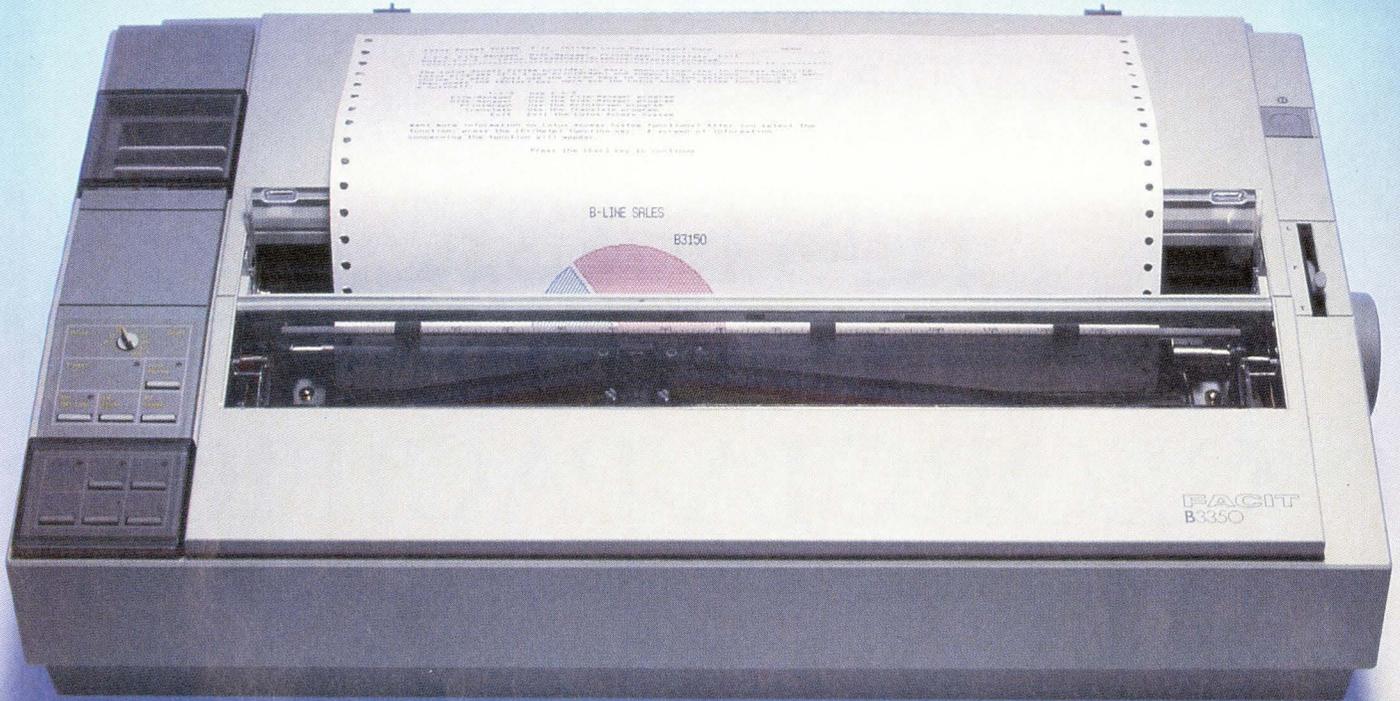
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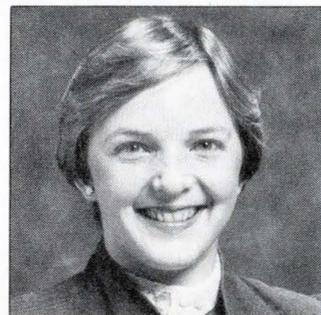
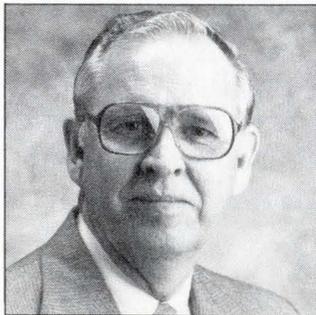
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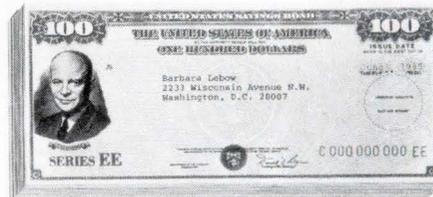
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How Strategic Is Information Systems Planning?

BY WILLIAM R. KING AND
T.S. RAGHUNATHAN

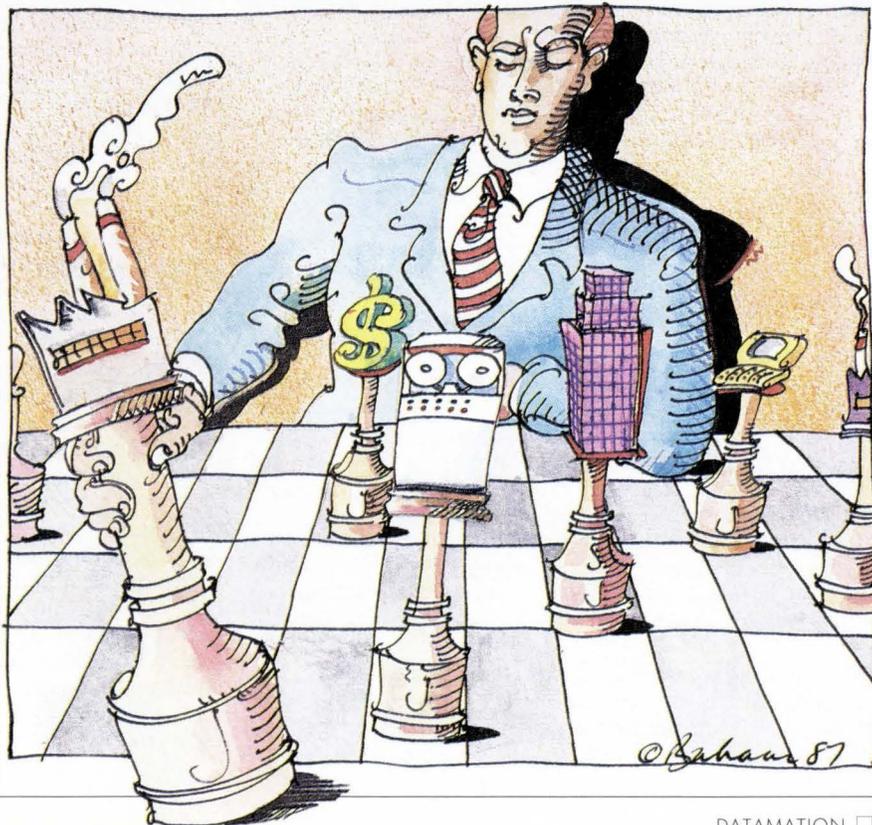
In an age with so many diverse opportunities available to develop and use information technology, IS planning activities have become a necessity. Firms that fail to plan their information systems agendas carefully may find that they have invested huge sums in systems that do not suit their business objectives or that do not meet their information goals. Even though everybody's doing it, no one seems to know what constitutes good information systems planning, or what makes it successful.

How can you ensure that IS planning will be effective and valuable, and prove that what academics and consultants ad-

vocate in theory works in practice?

Recently, we conducted a large-scale study of IS planning under the sponsorship of the Katz Graduate School of Business at the University of Pittsburgh. The study was done in cooperation with the Chicago-based Society for Information Managers.

The study was the first of its kind to collect data from both end users and from IS executives within the same companies to explore the nature of information systems planning. This approach provided us with independent viewpoints on the extent of planning and on the impact of that planning, measured in terms of user satisfaction. A total of 140 companies, each represented by two independent respondents, furnished the data that were



IS planning is something everybody talks about and does, but no one seems to know what makes it work—if it does. Rating its impact on the basis of user satisfaction, we found that IS planning does work. However, you should not conclude that if a little planning is good, even more is better. There is a limit beyond which resource commitments to IS planning do not pay off. Nor should you expect overnight results: the impact of good planning may take years.

Illustration by Yvonne Buchanan

Is Info Systems Planning Strategic?

used in the analysis (see "Measuring Methods").

The study focused on three major levels of information systems planning: strategic planning, systems planning, and plan implementation. These three levels were for our use only. We did not impose this structure on the survey's respondents.

The impact of these three levels of IS planning was assessed by employing a user satisfaction survey questionnaire. We hoped to discover the degree to which the users of information systems believe that a variety of specific information-related functions are well served by the organization's information systems operation.

In other words, user satisfaction with the overall level of support provided by the organization's information systems department is a surrogate measure of the organizational impact of IS planning. While it may be argued that this is a limited measure at best, from our experience it has been a reasonably valid as-

essment and has yielded useful insights into information systems management practices.

Strategic Planning Significance

The results of the statistical analyses indicate that both the systems planning and plan implementation phases have a significantly positive impact on information systems. Interestingly, the relationship of IS strategic planning to user satisfaction is not statistically significant, indicating that the two later phases of information systems planning may actually be more important.

It would seem that, contrary to the prescriptions of academics and consultants, the much-touted set of management activities that constitute IS strategic planning does not appear to have as much effect on user satisfaction as the traditional kinds of planning activities associated with systems integration and plan implementation. This may have far-reaching implications for IS chiefs who constantly must decide how best to

allocate limited managerial resources.

A caveat that may apply here is that since IS strategic planning activities have only recently begun in most organizations, their impact may not yet have been fully realized. (Our survey showed that more than 50% of the firms responding had begun planning for information systems only in the last five years.) So, we further examined the somewhat surprising finding by splitting the sample companies into two groups: those with three or more years of experience with formal IS planning and those with less than three years.

When the relationship between the extent of IS strategic planning and user satisfaction is compared in the two

Measuring Methods

Since nothing exists in a vacuum, when we set about to measure the effectiveness of IS planning we sought to compare the planners' assessments against the evaluations of the end-user beneficiaries. Working with members of the Society for Information Management, we were able to obtain "matched pair" data from the sample of 140 firms.

IS managers in the member companies provided data on the extent to which their firms conduct various specific planning activities and tasks that are related to the three levels of planning (strategic planning, systems planning, and plan implementation); correspondingly, business managers who were identified as intensive users of a variety of organizational information systems evaluated IS performance. We were thus able to gain an independent assessment of the organizational impact of planning in terms of users' overall satisfaction with the resulting information systems.

In all instances, the three planning levels were used for purposes of analysis only. They were not imposed on the respondents. Questions were asked in terms of very specific identifiable activities that are generally thought of as making up each of these three planning levels so that the respondents did not need to conduct their planning according to these phases or even to understand or agree with them in order to respond meaningfully.

The various strategic factors were described in terms of a variety of activities involving the future of computing, the future roles of various IS customer groups, and other activities that are generally associated with strategic planning. For instance, the extent to which the firm considers future end-user environments and the extent to which it considers future technological developments in constructing its plans were associated in the data analysis with the IS strategic planning level.

Similarly, items that are related to planning for the integration of systems were combined into assessments of the IS systems planning phase. The systems planning level was described in terms of various functions and activities that are generally related to the integration of multiple organizational information systems.

Those aspects of IS planning that are related to how well the plans are translated into action were combined into an assessment of the implementation of IS plans. Plan implementation was described using activities associated with "actually getting it done."

STEERING COMMITTEES MAY MAKE STRATEGIC PLANNING WORK.

groups, the difference is statistically significant. In the case of those organizations where formal IS planning has been in existence for more than three years, IS strategic planning is more positively related to user satisfaction than in those in which it has existed for less than three years.

This could mean that it may take at least three years for IS strategic planning to have a substantial impact on end users. It is important to realize, though, that such a lead time exists so that a company can effectively plan for the implementation of strategic planning in its organization.

The analyses also revealed that all three planning phases are strongly related to one another, indicating that companies that devote substantial attention to one of the three phases also tend to focus substantial attention on the others as well. Thus, none of the stages is likely to exist in isolation, invalidating the common caricature of strategic business planning as an activity that is carried out at a theoretical level without ever being put into practice.

The earlier finding, however, that

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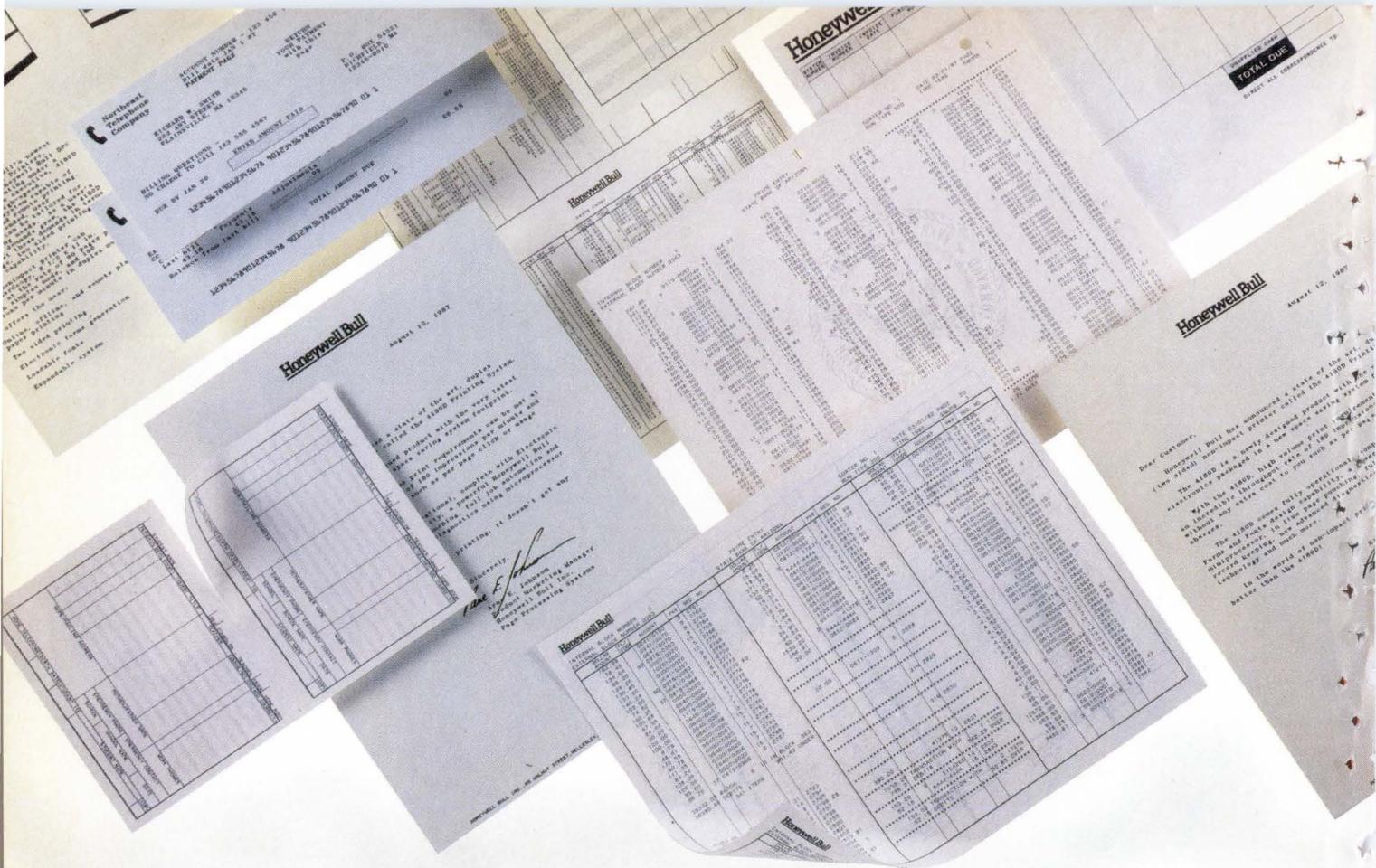


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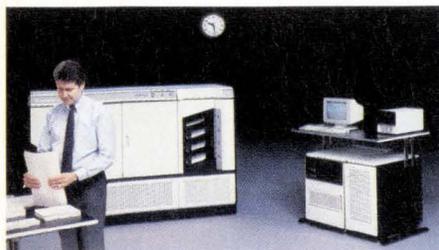
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Is Info Systems Planning Strategic?

the strategic planning phase of overall information systems planning did not have a significant impact on user satisfaction made us wonder if there might be any identifiable characteristics or conditions among firms that might enhance the efficacy of strategic systems planning. Firms with steering committees held the potential of providing such a characteristic.

Steering Committees Used by 60%

Prevailing wisdom emphasizes the importance of steering committees for the success of the IS function in companies. About 60% of the IS executives who

**IT TAKES TIME
FOR PLANNING
TO HAVE AN
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responded say that their firms use IS steering committees. In about half of those, the committees had been started after formal planning efforts were begun. In the other half, both were launched at about the same time.

Companies that had used steering committees for at least one year were analyzed separately and compared with firms that had used them for less than a year, or not at all. Interestingly, in the group of firms that were experienced with steering committees, there was a significant positive statistical relationship between the extent of strategic planning and user satisfaction. This suggests that these committees may, in fact, be very important in making strategic IS planning work.

Firms that use steering committees and those that have had IS strategic planning for more than three years were the only subsets of firms in which a significant positive relationship exists between strategic IS planning and user satisfaction.

The question of what makes IS planning effective must necessarily deal with the appropriate level of resources to devote to these planning activities. To address this question, we categorized the companies based on their *relative* levels of resource allocation to IS planning. The

industry average seems to be a rough indicator of the most appropriate level of resources commitment. We found the relationships between the extent of planning and its impact to be much stronger and more significant at average levels of resource allocation than at above-average levels.

While this is a crude indicator at best, it suggests that the declining-marginal-returns phenomenon that characterizes virtually all managerial activities is at work. That a little IS planning is good does not imply that more is even better. Thus, you may be well advised to engage in some formal IS planning (perhaps as high as the average level for your industry), but avoid overcommitting to increasingly sophisticated and increasingly costly planning efforts.

The expenditure of resources for more extensive and sophisticated planning does not necessarily lead to greater user satisfaction. Should you decide to institute IS planning, you should do so in a measured way. And not only should resources be carefully apportioned, but expectations as well.

You should not expect to gain quick results from information systems planning, because when too much is expected of a managerial activity too soon, it is often perceived to have failed when those unrealistic expectations are not met and it is then aborted. The results of good planning don't happen overnight, they take years. ■

A professor at the University of Pittsburgh, William R. King was senior editor of MIS Quarterly.

T.S. Raghunathan is assistant professor of business at the University of Toledo, Ohio.

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Indesys' product, called Personal Information Network (PIN), is being used for "scheduled" delivery of information, as opposed to real-time delivery, the way this technology has been most widely used. Indesys is hoping to offer users a low-cost alternative to facsimile machines and public e-mail services. The company says PIN will allow a user at one location to send information to many locations at three different speeds: 10 minutes (MaxMail), one hour (Digitext), and overnight, to arrive by 8 a.m. local time (Nitetext).

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BY THERESA BARRY

Pyramid Technology has entered the transaction processing market with a family of five systems. Specially modified 32-bit Pyramid Series 9000 computers have been outfitted with a new database manager and development products from Berkeley, Calif.-based Sybase Inc.

The R*TP has what Pyramid calls a requester/server architecture, which separates user application logic and presentation from database access, permitting cooperative processing between networked workstations (requesters) and dedicated database servers. The Sybase DataToolset (requester), which runs on workstation front ends and terminals, manages the data presentation and presentation logic. The Sybase back-end DataServer (server) provides transaction logic, data integrity logic, data access, and concurrency control.

The R*TP systems operate an enhanced version of Pyramid's dualPort OSx, a concurrent implementation of AT&T System V and Release 4 BSD versions of Unix. OSx works tightly with the

Sybase back-end DataServer to create a transaction processing kernel to speed up transaction rates, says Pyramid. The company claims OSx is still upwardly compatible and adheres to Unix standards.

Changes to database design and schema can be made on-line while other applications are running, Pyramid says. Database backup is dynamic and includes tape handling facilities to build tape libraries. Optional hardware includes dual ported and mirrored disks, multiple cpus, universal power supplies, and full transaction shadowing by distributed systems synchronized by two-phase commit.

All five R*TP systems are available now. Pyramid says they are all source- and object-code compatible, and their fields can be upgraded. Basic systems include memory, disk and tape drives, I/O and networking subsystems, enhanced OSx, and the Sybase data-server. Model 50 is priced at \$165,000, Model 100 is \$295,000, Model 200 is \$410,000, Model 300 is \$560,000, and Model 400 is \$675,000. A maximally configured Model 400 supports 512 direct

terminal connections, hundreds of workstations, 128MB of memory, and 32GB of mass storage. Upgrade kits to convert existing Series 9000 systems into an R*TP are available. PYRAMID TECHNOLOGY, Mountain View, Calif. CIRCLE 250

System/3x Terminals

Ideassociates expands System/3x product line.

Ideassociates' Idea 197 terminal series for IBM System 34/36/38 minicomputers consists of three models.

Model 197-1 features one 3180 display session; the 197-2 features two 3180 sessions; and the 197-PT features two display sessions, one of which can be used for system printer emulation. All of the terminals attach directly to the S/3x or 5294 controller via twinax cable. The 197-PT, in addition to enabling any serial or parallel PC printer to emulate the IBM 5219 system printer, offers emulation of the 5224 and 5225 system printers with graphics support, as well as the 5256.

All of the new terminals have a 14-inch display and offer 80- or 132-column display mode. International language keyboard support is provided for the 122-key keyboard. An alternate station addressing feature allows users to free host sessions independently. A record/playback capability allows for storing frequently used key sequences. Type-ahead buffering allows keystrokes to be saved even if a session is exited.

All three terminals are now available. The 197-1 costs \$1,195; the 197-2 costs \$1,295; and the 197-PT costs \$1,495. IDEASSOCIATES INC., Billerica, Mass. CIRCLE 251



New Multispeed Laptop

NEC adds a 20MB hard-disk version of PC-compatible laptop.

The MultiSpeed HD from NEC Home Electronics is a 20MB hard-disk version of its MultiSpeed IBM-compatible laptop computer. The MultiSpeed HD has a 20MB hard disk, a 3.5-inch floppy disk drive, an electroluminescent, backlit, supertwist liquid crystal display, a two-speed NEC V-30, a 16-bit 8086 processor, and 640KB of RAM.

The 14-pound MultiSpeed HD is two pounds heavier than the MultiSpeed EL because of the hard disk. NEC says it used plated media in the hard disk to protect against head crashes. Battery life is one to two hours with continuous screen backlighting and hard disk operation, two to four hours with partial operation, and up to six hours with both the backlighting and hard disk turned off. A warning light glows when battery life is down to 10 minutes, and an audible alarm is sounded when it drops even lower. A user has the option of continuing to use the hard disk, or if he or she chooses not to, the drive shuts down and cannot be accessed again

until the unit gets additional power. Ports include an RS232C, Centronics parallel, RGB video, and floppy disk controller/expansion.

The MultiSpeed HD is available this month for \$3,695.

NEC has also made available a 2,400-baud, Hayes-compatible modem that fits inside its MultiSpeed laptops. It can be switched between 300, 1,200, and 2,400bps and operates using the Hayes AT command set. The modem at 2,400 baud is \$499, and the modem at 1,200 baud is \$399. NEC HOME ELECTRONICS (U.S.A.) INC., Wood Dale, Ill. CIRCLE 252

Accelerator Board

Applied Reasoning says it works in any PC, XT, or AT.

The PC-Elevator 386 from Applied Reasoning is a 386 plug-in accelerator board that the company claims works in any PC, XT, AT, or compatible. The board runs an Intel 80386 processor at 16MHz with a 32-bit bus. Included are 1MB of on-board RAM, expandable to 16MB with daughter cards. The vendor rates its board at 2.3MIPS and at 18.7 on the Norton score, making it three to four times faster than an AT and 10 to 20 times faster than a PC or XT. An 80387 floating point processor is optional. Applied Reasoning says installation of the board requires no modification of the host computer and requires no cables to attach. It works in tandem with the host processor for handling I/O.

The PC-Elevator 386 is available now for \$1,995. APPLIED REASONING CORP., Cambridge, Mass. CIRCLE 253

Tape Subsystem for VAX

Allows for storage of up to 2.3GB of data on 8mm videocassette.

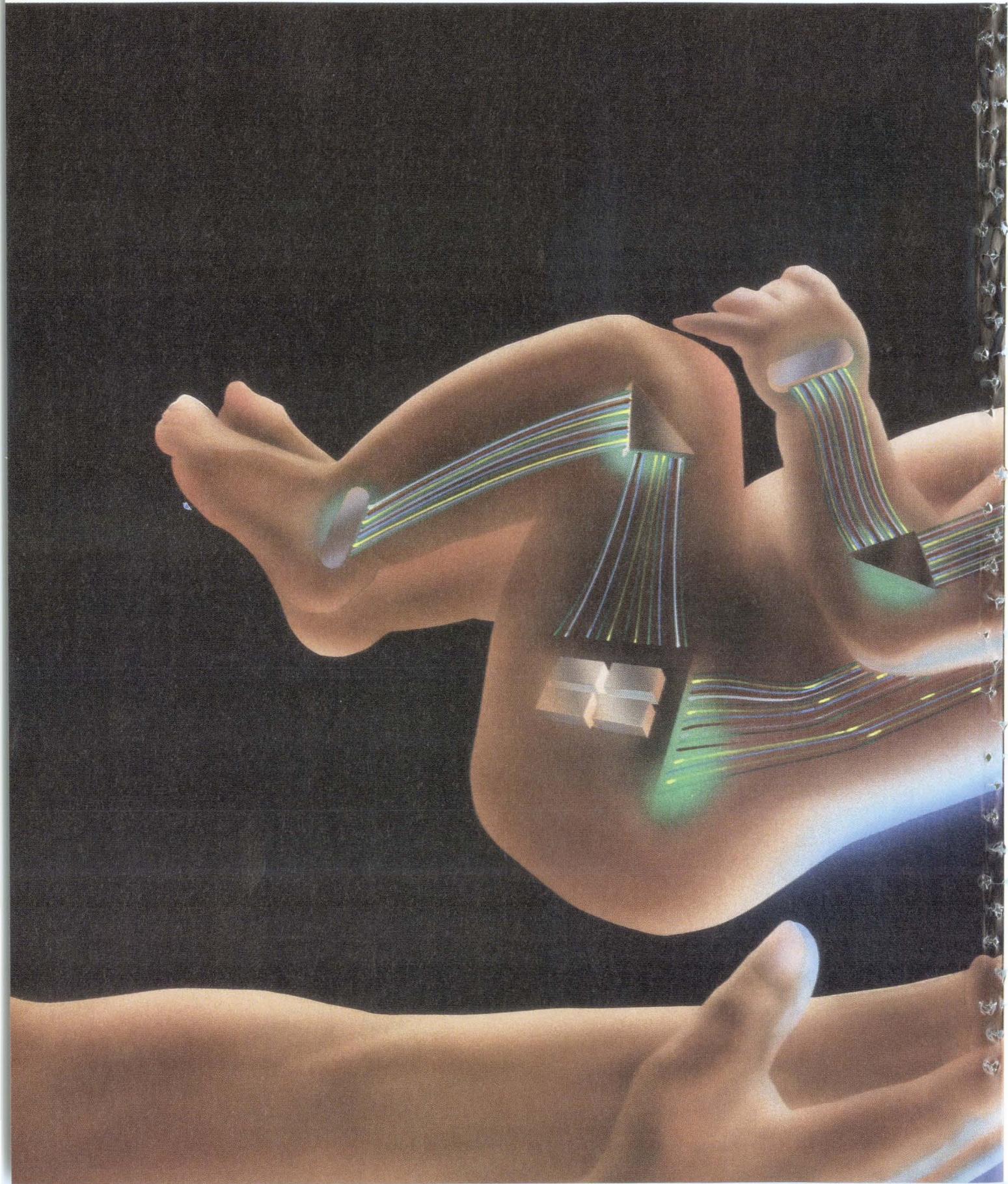
Transitional Technology Inc. has made available its CTS-8 family of high-capacity tape subsystems for VAX and MicroVAX computers.

The vendor says it employed helical scan technology to produce the subsystem, allowing for the storage of up to 2.3GB on an 8mm videocassette, the same media that is used for consumer video camcorders. Transitional claims the particle tape used has a higher coercivity than that traditionally used for data storage, making it less prone to magnetization from stray magnetic fields. The error rate is less than 10^{13} , says the vendor. An integral 256Kb buffer provides start-stop performance and allows for the

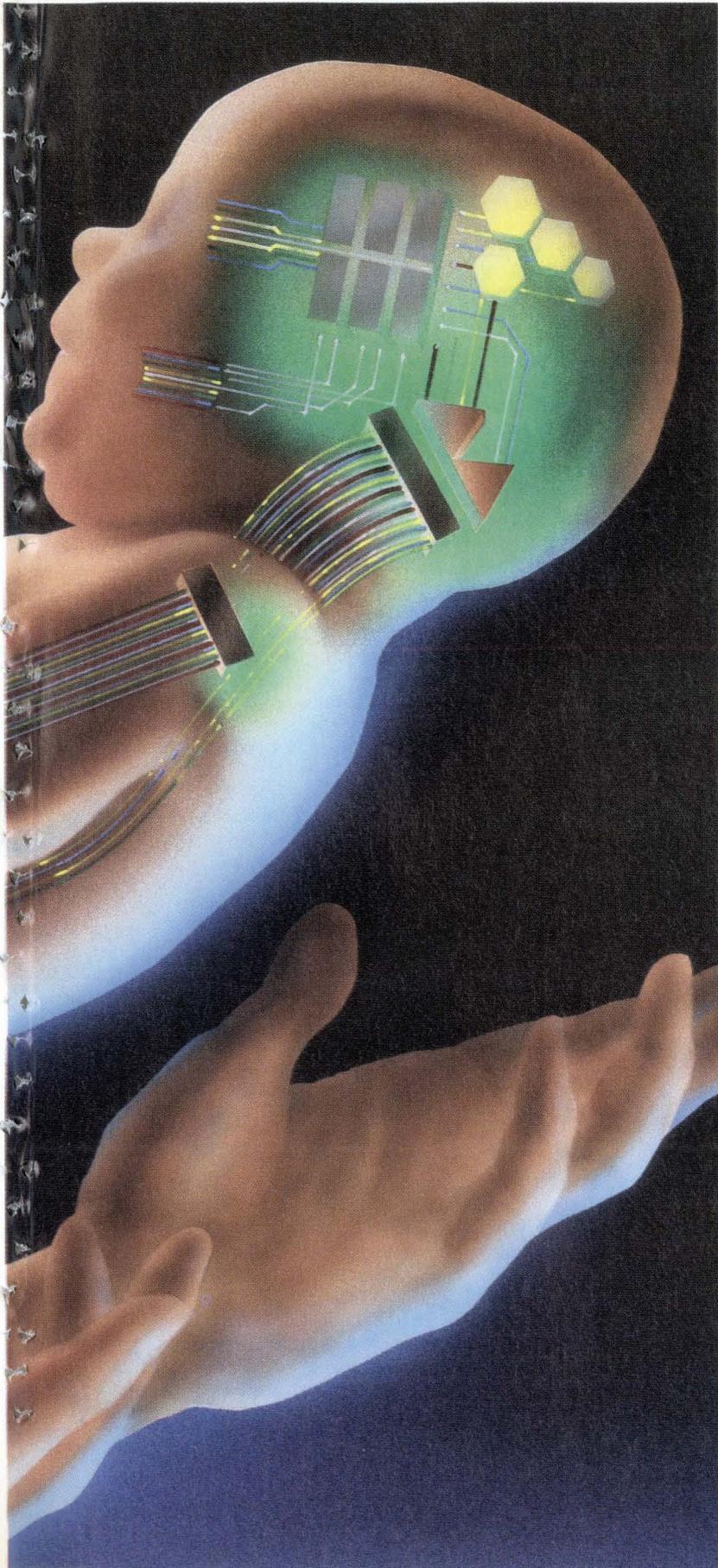


Ideassociates' three new 197 series terminals for IBM System 34/36/38.

ANNOUNCING THE BIRTH



OF A NEW CONNECTION.



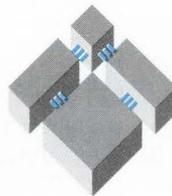
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drive's maximum transfer rate of 246Kbps.

The CTS-8 is available now as a complete subsystem for both Unibus and Q-Bus VAX systems and can be mounted directly in an existing BA-23 or BA-123 enclosure or supplied in its own tabletop enclosure. It's fully compatible with the VMS backup and copy utilities. Pricing for the CTS-8 begins at \$5,995 for an internal mount Q-Bus system in unit quantities. TRANSITIONAL TECHNOLOGY INC., Orange, Calif. CIRCLE 254

Laser Printer

Lexi's twinax, coax IBM-compatible printers with Prescribe PDL.

Four new laser printers, two for the Coax A and two for the twinax marketplaces, are now available from Lexi Computer Systems. The coax 2087 and 3087 and twinax 2019 and 3019 all feature Prescribe, a page description language developed by Kyocera of Japan, which allows for the integration of text with charts, boxes, and circles. Lexi claims Prescribe is faster than competitive PDLs because it requires less memory in order to generate graphics.

The 2087 and 2019 offer 10ppm printing while the 3087 and 3019 feature 18ppm. All are based on the laser printer engine provided by Kyocera. Users can select from a resident library of 38 fonts in the 2087 and 2019 and 78 fonts in the 3087 and 3019. The 2087 and 3087 printers emulate the IBM 3287, 4214-2, and 3268, and operate in the LU 1, SNA, and LU 3 non-SNA environments. Both attach directly to IBM 3174, 3274, and 3276 controllers. The 2019 and 3019 feature computer output reduction, an emulation of the IBM 3812 laser printer. This allows Lexi's printers to print documents with a line length greater than 80 columns. Lexi says the 2019 and 3019 can also be used for IBM Displaywrite/36 applications. A switchable RS232C interface in all four printers allows optional connection to pcs, making the printers emulate the HP LaserJet, Diablo 630, IBM Graphics Printer, Qume Sprint, NEC Spinwriter, and Epson FX80.

Lexi claims that both printers have a 3,000-page toner cartridge life, a drum life of 10,000 pages, a developer life of 50,000 pages per unit, and a modular toner, drum, and developer configuration. The 2087 costs \$6,995; the 3087 costs \$10,995. LEXI COMPUTER SYSTEMS CORP., North Andover, Mass. CIRCLE 255

Work Group Communication

Zymacom offers messaging system with open architecture.

Zymacom has introduced ZACH, the Zymacom Automated Communication Hub, an open architecture, integrated messaging system that the company is gearing toward work groups and departments within organizations. The four-module system allows the use of existing telephone or PBX wiring and office automation equipment, and users have the option of either building a system module by module or of purchasing the entire ZACH system.

The company claims its new messaging system will help cure some of the most common communications problems associated with telephone use: telephone tag, missed messages, and time zone conflicts. The ZACH system, says Zymacom, is accessible through a touch-tone telephone, pc, or communications terminal, and it requires little user training.

The four modules of ZACH are ZACH-Mail, a text and voice messaging capability; ZACH-Net, a networking capability; ZACH-Query, an audiotex capability; and ZACH-Ware, a set of productivity tools.

ZACH-Mail offers voice messaging, e-mail, and automated attendant capabilities. Users can input a phone extension on their Touch-Tone phone without going through the company PBX. Callers can leave voice and/or text messages through the messaging function. Message notification, delayed message transfer, and a message light attached to the phone or pc are featured.

ZACH-Net acts like a LAN using existing wiring, says Zymacom. Users on the system can pass messages among themselves, and they can also access the system via modem.

ZACH-Query is the audiotex module. Through a Touch-Tone phone, callers can get information in audio form without talking to an individual. Zymacom says this will be especially useful in customer support areas where the same questions are frequently asked.

ZACH-Ware is a set of productivity tools for work-group time and information management. It allows users to share files and offers features such as a calendar and "to do."

Prices for ZACH range between \$24,500 and \$137,000, depending on configuration. ZACH is available now. ZYMACOM, Westford, Mass. CIRCLE 256



Raster/Vector Scanner

Ana Tech's scanners feature patented document analyzer.

The Eagle family of high-resolution CCD scanners from Ana Tech features VANA, a patented document analyzer that converts captured raster data to vector format in real time, the company says. The analyzer supports other scanners, such as those from ECRM, Imagitex, III, and Vecsatec. The Eagle scanners have a mean time between failures of 5,000 hours. Scanner specifications include line width detection of 0.002 inches, variable scanning speed and resolutions of up to 1,000lpi or 1,600lpi. They come with a patented, continuous feed roller, which accepts paper, mylar, vellum, or film up to 0.010 inches thick.

Ana Tech's five new scanners join two existing models. The 6050 scans up to 60 inches wide at 500lpi. It's priced at \$90,000. The 2480 scans up to 24 inches (D size) wide at 800lpi, interpolated to 1,600lpi. Its field can be upgraded to 44 inches wide (E size), and it costs \$60,000. The 2450 scans D size at 500lpi, interpolated to 1,000lpi. Its field can be upgraded to E size; it costs \$55,000. The 1680 scans at 16 inches wide at 800lpi, interpolated to 1,600lpi. Its field can be upgraded to D or E size; it costs \$50,000. The 1650 scans C size at 500lpi, interpolated to 1,000lpi. Its field can be upgraded to D or E size; it lists for \$45,000.

Standard operating platforms for Eagle scanners include the full range of Sun 3, Apollo Domain, IBM PC AT, and Digital Equipment Corp. workstations. Interfaces to Auto-trol and Computervision are available from the vendors. CAD-compatible output formats are available for Intergraph, CADAM, CalComp, AutoCAD, Interleaf, and InterCAD.

The VANA document analyzer is available separately for \$15,000. ANA TECH CORP., Littleton, Colo. CIRCLE 257



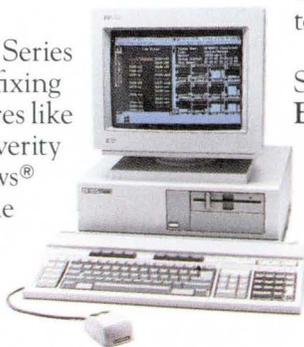
Wouldn't it be nice if isolating network problems was this easy?

Our new network managers let you find problems and fix them faster and easier than ever before.

At Codex, we understand that no one relishes the thought of looking for network problems. Because if you don't find problems and fix them quickly, chances are they'll find you.

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UPDATES

PROTOCOL ANALYZERS, also known as network analyzers and by a variety of other monikers, are beginning to proliferate almost as much as are local area networks, their raison d'être. The companies supplying the products in this market niche tend to be of the small, startup variety (see "Practical Network Problems Commanding Users' Attention," Oct. 15, p. 19).

Although such companies as Excelan Inc., San Jose, and Network General Corp., Sunnyvale, Calif., are providing hardware/software combination products priced from \$10,000 at the low end to \$25,000 at the high end, a Boston-based startup called ftp Software Inc. is offering a software network analyzer for IBM PCs and compatibles priced at \$1,200. Granted, you do need the hardware to run the software, but, says Roger Greene, ftp's vp of sales and marketing, "A user can buy an AT for about \$3,000 and a network card for \$500" and still come in well under \$10,000. According to ftp, the analyzer, called LANWatch, can run on any PC on the network, and, if the PC is needed only occasionally for LAN management, it can also be used for other tasks. No dedicated network analyzer hardware is required.

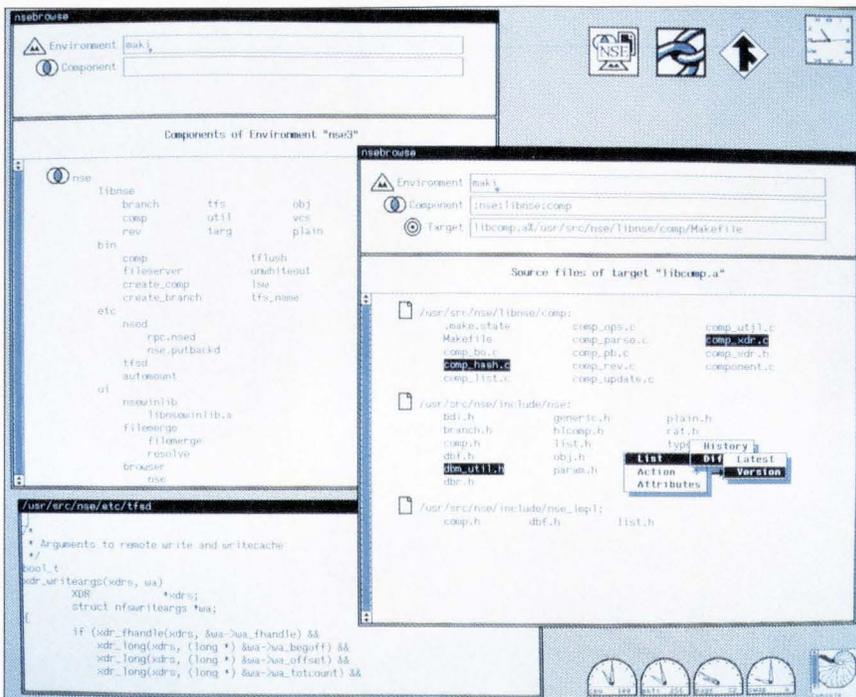
LANWatch is an Ethernet network analyzer for IBM PCs and compatibles; it monitors Ethernet traffic by capturing packets of data as they pass through and by storing them for later referral. The company claims that special filters in LANWatch can capture selected packets when only certain categories are of immediate interest.

LANWatch has two modes: display and examine. In display mode, all packets on the Ethernet are captured. In examine mode, the user can scroll among stored packets or zoom in on an individual packet in detail. Examine mode shows the full packet header and the actual data stored.

LANWatch is the second product from two-year-old ftp, which introduced its first product, PC/TCP, in March '86. PC/TCP, as the name implies, is an implementation of the Department of Defense's TCP/IP protocol family for the IBM PC and compatibles.

LANWatch is available now on Ethernet for the Excelan EXOS205 and 205T boards, the Micon-Interlan NI5010 and 5210 boards, and the 3Com 3C500. It will be available for BICC, National Semiconductor, Proteon, Ungermann-Bass, Western Digital, and additional 3Com boards in the near future.

SOFTWARE



Sun Microsystems Shows CASE Network Environment

The company's new product is designed to integrate software development projects.

BY THERESA BARRY

Sun Microsystems' Network Software Environment (NSE) is the company's platform for integrating the software development life cycle of large-scale software development projects. In addition to use within the Sun organization, the company is targeting aerospace companies, defense contractors, and government prime contractors as users of NSE.

Sun is calling NSE a generic platform. An interface for the integration of other CASE products is provided, and, says Sun, newly developed technologies will be able to be integrated. NSE supports various development objects used in software development, including source code and associated files, project requirements, design documents and drawings, test data and drivers, schedules, budgets, and staffing plans. Sun says NSE offers what they are calling parallel development, which allows two developers to work separately on the same

file. The system then merges as much of the two developers' work as it can.

As an Open Network Computing product, NSE is claimed to provide transparent access to development objects throughout the network. Concurrent operations do not interfere with each other, and machine or network failures are automatically detected. The NSE Version Control System provides a record and history of different versions of all objects.

NSE will be available to end users in the first quarter of '88. The price is \$2,500, and network pricing is available. In the next nine months or so, Sun plans to support military software development requirements and remote development, and plans to add additional integrated life cycle tools and support on future hardware products. Sun says it will also continue to develop third-party software agreements for the CASE market.

Sun has also announced Suntrac, the integrated project management pro-

gram in NSE acquired from Ford Aerospace. It includes standard management tools, like gantt and pert charts and critical path method techniques. It has a mouse-driven graphic input system, risk management as required by DOD-STD-2167, risk analysis of cost and schedule, overtime allocation, a 10,000-node capacity, and LaserWriter support. It's priced separately at \$2,495. SUN MICROSYSTEMS INC., Mountain View, Calif. CIRCLE 260

New ADR Products

Systems include text/voice e-mail and CASE tool.

Applied Data Research recently made some additions and enhancements to its line of performance software tools.

eMail-Voice is an electronic information delivery system that provides text and voice to computer workstations or telephones from a corporate database. ADR says that because eMail is integrated with its Ideal and Dataquery software, information from the corporate database can be stored as an eMail message. The content of the reports can be transmitted by phone to the recipient via the CallText Voice Gateway. Speech Plus's CallText System is being used for this. eMail-Voice operates under VSE and MVS with CICS; MVS with Roscoe; and VM/CMS and TSO under MVS. It runs on IBM 3270 or compatible terminals and TTY or compatible devices and touchtone telephones. Prices start at \$54,000 for a package including ADR/eMail, the CallText Voice Gateway, and the CallText System.

In the second quarter of '88, ADR will make available Depictor, the company's first CASE product. Depictor works on both mainframes and pc workstations, and its initial release will provide facilities for data modeling and database design, says ADR. Analysis and design information can be stored in ADR's Data-Dictionary and shared. The mainframe portion of Depictor is used for large system modeling tasks requiring interactive access to the central model and for maintaining security. The pc workstation portion is used for interactive graphics and is based on technology from CADWare Group Ltd., New Haven, Conn. The mainframe portion operates in the standard Datacom/DB environment under VSE, VM/CMS, MVS, and MVS/XA. The pc component operates on IBM PCs, including PS/2s, and requires 640K of RAM and a hard disk. Prices range between

\$24,500 and \$28,500. A pc version is included; additional pc versions are \$3,500.

Mindover MVS is ADR's first expert system offering. Mindover MVS has four components. A knowledge base consists of an MVS rule-set; a run-time system includes the inference engine; a mainframe command set resides on the mainframe and collects the data required to perform analysis; and a communications link establishes the connections between Mindover MVS running on the PC, and the Mainframe Command Set. ADR says it's a menu-driven system for both on-line and off-line analysis of applications running under MVS and MVS/XA. Conclusions and recommendations are displayed on-line while the analysis is taking place. Mindover MVS runs on the IBM AT and compatibles with 580K of memory available and at least 4MB of available hard disk. An appropriate monitor; a CGA, EGA, or compatible adapter; an IRMA board; and IBM PC DOS 3.0 or higher are also necessary. It's available this quarter for \$42,500.

ADR has added full SQL support in Version 8 of Datacom/DB, its relational DBMS. Datacom/DB Version 8 is priced at \$114,500 for VSE and VM/CMS environments and at \$145,900 for MVS environments. It will be delivered in the second quarter of 1988.

Version 2 of Ideal, ADR's application development system, was also announced. With this release, scheduled for delivery in the first quarter of '88, ADR will support DB2 and Datacom/DB. ADR says Ideal Version 2 will directly support the embedding of DB2 SQL statements within the Ideal procedural language. It will cost \$175,000. APPLIED DATA RESEARCH INC., Princeton, N.J. CIRCLE 261

Ada Development System

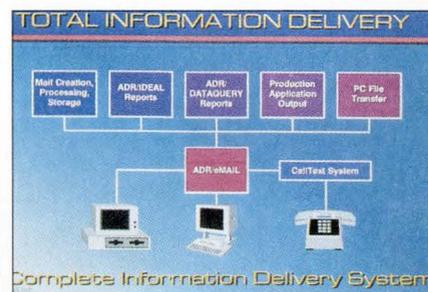
Pyramid unveils product to run across its entire hardware line.

The Pyramid Ada Development System is the result of a relationship between Pyramid Technology and Verdex Corp., McLean, Va. The system's Ada compiler was designed to meet the specifications of ANSI MIL-STD-1815 for mission-critical and fault-tolerant computer systems as required by the DOD (Department of Defense), NATO, and NASA. Pyramid says it will market its Ada to prime government contractors with defense contracts. Ada will be submitted for government validation in the first quarter of '88, and pre-validation copies will be available then.

Pyramid's Ada consists of a screen-

oriented symbolic debugger, library management and program utilities, and a run-time system. The company says it operates with the full support of Pyramid's OSX operating system.

On 9840 and 9830 multiprocessor systems, Ada is priced at \$50,000; on 9820 and 9810 systems, it's \$40,000; on



9805s, it's \$30,000; for installed 98x/xe systems, it's \$25,000; and for installed 90x and WorkCenter systems, it's \$20,000. PYRAMID TECHNOLOGY CORP., Mountain View, Calif. CIRCLE 262

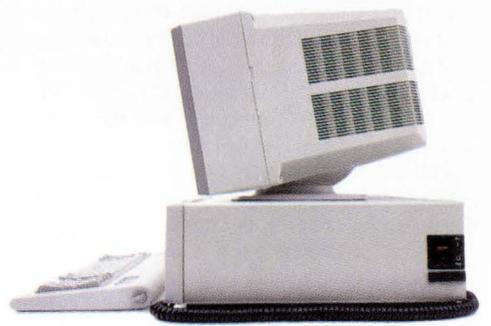
E-Mail for IBM VM

Soft•Switch provides products to integrate e-mail networks.

Soft•Switch has introduced a series of electronic mail connectivity products for the IBM VM environment. The company says they transparently interconnect the e-mail systems of IBM, Digital, Wang, HP, Novell, 3Com, NBI, and Xerox for the interchange of messages and documents that can be edited. The products can also be used to enhance SNA by exploiting SNADS capabilities. The new products are Central/VM, SNADS Gateway/VM, PROFS Gateway/VM, and Mailway Gateway/VM.

Central/VM is a platform for the other gateways. It's an e-mail network switch that provides network routing functions, directory services, document translation services, and logging and accounting services. It supports the distribution of final form messages and the interchange of documents that can be edited.

SNADS Gateway/VM executes in the Central/VM environment. Soft•Switch says it's a full implementation of the SNADS protocol and includes a proprietary LU 6.2 interface. It does not require use of any IBM subsystem besides VTAM, says the company. Soft•Switch certifies that it will connect directly to IBM's SNADS protocols DISSOS, 5520, PS/36 on the System/36, and PS/38 on the Sys-



How to get your PCs on speaking

You've got a lot invested in the many elements of your Data Processing operation. Mainframe applications programs. PC software applications. And the necessary micro-mainframe links. But your PCs and mainframe still aren't talking the same language.

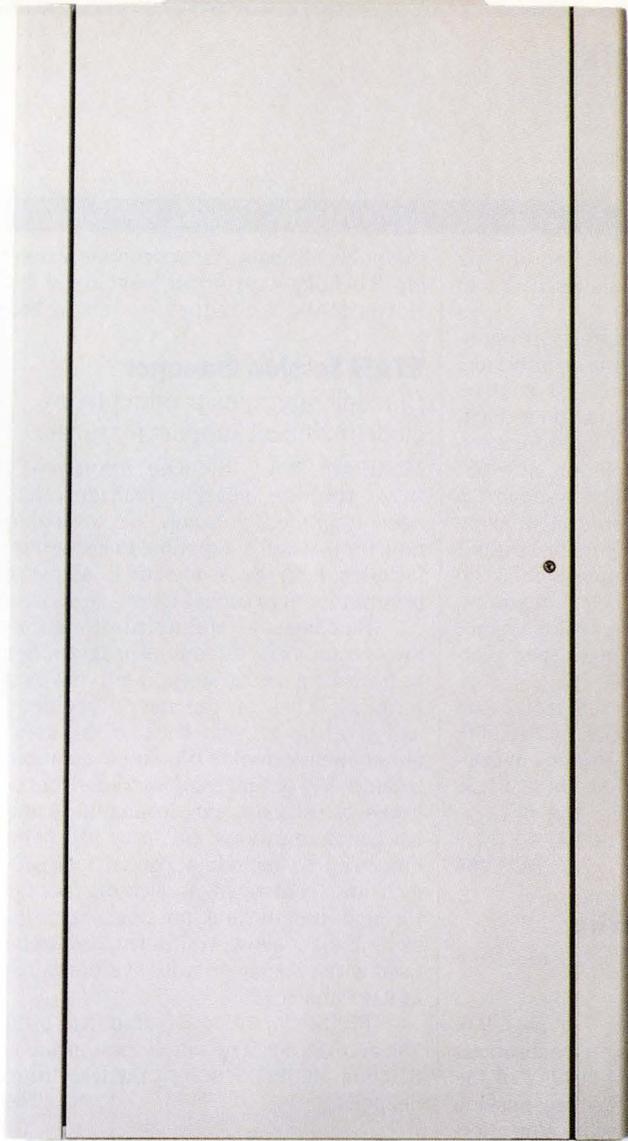
Your DP staff is burdened with time-consuming and costly chores. Incompatible interfaces must be learned. Extract and import programs must be written for user after user. Improperly formatted data must be manipulated. And micro-mainframe links must be customized.



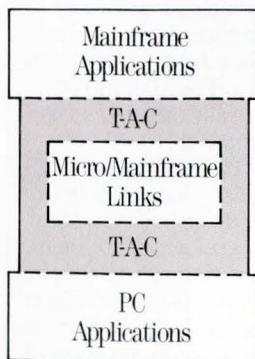
PC users never have to leave their PC application.

Your end-users wait for special requests to be processed. Then they perform the time-consuming task of re-keying data, inviting human error. And, even if your PCs are linked, end-users must leave their favorite PC programs to work with micro-mainframe links and mainframe query languages. Another stumbling block in the path of creating a smooth exchange of information.

The Application Connection™ (T-A-C) from Lotus® is a mainframe and micro software product that lets you realize your investments in mainframe applications, micro-mainframe links and PC applications by connecting them for a fast, secure, uncomplicated exchange of information.



terms with your mainframe.

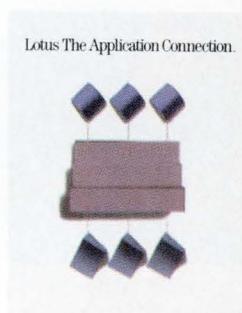


T-A-C creates a complete connection, making it the only product available that allows your end-users to securely access a variety of mainframe applications from within their PC applications. For example, from within 1-2-3®, a user can easily extract sales information from a DB2 database.

T-A-C connects to many mainframe applications such as DB2, SAS, FOCUS and others. And many PC applications such as 1-2-3, dBASE® and Symphony®.

So, if you find that the number of end-user requests you are faced with is growing, but your return on DP investment is not, T-A-C from Lotus can help you get your PCs on speaking terms with your mainframe.

To receive more information about T-A-C, call Lotus at 1-800-345-1043 and ask for product MN-2540.



Lotus T-A-C

tem/38; and to Soft•Switch Gateway/VM; SNADS Gateway/3+Mail on 3Com LANS and other copies of SNADS Gateway/VM.

PROFS Gateway/VM executes in the Soft•Switch Central/VM environment and provides connection to an entire IBM PROFS network, says the company. It implements the ZIP packet protocol used by PROFS to communicate with each other and with DISOSS.

Mailway Gateway/VM is a complete implementation of the Wang Mailway protocol and allows Central/VM to participate in a Mailway network as a Mailway distribution point.

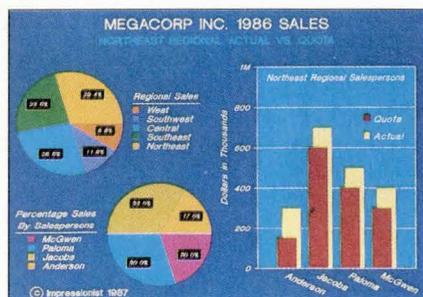
Central/VM includes an additional gateway that provides connectivity to all Soft•Switch Mailbridge Server products, so that Central/VM can act as a distributed switch for Mailbridge Servers, and it can interconnect Mailbridge Servers to SNADS, PROFS, and Wang Mailway networks. Soft•Switch Central/VM can execute on any VM system with other applications or can be used as a dedicated application.

Central/VM and all the other gateway products are available now. Prices range between \$21,600 and \$250,000, depending on configuration. SOFT•SWITCH INC., Wayne, Pa. CIRCLE 263

Business Graphics

Execucom's package available for mainframes, minis, and micros.

Impressionist 2.0 is the upgraded version of Execucom's business graphics package for three different hardware platforms that the company says can be



used from ad hoc production to complete creation of business graphics.

Impressionist is comprised of three graphics functions. Chartbook, for beginners, allows users to select from more than 100 graphic types. Basic Graphics enables users to accept data and files from other business software, to generate graphs using menus or commands,

and to choose from a selection of type fonts. Graphics Editor allows users to tailor their designs.

New enhancements in Impressionist 2.0 are a reorganized user interface, text fonts with enhanced text control, new Chartbook formats, all new documentation, data and text table formats, device independent resolution, new 98-color palette, additional device support, a symbols library, and removal of copy protection on the micro version. Output devices supported by Impressionist 2.0 include the IBM EGA, color monitors, high-resolution cameras, color ink-jet printers, dot matrix printers, pen plotters, and Video Show 160.

Impressionist runs on IBM's CMS and TSO systems and is priced at \$15,000. In the Digital VAX and Prime environments, the price is \$9,000. On IBM PCs, XTs, ATs, or compatibles, the price is \$695 per copy. EXECUCOM SYSTEMS CORP., Austin, Texas. CIRCLE 264

Public Network Service

Tymnet offers 9.6Kbps access for public datacom lines.

Tymnet has announced TymDial 9.6, which provides users asynchronous transmission at 9.6Kbps instead of the previously offered 2.4Kbps transmission speed. The company says the new offering will allow customers to access IBM 3270 mainframe applications using ordinary dial-up telephone lines at 9.6Kbps.

Tymnet's TymDial 9.6Kbps asynchronous transmission utilizes Concord Data Systems' (Marlboro, Mass.) 296 modems internally and supports V.32 modems adhering to CCITT standards. By the year's end, this service will be accessible in 10 locations, including San Francisco, Los Angeles, Denver, Dallas, Chicago, New York, Washington, D.C., Boston, Miami, and Atlanta.

Additional service enhancements Tymnet is offering are the expansion of its Outdial service to 61 new cities. Outdial permits two-way transfer of information between a central host or pc and unattended pcs and terminals, making it possible for users to take advantage of off-peak rates, says Tymnet. Other enhancements include the following: an upgrade to 2.4Kbps from 1.2Kbps in 33 cities; the support of MNP error detection and retransmission protocol for local lines; and the addition of new access locations.

Tymnet says it intends to support

the public domain Asynchronous Framing Technique protocol developed by Hayes. TYMNET, San Jose. CIRCLE 265

VTAM Session Manager

Blueline upgrades product to include technical support features.

Multiterm/SNA, Blueline Software's VTAM terminal session manager, has been upgraded. Version 2.2, available now for IBM and compatible mainframes, includes help desk facilities, allowing programmers to access users' sessions.

Blueline says Multiterm/SNA 2.2 allows an authorized systems programmer to transfer a user's session into his own terminal, work on the user's problem, and give the session back to the user. Other enhancements Blueline is claiming include log-on messages, timed messages, broadcasts, and terminal-to-terminal communications. Security has been enhanced to include terminal lock/unlock and controlled application access through menus and autolog. Security system exits allow Multiterm/SNA to be used with popular security systems such as RACF and ACF2.

Multiterm/SNA 2.2 supports DOS/VSE and VSE/SP. The site license price is \$10,795. BLUELINE SOFTWARE INC., Minneapolis. CIRCLE 266

Spreadsheet

Microsoft unveils MS/DOS program to run under Microsoft Windows.

The recently introduced Microsoft Excel for Microsoft Windows contains a bridge from Lotus 1-2-3. Included are two-way file compatibility, which allows users to load and save Lotus spreadsheets directly, a 1-2-3 help facility for users to learn Excel, and a Macro Translation Assistant, which automatically translates 1-2-3 macros into Excel macros.

Other features of Excel are its recalculation feature, which changes only the cells that are affected, the ability to show multiple sheets on screen and link them, a set of tools for auditing spreadsheets, the ability to apply various font sizes and styles, a spreadsheet size of 256 columns by 16,384 rows, and the integration of Excel's database into the spreadsheet.

Microsoft Excel for MS/DOS runs on the IBM PS/2, PC, AT, XT, Compaq 386, and compatibles equipped with Microsoft Mach 20 and memory add-on. Priced at \$495, it is available now. MICROSOFT CORP., Redmond, Wash. CIRCLE 269

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PEOPLE

Resolving Family Conflicts Is This Lawyer's Forte

Robert H. Mnookin's role as an arbitrator in the IBM-Fujitsu case may seem far afield, but his past has prepared him well for the task.

BY JEFF MOAD

At first glance, Robert H. Mnookin would seem an unlikely candidate to make a major impact on the computer industry.

The 45-year-old father of two has never worked in the computer industry. He is a professor at Stanford Law School in California, where he specializes in the resolution of conflicts concerning children and families. He is currently working on a study of families broken by divorce.

But Mnookin, who is a 1968 graduate of Harvard Law School, was also one of the two arbitrators who, over a two-year period, hammered out a recently announced landmark order that will settle a long-standing software property rights dispute between mainframe giants IBM and Fujitsu.

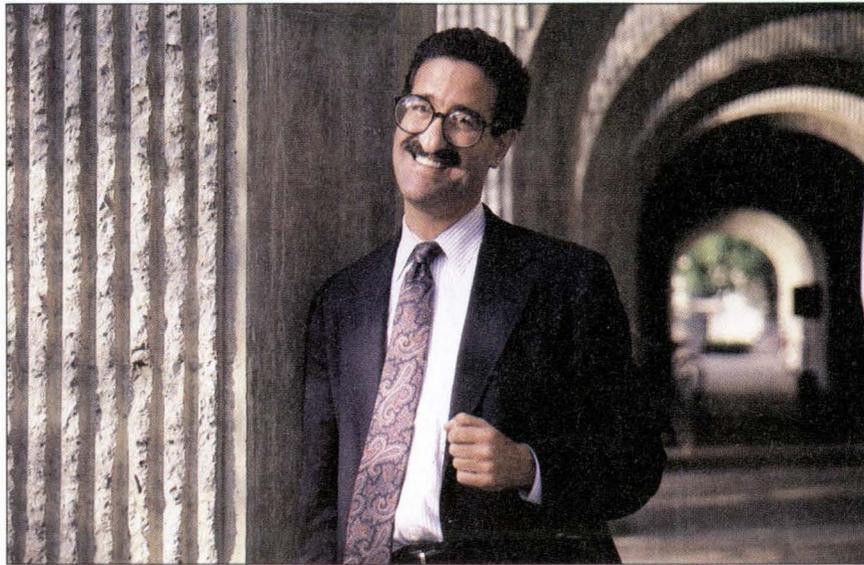
Many observers say the settlement and the way it was reached could alter the face of the computer business.

How did a law professor with seemingly little previous industry contact

find himself in such a position? Fujitsu picked Mnookin after the company apparently decided his skills in conflict resolution were more important than an intimate familiarity with ACF/VTAM.

Fujitsu's decision seems to have paid off. Mnookin was able to team up with MIS veteran and retired Norfolk Southern Corp. executive vice president John L. Jones to turn what was a festering, acrimonious dispute into a settlement of possibly historic importance. Mnookin says that he and Jones were

able to bring the two computer giants closer together by applying some of the same basic principles of conflict resolution used in family disputes. Their techniques included reducing the number of participants in the negotiations to only the key, high-level attorneys from the two companies and deciding which issues could be resolved and which couldn't. In this case, the arbitrators decided not to examine each Fujitsu program line-by-line in a search for copied IBM code, but instead to create an overall settlement framework that would cover



MNOOKIN: The IBM-Fujitsu dispute was the largest he'd ever tackled.

existing as well as future Fujitsu programs.

Mnookin says, "The scale of the dispute was far larger than anything I had been involved with in the past, but, as it turned out, many of the analytical tools I had used before worked here."

While Mnookin may have been a newcomer to the computer industry, he was not unfamiliar with computers. As the energetic Mnookin puts it, "I've had a serious amateur interest in computers for a long time." He put that amateur in-

terest to work as a Harvard undergraduate in 1964 when he used the university's computers and actually programmed in FORTRAN. In the early 1970s, he was one of the first law school students to use computers at the University of California, Berkeley. "Seven years ago, I bought an Apple II as a bat mitzvah gift for my 13-year-old daughter," he says. "I've always enjoyed gadgets, and I suppose I like the fact that, analytically, computers make sense as a tool."

In 1983, Mnookin and two other Stanford Law School professors set up that school's first course concerning computers in the law. The course focused not only on legal decisions with implications for the computer industry but also on ways in which computers might change the practice of law.

Currently, Mnookin and two associates are using a mainframe version of IBM's SAS statistical analysis software package as part of their ambitious three-year empirical study of divorce in fami-

lies. The study, which is following 1,100 families and is funded by the National Institutes of Health, employs a full-time expert in statistical analysis.

Now that Mnookin and Jones have delivered their landmark order in the Fujitsu-IBM dispute, Mnookin should have more time to spend on his legal work and to devote to his daily regimen of running four miles near his home in Palo Alto. Mnookin, though, is likely to learn a lot more about the computer

industry before his duties in the IBM-Fujitsu case are entirely completed. Mnookin and Jones are committed to monitoring the IBM-Fujitsu relationship for the next 15 years.

Mnookin expects that by next summer, he and Jones will have delivered their instructions and decided how much Fujitsu owes IBM. After that, Mnookin says, "I hope, if we do our job well enough, that there won't be much more for us to do, and that this can go back to being a part-time job again." ■

BOOKS

Curricula on Course

INFORMATION SYSTEMS EDUCATION:
RECOMMENDATIONS AND
IMPLEMENTATION

by R.A. Buckingham, R.A. Hirschheim,
F.F. Land, and C.J. Tully, Cambridge
University Press, Cambridge, England
(1987, 256 pp., \$39.50).

BY CECILIA M. COWLES

I'm a baby boomer. To judge from the number of 40th birthday parties I attended last year, so are a number of my information systems colleagues. In fact, the computer itself is just over 40 years old.

We baby boomers didn't go to school for training as information systems specialists. Departments of computer science were an innovation then. We discovered that computers were fun in the course of studying or working in some discipline where they were used. We figured out what was needed and trained ourselves to be the kind of professionals required in the rapidly changing and expanding field.

So it was with envy and fascination that I read the curriculum described in *Information Systems Education: Recommendations and Implementation*, a book published as part of the British Computer Society (BCS) Monographs in Informatics. Outlined here is a four- to five-year course of study encompassing what has taken many of today's information systems professionals a lifetime of trial and error to learn.

The curriculum described in *Information Systems Education* is a revision of a curriculum initially prepared by the International Federation for Information Processing (IFIP) and published in 1974. It is one of three internationally recognized curricula for the education of information systems professionals. The others are the Association for Computing Machinery (ACM) curriculum, first developed in 1972 and then updated in 1982, and the Data Processing Management Association (DPMA) curriculum published in 1981.

The training-oriented DPMA curriculum has had a major impact on two- and four-year undergraduate schools but has had less impact on graduate programs in information systems and little influence on research universities. Thus, the authors devote little space to discussing it.

The more academic, more advanced ACM curriculum is directional, rather than proscriptive. As such, it is more comparable to the IFIP/BCS curriculum outlined in *Information Systems Education*.

In the book's third chapter, Gordon B. Davis, developer of the ACM curriculum, compares the IFIP/BCS agenda to his own schedule and finds that their similarities outweigh their differences. One important difference of the IFIP/BCS curriculum is that it provides more depth in communications skills and some application studies, as well as some philosophical, political, and economic aspects.

The reason for this difference is hinted at in the definition of an information system used by the authors of the IFIP/BCS curriculum: "a system which assembles, stores, processes and delivers information relevant to an organisation [or to society], in such a way that the information is accessible and useful to those who wish to use it, including managers, staff, clients, and citizens. An information system is a human activity which may or may not involve the use of computer systems."

Such a definition connects the information systems designer to the world of organizations. The curriculum developers explicitly recognize that "the information analyst and system designer can no longer be regarded as technical experts only."

Besides "having a professional knowledge and command of information technology, they must understand the basic needs of the organisation in which they operate and of the users of the information systems which they develop." As a result, the curriculum includes modules on sociology, the exploration of new technology, the person-machine interface, information processing methods, and the purposes and means of communications.

The bulk of *Information Systems Education* consists of an outline of the suggested modules. The outline form makes browsing easy, and browse is probably what you'll want to do, unless you are an educator designing a curriculum.

If you are an information systems professional, the curriculum will provide a basis for categorizing your own knowl-

edge and skills, as well as a standard for evaluating the knowledge and skills of job applicants. Those of us who still find ourselves interviewing a number of applicants who have taken junior college courses in FORTRAN programming will be thrilled to find an applicant who has gone through a program such as this one.

There is much food for thought in the papers that follow the recommended curriculum. Implementations of information systems curricula in England, Australia, Finland, and the U.S. are described. The common thread tying all of these implementations together is the recognition that information systems designers have to be more than "computer people."

The Australian author Robert D. Galliers expresses this need best when he writes of graduates of traditional systems analysis courses. They "enter the work force technically able but organisationally naive, more or less unaware of the political ramifications of information systems developments. . . . Perhaps there is a danger, too, that they join the ranks of data processing staff who constantly bemoan the lack of clarity and/or consistency in the stated requirements of users, little thinking that they themselves might lack the necessary skills to elicit information needs."

Unfortunately, the book gives little indication that American universities are adopting curricula with a well-rounded, liberal arts orientation. The American example described is a rather poorly written account of the undergraduate information systems curriculum at Philadelphia's Drexel University, where students are sent to the humanities for some courses. In the book's first chapter, Peter G.W. Keen criticizes American information systems research—which takes place mostly in business schools—for not being scholarly enough, while he finds European research in information systems scholarly, but lacking in practicality.

In time, perhaps the twain shall meet, and our generation of information systems professionals will be able to recommend a graduate program to their children (or grandchildren) that offers technical and general business skills, as well as scholarship and pragmatic knowledge. ■

Cecilia M. Cowles is assistant director of academic computing at Cornell University, Ithaca, N.Y.

CALENDAR

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Canadian Computer Show & Conference.

Nov. 16-19, Toronto. Contact Robert Grainger, Industrial Trade Shows, 20 Butterick Rd., Toronto, Ont., M8W 3Z8, (416) 252-7791.

Wescon '87 (Electronics Show).

Nov. 17-19, San Francisco. Contact Electronics Convention Management, 8110 Airport Blvd., Los Angeles, CA 90045, (213) 772-2965.

International Hard Copy Supplies Conference.

Nov. 18-20, Amsterdam, the Netherlands. Contact Jean O'Toole, CAP International, One Snow Rd., Marshfield, MA 02050, (617) 837-1341.

DECEMBER

Unicom 1 - NATA '87 (North American Telecommunications Association Exhibition).

Dec. 2-4, Dallas. Contact Karen Palermo, 2000 M St. NW, Suite 550, Washington, DC 20036, (202) 296-9800.

Dexpo West '87 (DEC-Compatible Expo).

Dec. 8-10, Anaheim, Calif. Contact Susan Werlinich, Expoconsul International Inc., 3 Independence Way, Princeton, NJ 08540, (609) 987-9400.

Conference on Superconductor Markets.

Dec. 15-16, Boston. Contact Kessler Marketing Intelligence, 31 Bridge St., Newport, RI 02840, (401) 849-6771.

AMS West (Advanced Manufacturing Systems Exposition and Conference).

Dec. 15-17, Anaheim, Calif. Contact Pat Dickinson, Cahners Exposition Group, 999 Summer St., P.O. Box 3833, Stamford, CT 06905, (203) 964-8287.

JANUARY

Computer Graphics '88.

Jan. 13-15, San Diego. Contact Carol Every, Frost & Sullivan Inc., 106 Fulton St., New York, NY 10038, (212) 233-1080.

CN '88 (Communications Networks Conference and Exposition).

Jan. 25-28, Washington, D.C. Contact Nancy Thayer, IDG, P.O. Box 9171, 375 Cochituate Rd., Framingham, MA 01701-9171, (617) 879-0700.

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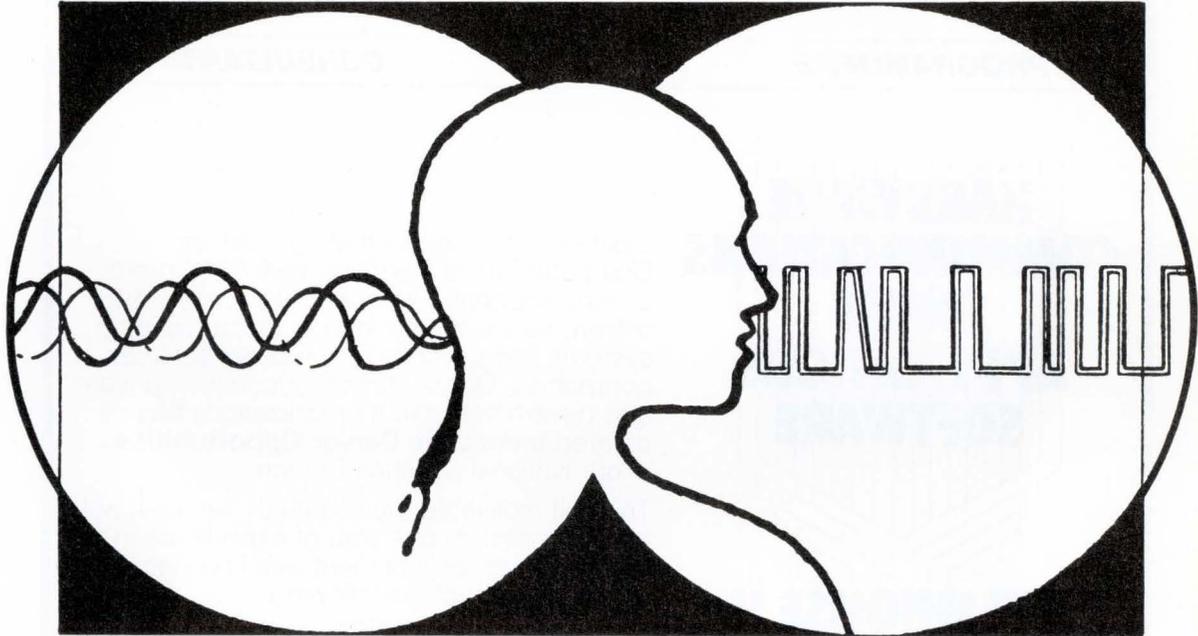
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- **Capacity Planning Analyst**

- **MVS Systems Programmer**

4-5 years in the technical computer area and at least 2 years of systems programming experience or performance experience. Prefer a 4-year degree and good interpersonal skills. Experience with VM/HPO, MVS/XA, and strong oral and written communication skills desirable. Project planning experience highly desirable. Will analyze disk placement and its affects on performance and the performance of in-house written code and identify bottlenecks created by code; will monitor and report on the status of the achievement of performance and reliability goals for the network components, VM/MVS system, and major subsystems such as CICS or DATACOM. Will work with other individuals to manage the configuration of both VM system and MVS/XA system.

Additionally, Performance Analyst will provide tuning and performance expertise for an operating system of MVS/XA or VM/CMS. Experience with VM tuning products such as Smart and Omegamon/VM would be helpful.

APPLICATIONS DEVELOPMENT

- **Programmers**

2-5 years structured coding experience in a development environment versus a maintenance environment. Highly desired experience would include: DATACOM; COBOL; IDEAL; CICS.

- **Systems Analysts**

5-plus years experience in a development environment versus a maintenance environment. Highly desired experience would include: Structured analysis techniques; Relational Data Modeling; DATACOM/DB; On-line real-time systems; Arthur Andersen's Method/1; Prototyping; Application Generators.

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Product Development Opportunities

Unisys Corporation, a \$10 billion company with \$700 million in research and development funding, was created by the merger of Sperry and Burroughs, two pioneers of the computer age. New development programs for banking products have created opportunities for experienced technical professionals to join our engineering and manufacturing site in Plymouth, Michigan. Located in the western suburbs of Metro Detroit, Plymouth is a family-oriented community near Ann Arbor, offering a full range of education and recreational opportunities, along with many cultural interests.

System Engineers/Custom Proposals

Several openings are immediately available for system engineers with a BSEE or Computer Science degree (Masters preferred) and at least 5 years' experience in systems design/integration and/or application software. Responsibilities will include developing proposals for customers in the financial industry for custom image systems based on standard products. Duties include initial customer contact, generation of system design and development of the proposal as well as presentation to the customer. Exceptional technical and communication skills are needed for this creative and highly visible role in product development activities for the banking community.

System Engineers/Architects

Our engineering staff requires several senior level engineers to coordinate the development of hardware and software for a major commercial computer product. The person that has strong analytic and technical skills plus 5 or more years' related experience, would play a key role as a systems architect. Primary responsibilities include assessment of hardware/software tradeoffs as well as design recommendations. The preferred candidates should have a degree in Electrical Engineering or Computer Science. A Master's degree in either field would be a definite advantage. Other desirable experience includes performance and capacity modeling using tools such as GPSS, as well as real-time

electromechanical hardware and/or software systems development experience.

Electrical Engineers

Candidates are needed for a variety of assignments in hardware design of complex banking systems. Requirements include BSEE degree and at least 3 years' experience in a product development environment. Typical duties will include developing product specifications, designing electrical hardware, as well as developing diagnostic routines to monitor product performance. Some positions will also require knowledge of Intel 8085 and Z-80 processors in circuit design, as well as experience with real time process control and analog or digital circuits.

Systems Programmers

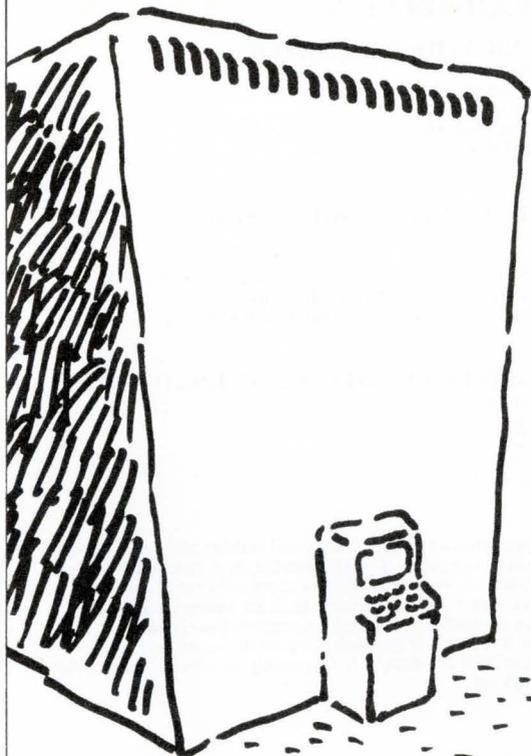
Various assignments will be available for experienced systems programmers to develop and implement computer software systems for banks. Qualified candidates will have a BS or MS degree in Computer Science or related technical area plus 3 or more years' experience in a product development role. All positions require knowledge of high level languages such as Pascal and C. Knowledge of RMX operating systems and Intel based processors is desirable for these positions.

Application Programmers

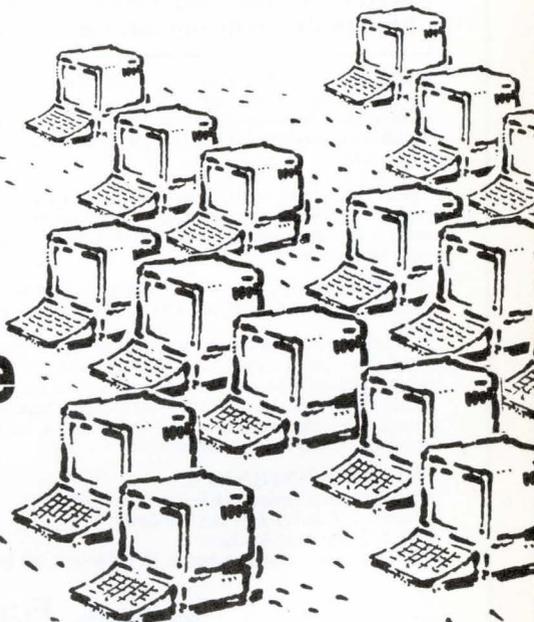
Requirements include at least 3 years experience developing mainframe and workstation programs to perform automated financial services using high speed electronic imaging equipment. Candidates must have a college degree in Computer Science, Information Systems or equivalent. COBOL programming skills and experience with Unisys V series or PC computers are a plus.

We offer major company benefits as well as excellent salaries. Your response will be handled in a fully confidential manner. Please send your resume, indicating position of interest, to: **Jean Outler, Human Resource Operations Manager, Unisys Corporation, 41100 Plymouth Road, Plymouth, Michigan 48170.** An affirmative action employer.

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- SSIS and Space Station Schedule Development and Integration

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