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OCTOBER 15, 1988
A CAHNERS PUBLICATION

Systems Discontinuity ROADBLOCK TO STRATEGIC CHANGE



Also in this Issue:

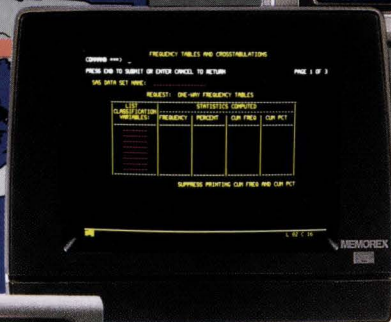
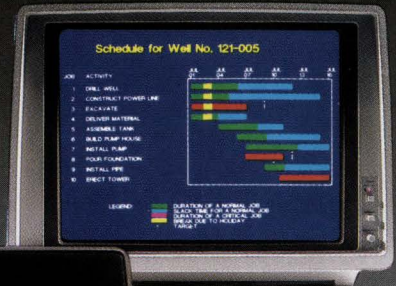
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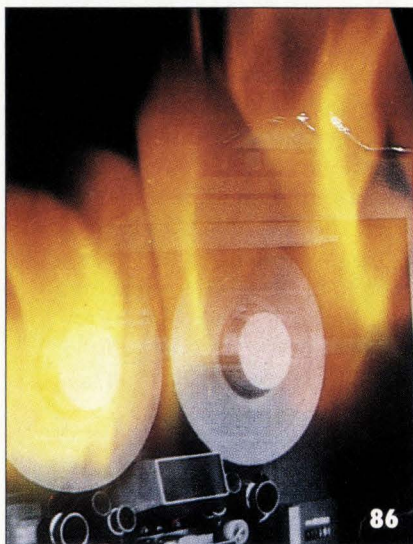
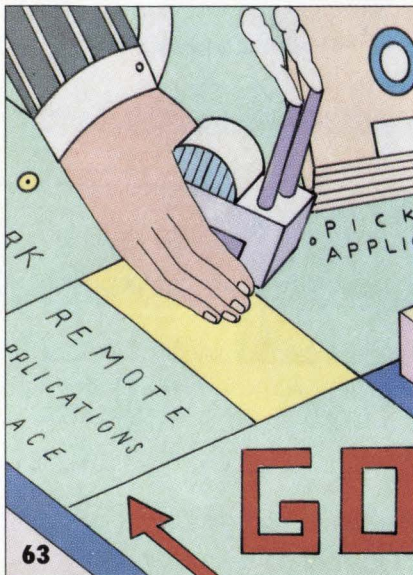
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Users Await Fruitful
DEC/Apple Yield
Chargeback Systems
Come of Age
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Solution

CALLING ALL USER GROUPS!

Please send information about your user group to be included in DATAMATION's User Group Directory. Please include your group's address, phone number, number of members, names of officers, date of next meeting, statement of purpose, and a list of services provided. The address is: 249 W. 17th St. New York, NY 10011 Attn.: David R. Brousell

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Editorial

Decision-Making Just Got Tougher

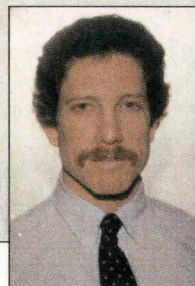
For many years, when it came to software products, the user community had it pretty good. A stable group of independent software companies arose, prospered, and provided users with real options.

Over the last few years, the software industry—driven as much by technological evolution as by shifts in the market—has undergone profound change. The companies that were once dominant—Cullinet, MSA, Software AG, Applied Data Research—have had their troubles as a new breed of company—capitalizing on microprocessor technology, industry standards, and new user applications requirements—emerged (note the rise of Lotus, Microsoft, and Oracle). For users, the old reliables perhaps weren't as strong anymore. Remember how service and support slipped after Mathematica sold Ramis (now owned by On-Line Software) to Martin Marietta, for example?

So it comes as no surprise that the founder/entrepreneurs of some of the software companies that have fallen behind have returned for an attempted rescue (see "Chairmen Reoccupy the Hot Seats at Major Software Firms," p. 17). Whether their efforts will succeed in the long run is the crucial question both for their companies and for users. Many observers of the software industry feel that what is happening is not just surface-level market changes or temporary power shifts. Rather, many feel that there are fundamental changes occurring in product technology, the mechanisms by which these products are delivered to the market, and to whom they are delivered.

Accordingly, we feel that users would be well advised to evaluate carefully the vendors they choose. It has become imperative to purchase products that are not only technically sound, but that are well cared for over the long haul by their providers. A product owned by one company one day can change hands the next. What's to ensure proper maintenance, enhancement, and support? Users know all too well that when they buy into a product, they usually buy into a long-term relationship with that product; it is not easy or inexpensive to change if it doesn't perform well or is not developed properly.

Even as the earth continues to move underneath the software industry, users must have their feet planted firmly on the ground. Decision-making may have just gotten tougher, but the rewards of the right purchasing decision will make life easier in the long run.



A stylized, handwritten signature of David R. Brousell in black ink.

DAVID R. BROUSSELL
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Letters

The Game, Not the Name

"CIO: Misfit or Misnomer?" (Aug. 1, p. 50), based on the Coopers & Lybrand survey of Chief Information Officers was an accurate report of the failure of senior corporate executives to meet the challenge of the information revolution that my co-author Bill Synnott and I identify in our book *Information Resource Management* (John Wiley & Sons, 1981).

The CIO concept we propose in our book is based on an analysis of the chaotic conditions in information systems management in the 1970s. Information systems was moving from a "dp monopoly" first stage in the information revolution, to a second stage of "decentralized anarchy." We were in a period in which user divisions and departments were running away from the "dp monopoly" with timesharing and minicomputers. We put forward the idea that there are very severe costs to "decentralized anarchy" and that senior corporate management needs an information technology strategy.

Synnott and I projected into a third phase of the information revolution in which we would move from "decentralized anarchy" to an era of the "electronic business," the third stage in the information era in which best information management would include information systems for competitive advantage and the chief information officer as one of the facilitating strategies.

When we wrote our book, we noted the lack of interest in information systems as a resource by top management. The high costs that we observed in "decentralized anarchy" were caused by top management disinterest, neglect, and lack of vision. Since that time, the lack of interest by top management has continued and frequent articles on the low payback on investments in information technology are a consequence.

The Coopers & Lybrand survey as reported in DATAMATION emphasizes the need for top management to give attention to how information technology should be managed as a strategic resource in the 1990s. The CIO problems cited in your article indicate that senior information systems officers, by whatever title they are called, are facing a hostile environment of decentralization, downsizing, and continued lack of interest and commitment by senior management in the use of information technology as a key strategic resource.

The problem is not with the name "Chief Information Officer" or the responsibilities and the status that Bill Synnott and I give to this concept. It is with the failure of top management to recognize that information technology would be a critical success factor in corporate performance.

WILLIAM H. GRUBER
President
Research & Planning Inc.
Cambridge, Mass.

Correction

Martin Litzky's name was misspelled in "Can Unisys Juggle Open Systems, Too?" (Sept. 1, p. 50). Litzky was formerly on the board of directors of the Sperry users group. Also, transposed dates and incorrect earnings per share appeared in a chart describing Unisys' financial performance on p. 54 of the Sept. 1 issue. Here is the corrected chart:

Recent Financial Results for Unisys Corp.

(In \$ millions except for earnings per share)

	Second Quarter		First Half	
	1988	1987	1988	1987
Revenue				
Net Sales	\$1,586.9	\$1,485.2	\$3,197.3	\$3,159.6
Service and Rentals	805.8	789.8	1,563.1	1,531.2
Total Revenue	2,392.7	2,275.0	4,760.4	4,690.8
Research and Development Spending	175.4	144.5	339.8	291.9
Net Income	162.3	121.2	311.6	231.4
Earnings per Share	\$.78	\$.62	\$1.50	\$1.19

Source: Unisys

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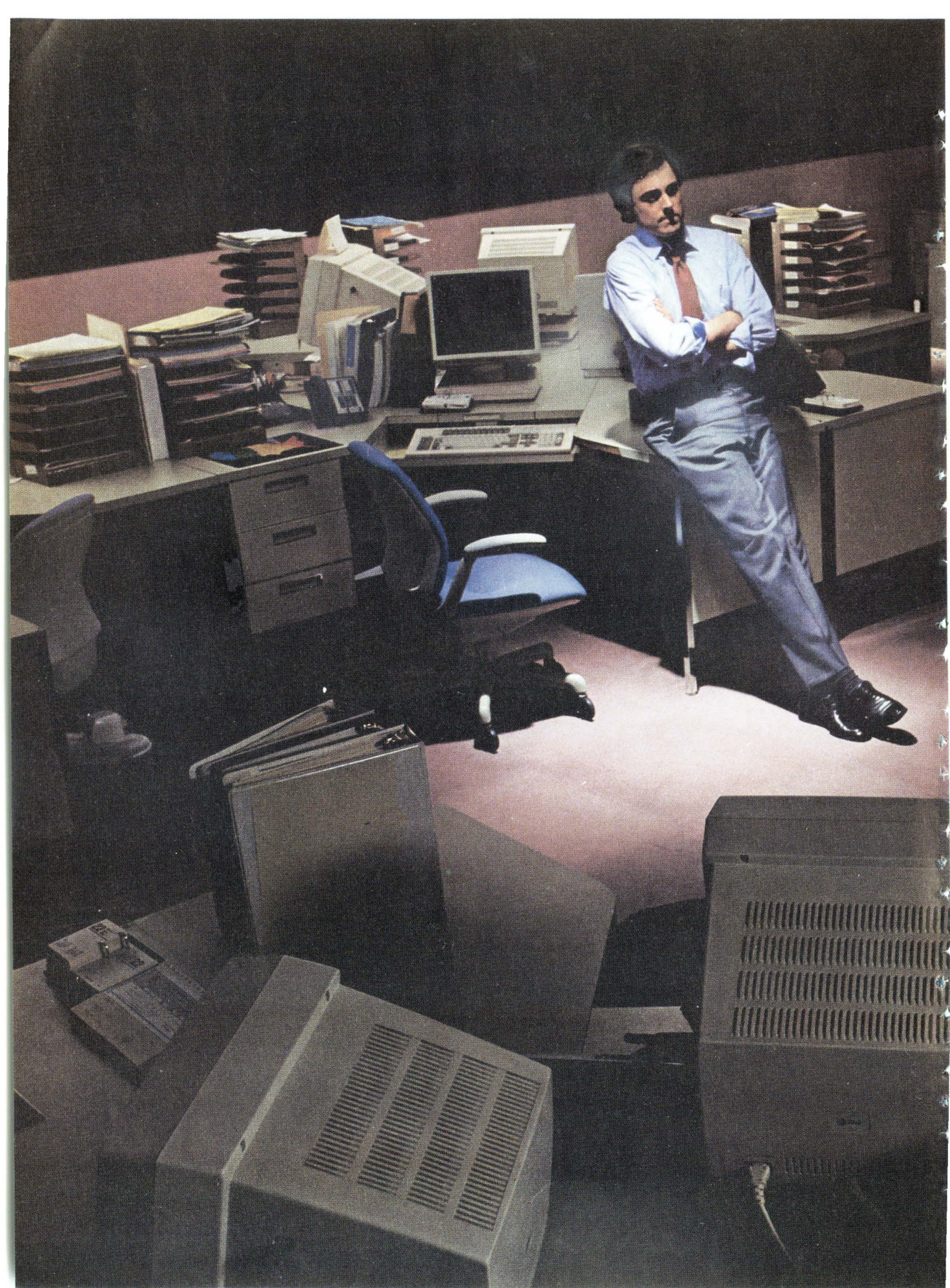
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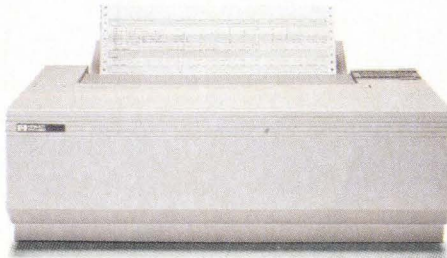
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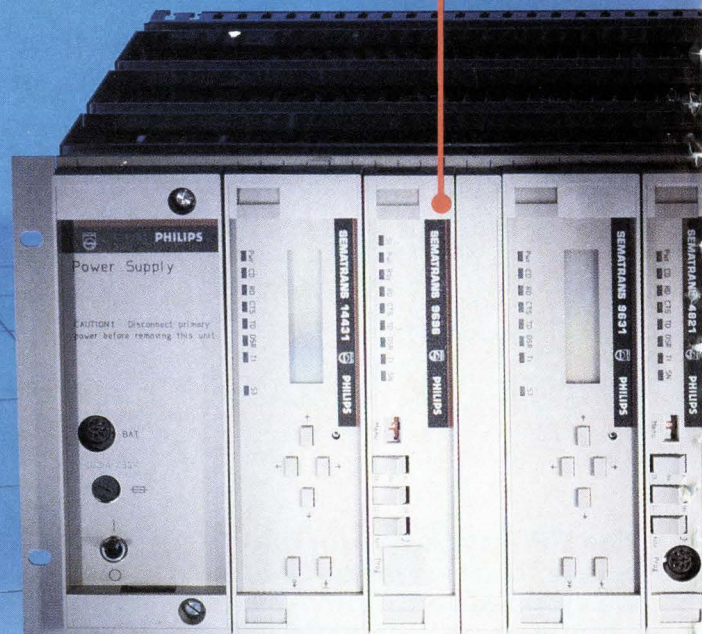
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Look Ahead

PC GROWTH COOLING OFF

BOSTON -- U.S. users are putting the brakes on pc purchases. The latest DATAMATION/Cowen & Co. survey of mini and micro users forecasts a 5% drop in pc shipments and a modest 10% rise in pc revenues next year, versus 21% unit and 23% revenue growth last year. A West Coast brokerage firm also has just scaled back its pc projections for 1989 to 5% growth, from a reported double-digit growth rate. Analysts speculate that users are holding off new pc purchases until they get their existing pcs networked and until they see whether there are enough OS/2 applications to justify new hardware investments.

4381 UPGRADE SEEN IN Q1

NEW YORK -- It looks like the rumored death of IBM's 43XX midrange system has been greatly exaggerated, or is at least premature. Observers now expect IBM to announce a 4381 upgrade in the first quarter of '89 that could give the line new life. The so-called 4391 is expected to go from a 7MIPS uniprocessor to a 22MIPS four-way air-cooled system. It's also expected to support the new MVS/ESA operating system and to include a vector processing facility--the better to challenge Digital Equipment Corp.'s VAX in technical applications. At the same time, observers say IBM's 3090 mainframe has at least one upgrade left in it. The "G series" would be announced in the fourth quarter of '89, with a 15% performance boost over the current S series. The G is expected to support larger and faster expanded and central storage and optical channels.

DEC VANS TO PULL UP IN EUROPE...

CANNES, FRANCE -- Expect DEC to announce its first value-added network services (VANS) partnership in Europe over the next few weeks. With its own financial services VANS already in operation in London, and network products being developed in its research center at Valbonne near Nice, the company is looking for a large slice of the European VANS market in the coming years. The new partnership deal will help expand DEC's network services offerings, perhaps in the French insurance market, but European marketing vp Bruno d'Avanzo won't say who the partner will be.

... AND A DESKTOP VAX IS ALSO SEEN

CANNES -- Also revealed at the DECworld exhibition was a DEC plan to soon announce a desktop VAX called the P-VAX, and a RISC-based workstation running a version of Unix that ultimately will be compliant with the future Open Software Foundation standard. Also under development are top-end VAX models to help large users expand their major DEC-based systems, and a vector facility.

Look Ahead

CUT FROM THE SAME BRANCH

CULVER CITY, CALIF. -- The two executives who directed Waltham, Mass.-based Nixdorf Computer Corp.'s U.S. banking strategy are negotiating an agreement to purchase rights to the company's branch automation software. The pair, Manfred Leuthard and Richard B. Ghas-tin Jr., recently formed Nevis Technologies Inc. here. They hope to complete development on the package and introduce new versions for OS/2 and the Open Software Foundation's AIX-based Unix operating system. Nixdorf reportedly is holding off on a licensing and investment agreement pending the pair's ability to raise financing from other sources.

MARIETTA TESTS OLGA AND BORIS

ORLANDO, FLA. -- Martin Marietta Data Systems' Orlando Data Center recently tested two yet-to-be-released MVS versions of Systar Inc.'s on-line performance monitoring software products, Olga and Boris, which have been used extensively by Sperry users. One deficiency discovered during the tests, says Andy Crawford, senior software systems designer, was the absence of threshold exception analysis, whereby the user sets a threshold and the software notifies the user when it is exceeded. With the products from Greenbelt, Md.-based Systar, he says, it is up to the operator to realize that a threshold has been exceeded from graphic representation of the data. But Systar plans to use its Daisy expert system to do threshold analysis, he adds. Marietta was testing the products for possible inclusion in a proposal for a multiple operating system environment. Systar says the products should be available early in 1989.

CA, FUJITSU TALK ABOUT SOFTWARE

GARDEN CITY, N.J. -- Fujitsu Ltd. may have lost out in the bidding for Princeton, N.J.-based Applied Data Research, but the Japanese giant is still set on finding third-party software to run on its Facom mainframe hardware. Charles Wang, chief executive officer of Computer Associates--ADR's new owner--says he and Fujitsu have been negotiating to adapt several of CA's systems software products to the Facom hardware. One problem, according to Wang, is that Fujitsu has been very slow to hammer out an agreement.

RUMORS AND RAW RANDOM DATA

IBM's refusal to sell its token ring local area network in Hong Kong may have been proven costly for Big Blue. Bank of America had been considering IBM as a vendor for a large office automation project at its data center there, but, according to sources, the absence of the token ring LAN pushed Bank of America into the waiting arms of Wang.



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ORACLE set the world record for performance by running 265 transactions per second (tps) on a 3090-600E class Amdahl* mainframe running the IBM MVS operating system. This breaks the old record of

240 tps set by a cluster of 16 Tandem computers.

ORACLE also set the record for DEC minicomputers by running 49 tps on a VAX 6240 running VMS. This breaks the previous VAX/VMS record of 29 tps set on a VAX 8700 connected to a VAX 8800. ORACLE's results were audited and verified by the Codd and Date Consulting Group. And not only is ORACLE's performance nearly twice as fast as this previous record, but ORACLE's cost per transaction is almost four times better than that of the other system.

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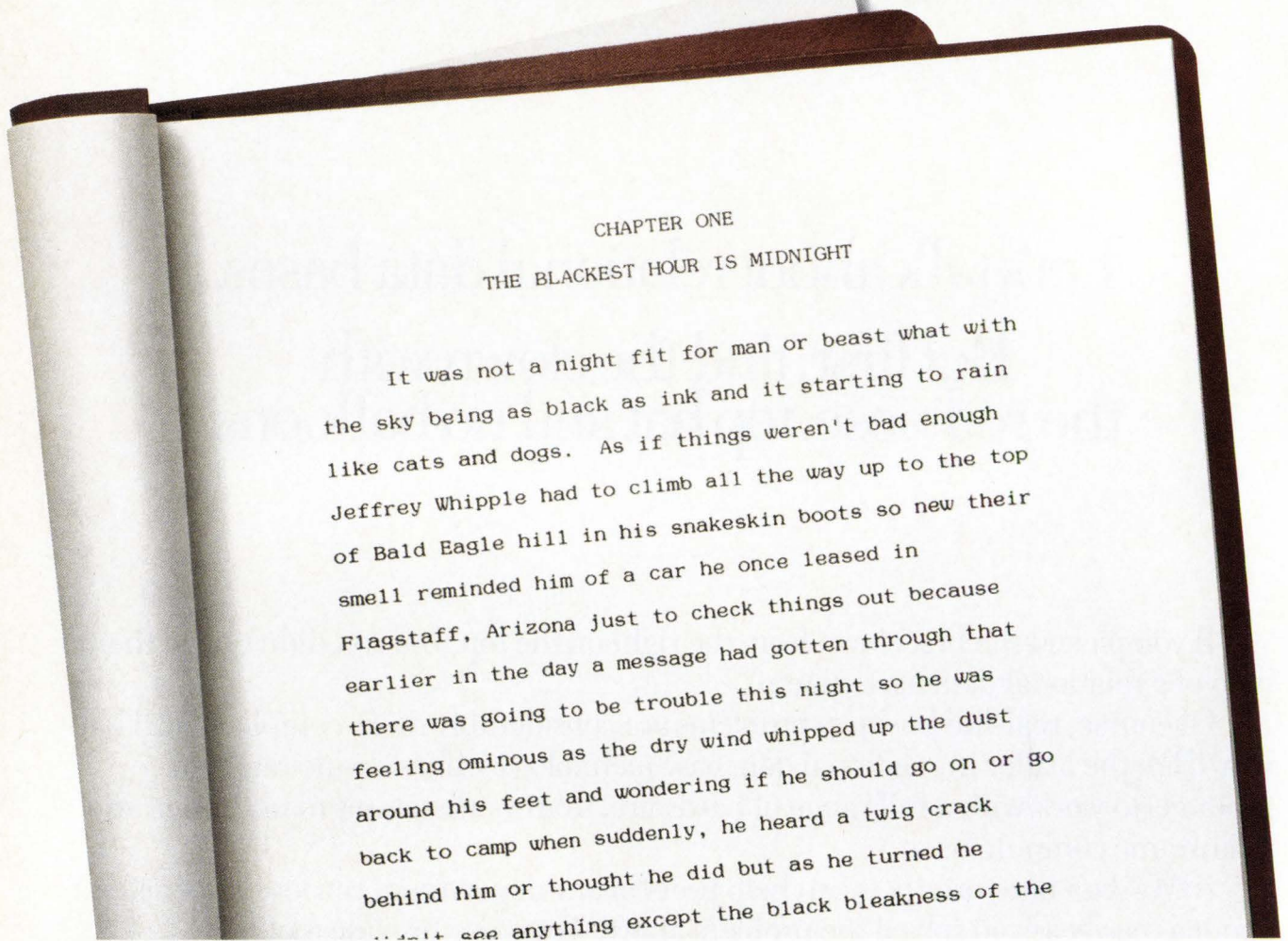
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News in Perspective

MANAGEMENT

Chairmen Reoccupy the Hot Seats at Major Software Firms

Founders are ousting their own handpicked successors and resuming operating control of their struggling companies; observers wonder if that's the answer.

BY JEFF MOAD

It is 7 p.m. and John Imlay is at his desk at Management Science America Inc., between meetings. Imlay, MSA's long-time chairman, contemplates the half-eaten lunch that stares back at him as he tries to explain the recent organizational changes that saw MSA president and chief operating officer William M. Graves resign, and the 52-year-old Imlay reassume operating control of the industry's largest applications software vendor. "It was something I felt I had to do," says Imlay. "Now that I'm back, I'm pretty busy."

Imlay is not the only software industry chairman and father figure who is back in the hot seat. In recent weeks, the chairmen and founders of at least two other major mainframe software vendors have ousted their handpicked successors and reassumed operating control of their struggling companies.

Imlay's unexpected return to MSA's top operating job was preceded by the celebrated reincarnation of John J. Cullinane as chairman and ceo of Cullinet Software Inc. And it was followed within days by the firing of On-Line Software International Inc. president Howard Sorgen and his replacement by chairman, ceo, and founder Jack Berdy.

Who Needs an MBA?

What gives here? Just a couple of years ago, successful entrepreneurs like Cullinane and Berdy were beating the bushes for professional managers who could step in

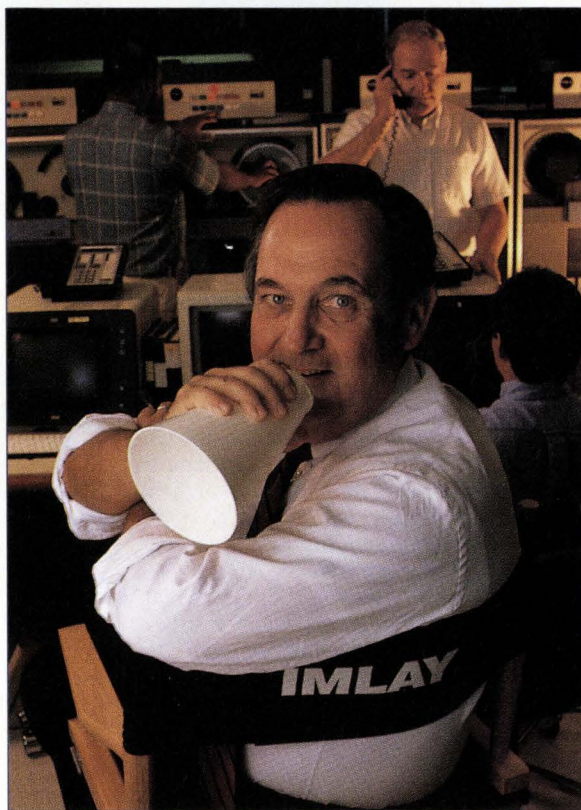
and run the software companies they had started but which supposedly were growing so large they needed executives with MBAs and big business experience to manage long-term growth. Now, after watching the profit margins and stock prices of their companies come under increasing pressure, these same software industry graybeards are leaving the bench and getting back in the game.

According to Berdy, "A few years ago, many of us had the idea we needed to bring in a new level of professional management. I thought it would free me up to do other things and that it would bring some magical knowledge that we didn't have. In retrospect, I'm not so sure what it actually brought to the table."

The return of Cullinane, Imlay, and Berdy to operating roles in their companies may be reassuring to some of their customers, investors, and board members who long for a return to prosperity and stability. Some observers, however, are wondering if, in a new era for the software industry that is characterized by new technologies, archi-

tures, and competitive forces, it makes sense to bring back the old team.

"Many of these larger mainframe software companies are having trouble bringing their older products up to date, to exist in a world of SAA,



MSA'S IMLAY: Has already made two key decisions.

SQL, and CASE," says Scott Smith, a software analyst with Donaldson, Lufkin, Jenrette. "The founder's magic alone won't be enough to turn those products around."

According to Stu Miller, a software industry veteran, "The founders of these companies feel they have to take

some action because things are not going well for their companies. The only thing they know is to take control. But that's not the answer. These companies need someone who can take a new look at how things have changed and are changing," says Miller, the former president and ceo of Software AG.

These Aren't the Good Old Days

At the time Cullinane returned to an active role at Cullinet, the company hadn't reported a profitable quarter since fiscal 1986. MSA recently reported a second-quarter net income drop of 69% and 16.5% lower operating revenues compared with the same period last year. MSA says it expects its second-half earnings to fall short of the first half. On-Line Software expects a first-quarter loss following \$4 million of red ink in the fourth quarter last year. Similar problems are rumored to have led Ameritech recently to sell mainframe software vendor ADR off to Computer Associates International Inc.

Obviously, many of the explanations for these troubles are different for each vendor. What is similar are the decisions of the companies' founder and/or chairman to ride to the rescue.

"I was getting frustrated by our earnings prospects, so I decided to act," says Imlay. "What it came down to was that my long-term strategy was different from Bill's. I felt we needed to move faster to

get into some new areas for growth."

His move followed several lackluster quarters that had driven down the price of MSA's stock and attracted takeover interest from Computer Associates. Analysts attribute MSA's poor performance to a string of questionable acquisitions, failures in the pc applications market, saturation of some of its key financial applications markets, and problems in updating key products.

MSA Will Buy Technology

Imlay says he already has made two key decisions that he hopes will put MSA back on the right road. He will be more active in seeking technology partnerships, and he will embark on a plan to make MSA's products comply with IBM's Systems Application Architecture. "Where Computer Associates is buying companies, we'll just buy the technology," says Imlay.


SAA compliance means that MSA applications will use interfaces published by IBM. Imlay even has plans to license and use IBM's Cross System Product 4GL as an applications generator for MSA products.

Imlay also moved quickly to reduce expenses, cutting MSA's payroll by 9%, or 230 jobs. Berdy at On-Line and Cullinane at Cullinet took similar steps as soon as they retook operating control of their companies. Berdy closed several direct sales offices, and Cullinane instituted layoffs and slashed \$10.5 million from Cullinet's first quarter 1989 operating expenses.

Most observers agree, however, that cost-cutting alone won't be enough. The question is, what will they do after they've cut costs? "The problem," says Kidder Peabody analyst Bahar Gidwani, "is that the market is maturing, prices are declining, and

vendors are going to have to start making things like tele-marketing part of their strategy. DB2 is putting pressure on a lot of the independents, and many of them are being forced to be more focused and to make changes in R&D that will help them get out the next release of their product."

On-Line's Berdy attributes most of On-Line's problems to high end-user sales and marketing expenses and longer sales cycles related to



IN A NEW ERA, CAN THE OLD TEAMS DO THE JOB?

some of the company's newer, higher-priced software products, such as Ramis II and the Caspac CASE product line. Berdy has acted by reducing the number of On-Line direct sales offices to four from nine, although he denies reports that he is de-emphasizing the Ramis II product line.

But, in addition to cutting sales expenses, Berdy is planning to reorganize On-Line's product development efforts and so make them more efficient. "We'll go more to a pooled development concept, rather than dividing projects up," he says.

Most users seem to approve of their vendors becoming more efficient. But some express mixed feelings about the return of chairmen and founders. Priscilla Davis, a systems analyst with wire manufacturer National-Standard Co. of Niles, Mich., is both an MSA user and president of the On-Line UFO and COBOL XE International Users

Group. She says that while she understands vendors having to cut costs to remain competitive, she doubts whether Imlay and Berdy can run their companies on a day-to-day basis and attend to long-term planning.

"One person can't do it all when it comes to running a big company," says Davis.

Users such as Davis also say the returning software entrepreneurs will be on the spot to make good on new product promises that have not been kept in the recent past. For example, users such as National-Standard and Metropolitan Life in New York bought MSA's new purchasing and payables integrated application for IBM mainframes only to find that the initial release of the product fell short of their expectations. Both are now planning to upgrade to release 2, but it's taking extra time.

Listening to Customers

"There was a time recently when some of these companies weren't listening very well to their customers," says Met Life senior vp Daniel J. Cavanagh. "But I'm hopeful that having people like Imlay and Cullinane coming back will improve things."

Users say Cullinet, too, has to improve on new product implementation. The company is counting on its new IDMS-SQL and Knowledgebuild products as key elements in improving revenues in the second half of 1989. But some Cullinet users who have tested the product say the company still has a lot of work ahead of it.

Atlanta-based utilities holding firm Southern Co. had considered using IDMS-SQL and Knowledgebuild to develop an on-line application for Alabama Power. But the company rejected the Cullinet products for that application because, among other things, they did not support a dynam-

ic pick list or multiple scrolling regions.

According to Southern Co. manager of power generation N.V. Subramanian, Cullinet has promised those features in future releases of IDMS-SQL and Knowledgebuild. "As of right now, the product is not mature," says Subramanian.

Problems Pre-date Successors

Observers note that, in many cases, software company founders were at least as responsible as their hired successors for the inflated operating costs, lack of product focus, and execution and other errors that they are now returning to correct.

"A couple of years ago," recalls Oakland, Calif., database consultant William M. Baasch, "when Cullinet was trying to decide whether to support SQL, John Cullinane said, 'Over my dead body.' Now they're doing it under his live body."

Cullinane acknowledges that many of Cullinet's problems pre-date his decision to step away from the company early in 1987.

"Two years ago," he says, "I knew we needed to do a lot of changing, but I also knew that would be difficult to do because there were a lot of people who had been with the company for a long time." Cullinane says his stepping aside—though only temporarily—opened the door for a new layer of management to infiltrate Cullinet, which now has much of the responsibility for working out Cullinet's comeback strategy, according to Cullinane.

Meanwhile, the return of Cullinane, Berdy, and Imlay to more active roles in their companies may at least hold off unhappy investors and unfriendly takeover attempts long enough to give troubled mainframe software vendors a chance to survive as independents. ■

OPERATING SYSTEMS

Federal Info Managers Embrace Stopgap Posix Standard

The new Posix federal information processing standard will be utilized until IEEE's draft full-use Posix is released later this year; officials see major advantages.

BY LEILA DAVIS

Federal information resource managers say they are eagerly awaiting the newly approved Posix federal information processing standard (FIPS) in the belief that it will ease public sector connectivity problems and reduce procurement challenges.

The new Posix FIPS was proposed by the National Institute of Standards and Technology (formerly the National Bureau of Standards) for use

as a stopgap federal standard until the IEEE's draft full-use Posix is released later this year. After a lengthy review process, the Posix FIPS was implemented on Sept. 12.

The full-use IEEE Posix will have to earn its own set of international approvals and is expected to be accepted by next summer (see "ANSI, ISO Back Posix, Despite AT&T," April 1, p. 30).

Posix, which stands for portable operating system for Unix, will be a "real advan-

tage for federal IRM," thinks the Department of Agriculture's associate director for IRM, John Kratzke.

"It gives us an authoritative basis to say what we want to specify on a procurement and it takes Unix out of the proprietary realm," Kratzke feels.

According to Bob Woods, director of the office of IRM at the Department of Transportation, "Posix will have a real impact as a FIPS. A lot of government agencies are trying to move toward more open architecture without stifling competition in the procurement process.

"Philosophically, the big issues for government users are software portability and connectivity. In upcoming big buys and son of big buys, if Posix is the only game in town, they'll latch on to it," asserts Woods.

Connectivity Is a Major Goal

The timing of the Posix standard is especially important, say IRM officials, because many government agencies are at the level of systems sophistication and applications need that makes large-scale networking mandatory.

"Connectivity in the micro arena is a major goal, especially in those agencies with field operations that have all different types of systems in offices all over the country," comments Howard Grandier, director of the office of software development and information technology at the General Services Administration's Office of Technical Assistance (OTA).

OTA acts as a consultant for other government agencies in systems and software procurement and planning. One of its most frequently used services is conversion management for agencies migrating from older disparate systems to newer networked installations.

"Most agencies are in phase two, meaning they are computerized, but their systems have been bought and implemented in a haphazard manner," says Grandier. "Phase three lets them connect those systems with a local or wide area network. A standard operating system like Posix would help."

Grandier sees Posix as a potential boon to further micro development "as long as the standard has teeth to it. If there aren't too many exceptions to the rules, it could persuade a lot of smaller agencies to standardize on a Unix-type operating system."

"Posix will be specified in RFPs more and more as vendors demonstrate their ability to provide it," predicts Transportation's Woods. "And my guess is that as more vendors get involved, Posix will drift away from [AT&T's] Unix."

Under their mandate to keep procurements as competitive as possible, many agencies have struggled to find a way to specify a Unix-type environment without weighting the requirements in favor of Unix's developer, AT&T. Last fall, the Army had to drop a requirement for a derivative of AT&T's Unix System V Interface Definition (SVID) on a \$2 billion Army Command and Control System upgrade. Vendors complained that even requiring them to employ a derivative of AT&T's proprietary Unix unfairly ensured that AT&T reaped licensing fees for the Army network.

As a result, the Army has firmly embraced Posix. "We are already specifying in all



DOD'S WOODS: Posix would make the transition easier.

GOVERNMENT

House Unit Criticizes Army VIABLE Pact

An unreleased report is said to allege an IBM systems bid by EDS locked the Army into a specific solution.

BY WILLIE SCHATZ

Something's happening here; what it is ain't exactly clear.

"As far as I know, there's nothing wrong with VIABLE," says Terry Miller, president of Government Sales Consultants Inc. (GSCI),

group thinks its olfactory nerve is right on, though. According to an internal Army memo, a recently completed S&I report apparently accuses the Army of a multitude of sins concerning ASIMS, foremost among them locking ASIMS into a specific technical



EDS' TARELL: We're not having any problems with the Army.

a Great Falls, Va.-based procurement analysis firm. VIABLE, AKA the U.S. Army's Vertical Installation Automation Baseline, is a \$656 million, 10-year deal with Electronic Data Systems (EDS), Dallas, to upgrade information processing at 47 Army installations worldwide. VIABLE has since been rechristened the Army Standard Information Management System.

"The problem is the Army's dp procedure as a whole, not the VIABLE piece," Miller contends. "But the VIABLE thing is beginning to smell, and I'm not sure why."

The House Appropriations Committee's Survey and Investigations (S&I)

solution: in this case, IBM systems. The S&I document reportedly also questions the competitiveness of the original 1982 VIABLE award, the software upgrading for the system, and whether the Army's Information Systems Command (ISC) had any idea of what it was doing.

The S&I analysis hit the street a few months after a General Accounting Office (GAO) report ripped the Army's entire dp standardization procedure. Those standards were based on a three-tier architecture that was intended to be mandatory and Armywide in scope. The three-tier architecture was laid to rest due to Congressio-

our procurements that once there is a Posix standard, within one year of implementation, we require the offerer to migrate the operating system to the Posix standard," says Enrico Merendini, technical director for the U.S. Army's Information Systems Selection and Acquisition Activity. "We hope that Posix will clear up these procurement challenges."

Dual Posix, DOS Requirements

The Army uses a Unix-type operating system for systems design, development, and maintenance. Merendini does not expect the opportunity for interconnectivity to bring more applications into the Unix fold at the Army because he sees Unix as "too complicated for use by nontechnical specialists.

"Interconnectivity is not enough of an incentive to give the general office worker Unix," comments Merendini. However, he predicts that large micro buys, common in the military agencies to feed a variety of applications, will have dual requirements for Posix and DOS in the future.

Grandier at the Office of Technical Assistance sees Posix as having a broader impact. "Right now, micro technology is still new, most agencies still have their original micro hardware, and there is no need to get rid of DOS," says Grandier. "But in two to three years, when it comes time to replace those systems, agencies will think seriously about standardizing. If Posix is there and has teeth, they'll go for it.

"The portability of software that Posix could provide could make a big difference to agencies. The savings in training costs alone could be tremendous," he says.

Grandier feels that even nontechnical office users can be converted to a Unix-type operating system if it is done as part of a major conversion,

when people expect and are geared up for change. Other IRM officials see a dual requirement for both Posix and DOS becoming prevalent.

The Department of Agriculture's Kratzke also expects that dual DOS and Posix requirements will be the norm for quite a while.

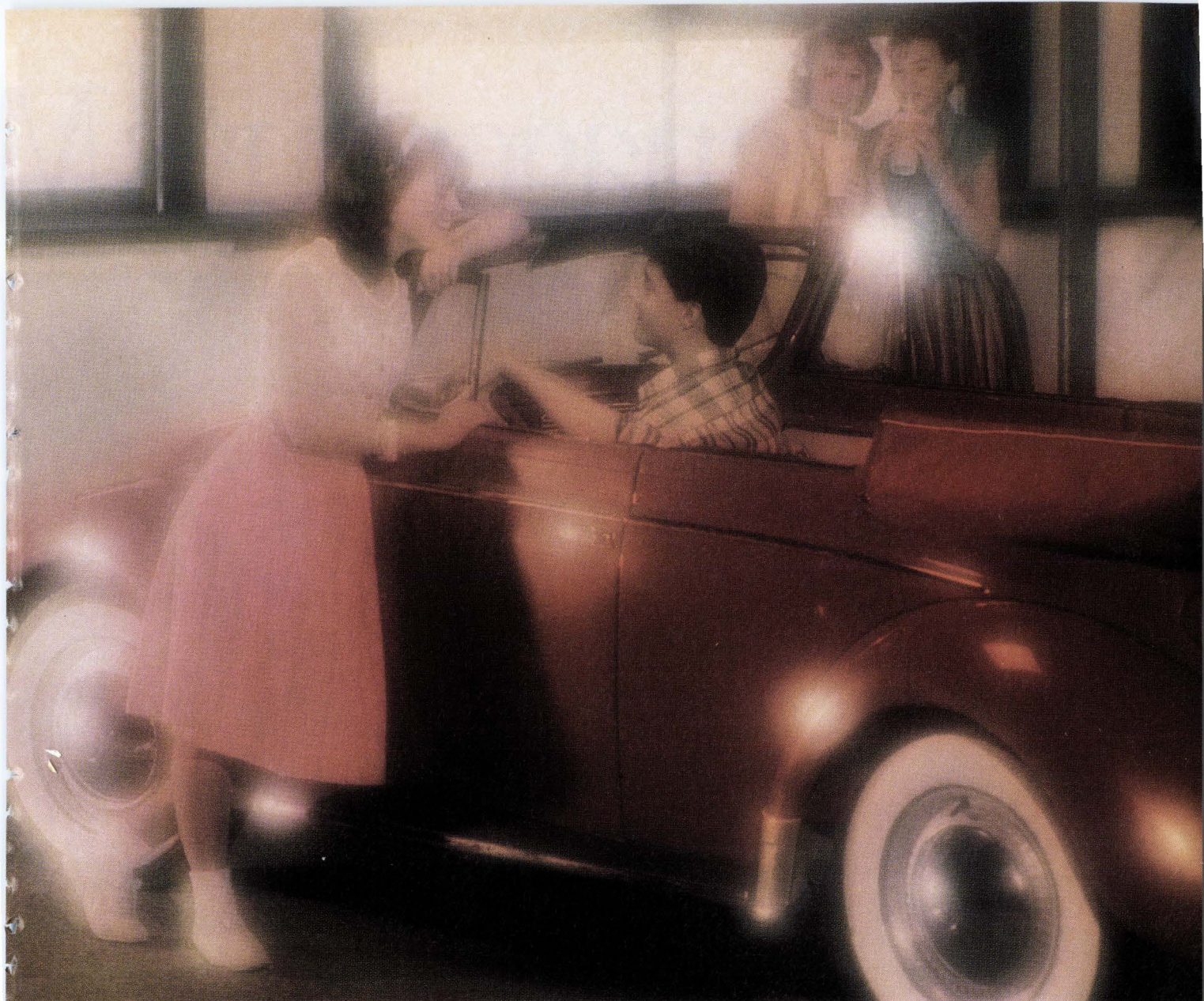
"There is a lot of old software around, and none of us have the resources to redo completely," Kratzke observes. "This department alone has 15,000 locations in the field. We will have to manage a large base of residual software for a long time, so we will need the flexibility to go both ways."

The Department of Agriculture has been closely involved with universities and research institutions that develop useful applications packages available in the public domain, says Kratzke. These various packages, mostly DOS-based, are used heavily throughout the agency. Because many federal agencies are in a similar position, IRM officials say that Posix is just the first step in the quest for a complete set of standards that will bridge many different operating environments.

Other standards also in the works, such as GOSIP, COS, and X/Open, will round out the definitions needed to standardize applications, Kratzke points out.

"In the long run, a mix of options, like X/Open's approach, might be the way to go," says Transportation's Woods. "There are a number of things that could happen—for example, if technology develops in an area that isn't Posix-compliant, or if the private sector doesn't come around to Posix, this trend could be reversed. One thing in Posix's favor is that the international market likes it." ■

Leila Davis is a freelance writer based in Alexandria, Va.



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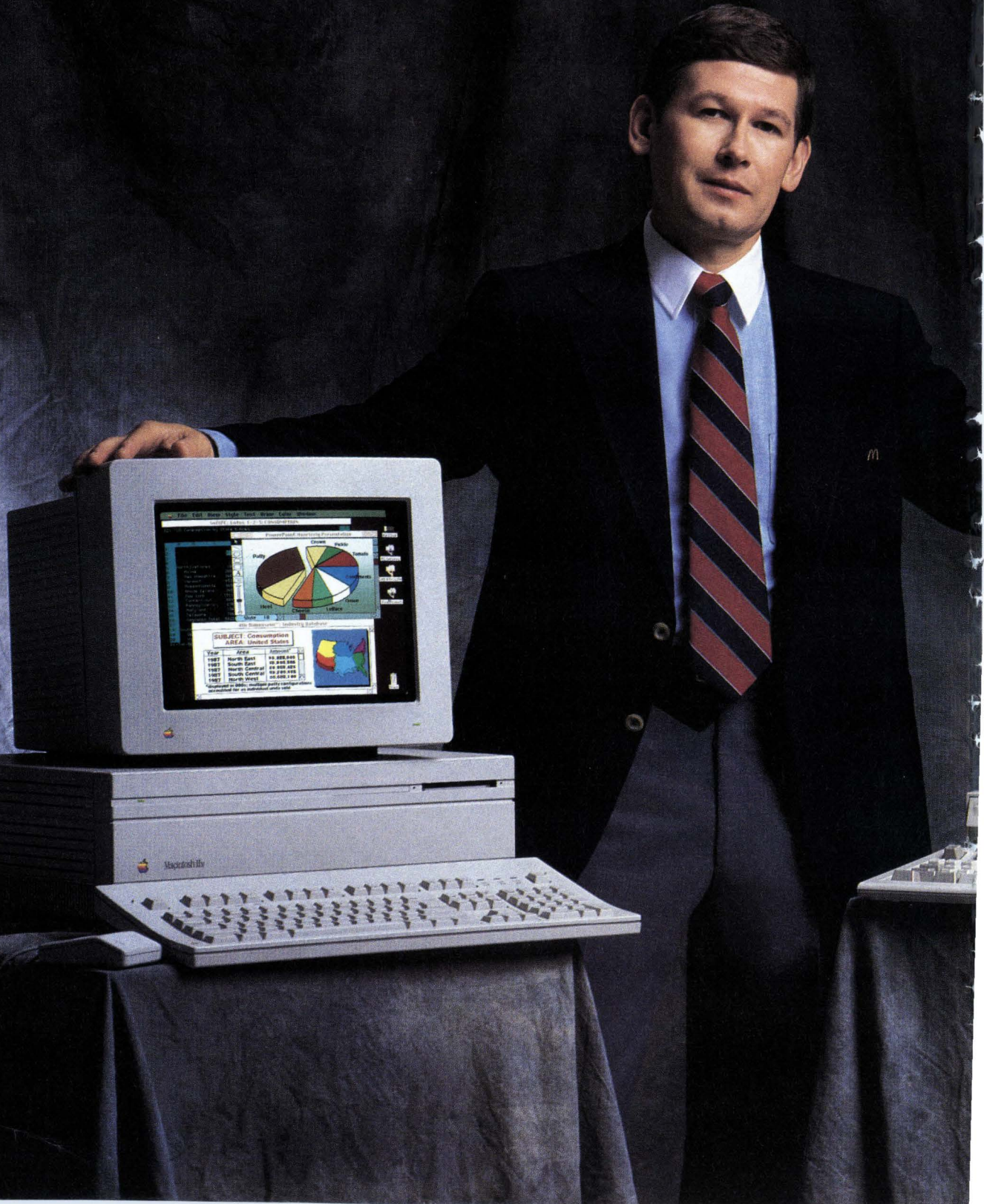
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News in Perspective

nal pressure and the Army's belated recognition that, as the GAO says, "the Army three-tier architecture standards would have limited future procurements."

The three-tier architecture's demise was also hastened by input to GAO from 17 competitors who felt they were restricted from bidding on Army contracts because of the mandated use of IBM's systems.

The June 1986 mandatory standards for the three-tier architecture had MVS as the tier one operating system; VM with CMS, MVS, VSE, or Unix 5 compatible for tier two; and Unix 5 compatible or MS/DOS for tier three. All DBMSs at tiers one or two had to include an SQL interface. General purpose pcs had to be IBM PC-compatible. Communications

had to be Systems Network Architecture or an SNA gateway with a minimum of remote job entry, 327x, and Document Interchange and Delivery/Document Content Architecture.

Nevertheless, while the three-tier architecture is history, its legacy isn't. Under the three-tier design, tier one consisted of the Army's five regional data dp centers and specifically identified activities such as distribution systems to support the mass of Army users. Tier two was organizations, such as commands and armories, within the Army. Tier three was the individual workstation and the desktop level.

So what happens to projects such as ASIMS that were installed under the late, unlauded standards? True,

ASIMS preceded the three-tier setup, which wasn't created until March 1986 and the standards for which didn't appear until June 1986. EDS finished ASIMS' five regional data centers in 1985, three years after it signed the contract. And the company has completed the 47 individual base sites.

Even though ASIMS was born prior to the three-tier architecture, however, EDS has had to follow those standards. Both it and IBM bid IBM equipment. EDS won because it proposed a more creative solution to the Army's problem. Does following these orders remove the blame for ASIMS being locked into a specific, outdated technical solution, as the S&I report charges? And if ASIMS is stuck in the wrong time zone, where does the Army go from here?

"They've really painted themselves into a corner," says a government relations staffer at a major computer company. "The Army knows it's got billions invested in IBM equipment, none of which was acquired under an acceptable federal standard. So what's it going to do? Trash VIABLE to comply with the federal standards?"

"They were very open about adopting IBM, and they were so naive, they thought it was okay. Are other companies supposed to sit still while that happens?"

The Army may be getting the message. After the fury over the three-tier architecture, the Army commissioned Planning Research Corp. (PRC), McLean, Va., to recommend standards that would meet the Army's

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needs—primarily, interoperability—while complying with federal competitive guidelines. Based on the Army baseline, the Army requirements, and “the litigious environment in the industry,” PRC concluded that any standard recommended should come from voluntary standard bodies such as the International Standards Organization (ISO) or the American National Standards Institute (ANSI). It also warned the Army of legal ramifications.

“The Army’s never given up on its goal,” the government relations staffer contends. “They’ve just taken different tacks to get there. One way they might do it with VIABLE is to continue with EDS even after the contract expires in 1992. In fact, EDS’s implementation of VIABLE is a

further indication of ongoing bias by the Army.”

That, among several other ramifications, was a major concern of the S&I report. Although the report hasn’t been seen, it’s obviously being heard. But some parties think the S&I group should not be seen or heard.

“I don’t know where this stuff came from,” says Joe Tarell, president of EDS’s Army systems division, Bethesda, Md. “Everything is fine with ASIMS. We continue to be on schedule and under budget. And we’re not having any problems with the Army. We’ve done everything they’ve asked us to.

“So I have no idea what precipitated this report. Whoever wrote it never bothered talking to us.”

The rule for S&I reports

is that they are rarely made public, and the ASIMS document will prove to be no exception.

According to Ronald Craven, acting assistant deputy director of policy and strategy in the Army’s Information Systems for Command, Control, Communications and Computers (DISC4), the S&I group knows exactly what it’s talking about.

“The S&I guys did a hell of a job,” says Craven, who wrote the memo responding to the S&I report after the report was released to the Army. “They checked into everything. They had no hidden agenda.

“I think the issue simply is that it’s a big project. I think it’s going to end up being a lot of to-do about nothing.”

Don’t bet adult money

on that one. Even if there’s no successor to VIABLE, we’re talking megabucks in future Army dp contracts.

“The question for those of us who want to compete for the next Army contract is whether the implementation of VIABLE has poisoned the well if they recompile,” the government relations source says. “The Army’s frozen in place because they don’t know what to do with their massive installed base.

“They’ve said on paper they’re going to change from the IBM standard, but they haven’t proved it. If they don’t change, we can’t compete for any VIABLE follow-on. They’ve got to break up this game and take their chances.

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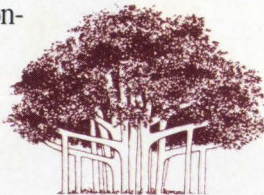




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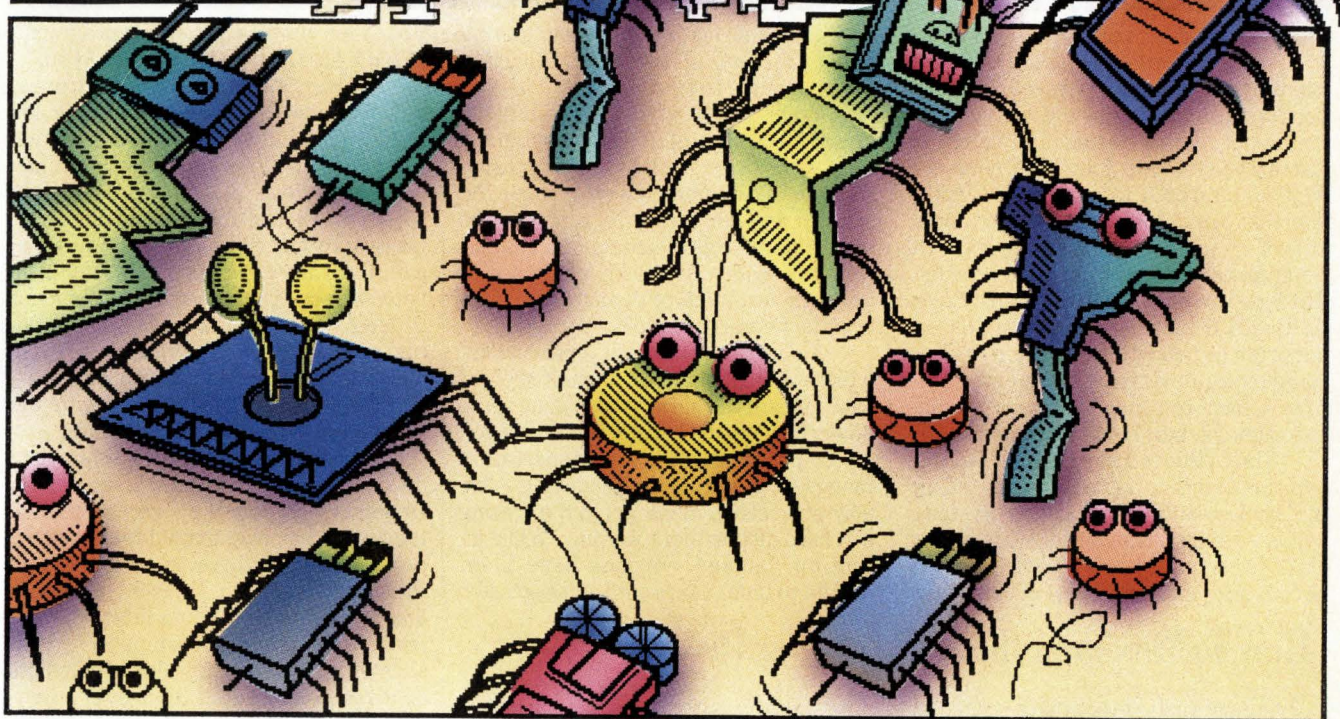
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Behind the News

SECURITY



Software Viruses: Pc-Health Enemy Number One

Covert code, designed to annoy or destroy, is emerging as the latest threat to pc security, and vendors are rushing to dispense protection.

BY EDWARD J. JOYCE

A few days before Thanksgiving last year, a student at Lehigh University checked out a software disk from the microcomputer laboratory. Within minutes, he returned what he believed to be a faulty disk and asked for another. Before the day was over, this scenario was repeated dozens of times with students checking out floppy disks at the 15 microcomputer laboratories across campus and returning them immediately as inoperable. Officials at the Bethlehem, Pa., university knew something was dreadfully wrong, but they could not explain what had caused disks to go haywire.

Unbeknownst to students and staff at the time, the university's computers were afflicted by a software virus—a small, mischievous program written by a hacker as a practical joke or as an act of vandalism. Viruses, like their biological counterparts, are programmed to repro-

duce rapidly, debilitate hosts, and spread like wildfire through a variety of carriers. Fortunately for Lehigh's computer users, the school's software analysts quickly identified the errant software and devised a "vaccine" program. Within days of the initial complaints, they had apparently eliminated the virus from software libraries in the microcomputer laboratories. Still, the virus had infected several hundred disks and probably disrupted the work of just as many students.

Although Lehigh University recovered relatively unscathed from its first bout with a computer virus, the well-publicized case augured the newest—and perhaps the most frustrating—problem in pc maintenance: diseased software.

More and more information systems managers are appreciating the destructive potential of this problem after watching viruses spread through their installations faster than the common cold. The pernicious attacks have affected

personal computers for the most part, although mainframes can function as carriers and transfer virulent code to other pcs. In the past six months, virus reports have been growing with alarming frequency, and the virulent software shows no deference to business, government, or academic computers.

Besides Lehigh, academic sites that have been hit by viruses include the Universities of Pittsburgh, Delaware, and Wyoming, Penn State University, George Washington University, Georgetown University, Bowie State College in Maryland, the College of Alameda in California, and Hebrew University in Israel. In the federal government, virus infections have been reported at the National Aeronautics and Space Administration and the Justice department. In the corporate world, Electronic Data Systems, Apple Computer Inc., AT&T, and Arco are among those that have been infected.

Even commercially sold, shrink-wrapped software has been infected with viral contagion. Seattle-based Aldus Corp. discovered a virus last March in copies of its FreeHand product, a Macintosh design program. The virus, which displayed a harmless "message of peace," was inadvertently passed to Aldus by another company that prepares training disks for Aldus. Contaminated copies of the software were distributed to retail outlets for a few days before the

Illustration by Didier Crenieux

Behind the News

problem was discovered.

While users are puzzling over the anatomy and biology of viruses, software vendors are rushing to the market with vaccine programs designed to detect or quash virulent code. John McAfee, president of Interpath Corp., Santa Clara, a firm that sells several antiviral products, knows of more than 25 different viral programs and he says the list is growing. Working closely with the National Bulletin Board Society, a Santa Clara-based, nonprofit organization dedicated to certifying communications experts, McAfee's firm routinely analyzes viruses and catalogs their behavior patterns.

Most viruses known today, McAfee explains, were originally implanted by the hacker-author in existing systems software or applications software on a pc disk. These viral hosts include systems boot blocks and operating system utili-

ties. The virus may be appended to an existing program or cleverly embedded in the program's code.

When the program is executed, the virus seizes control of the computer and tries to replicate itself by copying the viral code to a noninfected program on the same or another disk. After reproduction or attempted reproduction, which is carried out relatively quickly so as not to draw the attention of the user, the virus transfers control to the host program.

Following a period of reproduction, which varies from virus to virus, the disease usually will surface by making some powerful and deliberate demonstration of its presence. This demonstration ranges from a benign—if annoying—display of a screen message, to the erasing of a hard disk without warning. While inflicting damage, viruses have been known to taunt users with messages like

"We hope you've enjoyed our program," "That's life Dr. Death," and "F--- you."

Newer, better-designed viruses, however, tend to mimic their organic-life counterparts, making self-preservation and global infection top priorities. They discreetly clone themselves and place copies on all available disk media, especially floppy disks—the conventional path for transferring programs and data between pcs. Their destructive behavior is tied to an incubation period, so the virus will have ample opportunity to reproduce and the user will be less likely to associate subsequent problems with the acquisition of the infected software.

Some viruses are programmed to do no harmful actions for a set period. Depending on how they were designed, they could be programmed to reproduce or lie dormant. Others are triggered by a specific date like Jan. 1, 1989. Still others link activation to random intervals or a predefined cycle. For example, a spreadsheet virus may slightly alter the results of a recalculate operation every hundredth time it is executed.

Once a virus is identified and removed from a system, one of the major challenges is to prevent reinfection. Peter Scheidler, systems engineer at the Providence Journal Co. of Rhode Island, went through several reinfection cycles last May while combating a virus that had infected about 10% of the company's 1,500 floppy disks. The Providence Journal case stands out as one in which the author of the virus was actually identified and confronted.

The trouble began in the early part of May when a reporter brought a damaged disk to the firm's systems department to see if a file could be recovered. An analyst determined that the disk's boot block contained a virus program, which the reporter was not aware of. Embedded within the program code were an address and telephone number from Pakistan. This virus, dubbed the Pakistani brain virus, has been determined to be relatively benign because its primary goal is self-replication on floppy disks. It can, however, destroy small amounts of data, particularly on disks that are full or nearly full. Further, mutant strains that have been modified by hackers have surfaced and exhibit much more sinister behavior.

Scheidler found the virus on disks in the Providence Journal *Bulletin* newsroom, in state bureau offices, and in employees' home computers. Personnel in

How To Maximize the Safety of Your Disks

Computer viruses range from crude, simplistic software to extremely sophisticated programming that may well be the work of several people. While it is impossible to eliminate totally the possibility of infection from these viruses, there are practical, commonsense ways to minimize the risks. The following material summarizes recommendations from virus victims and the vendors of antiviral products.

- If you're booting a pc from a floppy disk, always use a single write-protected copy of the original system disk. Booting from borrowed, unknown, or multiple disks greatly increases the chances of infection.
- If your pc has a hard disk, use it for booting, if possible.
- Treat all public domain software and shareware as if it were infected. There's at least one virus that masquerades as software that gives instructions for a popular shareware vaccine program; while displaying instructions on how to combat viruses, the virulent software erases the hard disk. If you must use software obtained from a public source, execute it on a standalone pc without a hard disk, so that it has no chance of infecting other disks. In the case of shareware, obtain a copy from a secure source, such as the original author, rather than from a bulletin board or a friend. Friends or acquaintances might in all good faith recommend a program that they do not realize is infected.
- Write-protect all floppy disks that you do not expect to be writing to. Remove floppy disks from drive slots when they are not being referenced. As yet, there is no evidence of a virus jumping from a pc's memory to a floppy disk that is not inserted in a drive.
- Watch for changes in the behavior of your pc. Do programs take longer than usual to execute? Does a device light turn on when there should be no activity on the device? Is there a sudden reduction in available memory or disk space? Any of these signs could be symptoms of viral activity.
- When using resources on another person's pc (a laser printer, for example), transfer the necessary data on a disk that contains no executable code. Exposing executable programs to foreign pcs increases the chances of viral infections.
- When using a publicly accessible pc, turn the machine off to clear its memory from viruses possibly left behind by the previous user, and then turn it back on to begin work. Rebooting in itself will not necessarily clear a virus. The machine must be powered off.
- If you must work with high-risk software, namely, public domain software or shareware or in an environment known to have viral infections, consider the use of antiviral agents.

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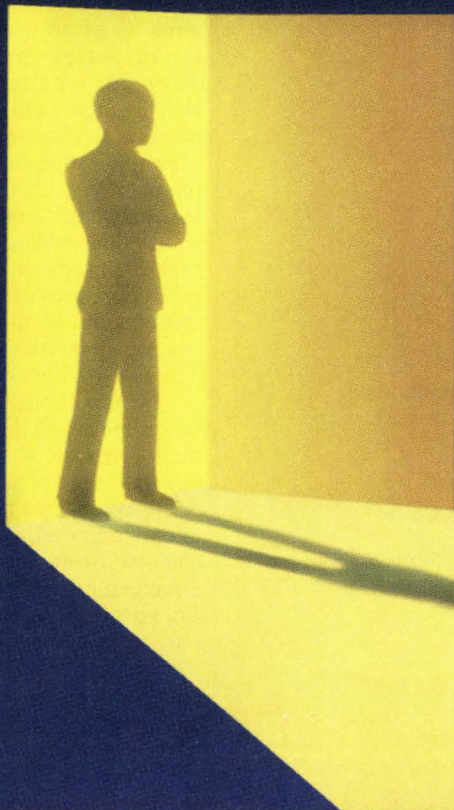
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his department spent two weeks testing and disinfecting disks at a cost of "about \$10,000" before they declared the problem "licked for now." During the course of his investigation, Scheidler dialed the Pakistani phone number "not knowing what to expect." The man who answered claimed he was the author of the virus, says Scheidler. "He said the virus was originally written to help him trace pirated copies of software that he had copyrighted in 1986. He had no idea how the virus ended up in the United States, but he apologized for the problems it had caused us."

Scheidler and others who have been smitten by viral bugs freely offer advice on prevention measures (see "Safe Disks"), but they admit that there is no foolproof method. Moreover, they predict that viruses probably will be a chron-

ic problem with no easy solution.

The medicine a user can buy off the shelf for fighting viruses falls into two general categories: programs that help prevent viruses and programs that help determine whether a system has been infected.

Stopping Viruses Before They Spread

Programs that prevent viruses are typically terminate-and-stay resident programs that monitor systems activity and watch for characteristic viral replication activities. They check all disk reads and writes and generate a warning message when potential viral activities are attempted. Such activities include writes to executable programs, systems device drivers, and boot blocks. This type of protection has the advantage of stopping viruses before they enter a system; how-

ever, viruses can be written to circumvent it.

The second category of viral protection software, programs that help identify an infected system, must first be installed on a known clean system. These programs work by periodically checking key information on the system disks (such as file date stamps, sizes, and check-sums, among other items), looking for changes that would indicate a virus has infected the system.

Vendors of vaccine software admit that their products are effective only against known contagion and will likely lag one step behind the latest mutant strains. Not only will new generations of mutants be more resistant, they probably will be much more difficult to detect because of increased complexity.

Some new viruses operate subtly with random and intermittent behavior to ensure survival. For example, a recent virus reported to the National Bulletin Board Society purportedly searches disks only for data files and then occasionally increments or decrements only numeric fields in those files. In a business application such as a billing system, the user may learn of this type of problem only after customers report occasional underbilling or overbilling. And then the user would probably choose to replace various hardware and software components of the system before discovering the actual cause of the problem, if indeed it is ever discovered.

The potential for viral-spawned disaster may spell the demise of public domain software, shareware, and the routine exchange of user-written programs. Some companies are already taking the initiative to restrict the flow of this type of software into the corporate computing environment. The Providence Journal Co. now requires users to boot their pcs only from company-supplied disks, and strictly prohibits the use of public domain software. Employees at Hewlett-Packard have been forbidden to bring to work uncopyrighted, public domain software.

One computer analyst views virulent software in light of a human virus of epidemic proportions. "The current free flow of information will stop. Everyone will be very careful about who they come into contact with and with whom they share their information. It might do to computers what AIDS has done to sex." ■

Edward J. Joyce is a consultant based in Lexington, Ky.

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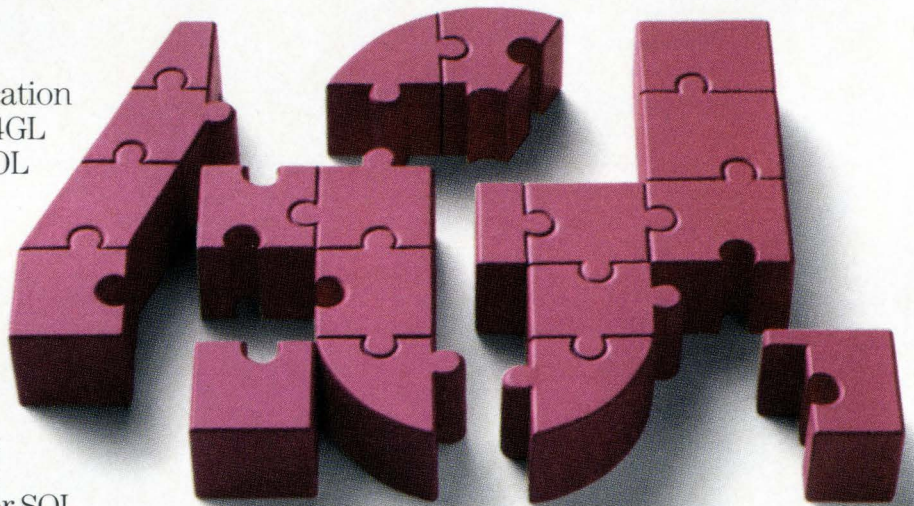
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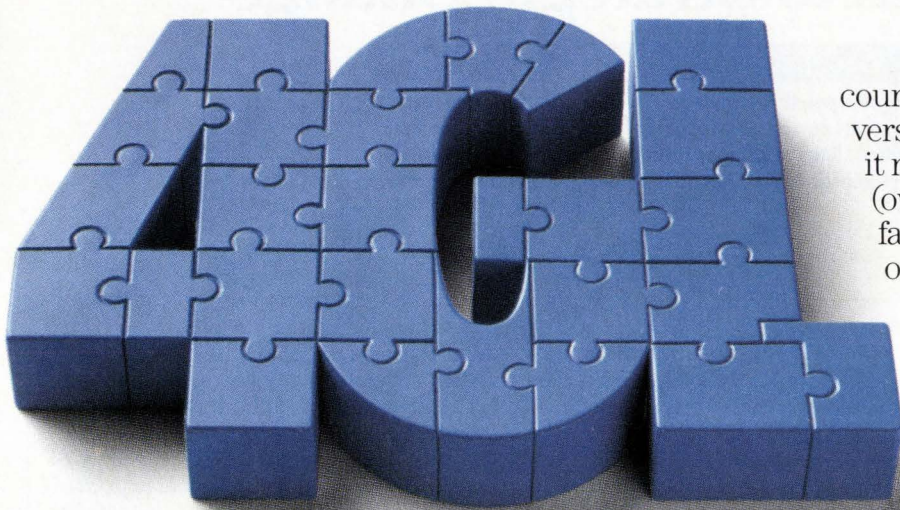
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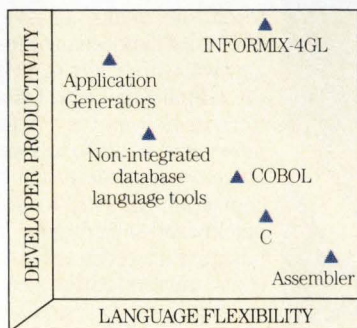
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Systems Discontinuity: Roadblock to Strategic Change

As firms strive to sharpen their strategies, they are running into systems discontinuity: systems portfolios incapable of supporting new initiatives. Often, management clings to kludges rather than risk rearchitecture. But in the long run, modification may not be the safest or least costly course.

T BY MICHAEL GOLDSTEIN
AND JOHN HAGEL

The high stakes of doing business in the intensely competitive 1980s have been driving radical redefinitions of corporate strategies, ratcheting up demands on systems portfolios. Since most computer systems have their origins in the 1970s or earlier, they embody business models, data structures, and decision rules that are less and less responsive to the methods that are today rapidly reshaping business. For many companies, systems portfolios are emerging as barriers to strategic change.

The result is systems discontinuity: the fundamental inability of a systems portfolio to support necessary strategic change. Companies facing such a discontinuity have two basic choices: either to continue on the current course (and risk even more severe and disruptive change in the years ahead), or to embark on an ambitious program of change, which requires mobilizing both the technical and user communities to define the new strategies and build new systems.

We will examine case studies of three firms that faced the two courses: one company that did not face up to a discontinuity and is living with the consequences; and two that took action to address their systems discontinuity before it was too late. The case studies are heavily disguised, but they are based on actual events.

The Price of Denying Discontinuity

Binary Inc. is a \$1 billion a year company that designs, manufactures, and sells digital systems for general computing, telecommunications, and some specialized applications. The bulk of its customers are midsize private companies. Binary is well regarded in the segments it serves, and has been in the business for over 20 years. Recently, however, its financial performance and stock price have been slipping.

The core of Binary's systems portfolio, 40 major systems in all, is over 10 years old, including the key order entry, customer service, and financial reporting systems. These systems have been constantly enhanced over the years, and have survived major strategic and structural alterations in Binary's business.

Binary's sales have shifted from exclusively leased sales, with bundled hardware, software, and maintenance, to primarily unbundled outright sales. The average price of systems has dropped as the typical order changed from a single system to multiple, microprocessor-based systems. Furthermore, Binary's manufacturing strategy shifted from manufacture-to-order for all products, to manufacture-to-inventory for many products. It changed from a pure functional organization to a product-focused development organization, with shared manufacturing and logistics and industry-focused marketing and sales. Binary also entered the realm of systems integration, where its maintenance force has to support hardware offerings from other vendors.

Binary had made successive modifications to its systems portfolio, but the efforts never had been totally successful. At each stage, management had been willing to accept compromises to get the systems up quickly and save money. Yet, the cost to the business in terms of excessive personnel costs, uncompetitive service levels, and the inability of Binary's management to make decisions was staggering. Over time, these problems had become part of the accepted method of doing business at Binary, and top management, all of whom had come up through the ranks, were only dimly aware that they had problems.

For example, Binary's order entry system originally had been designed to handle single-cpu orders, and this was deeply embedded in the logic of the system. Today, if a customer orders 10 microprocessor-based systems, the salesman must enter 10 separate orders. A recent sales efficiency study found



*The Challenges of
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Second in a Series*

that account executives spent 40% of their time on order entry. Moreover, the system had become so complicated, with cryptic codes and procedures for special cases, that each sales office employed a person to support the sales force in order entry.

At the corporate level, the finance department employed dozens of analysts to take reports that were designed for a functional organization and rework them into a form usable by product management. Maintenance technicians working on integrated systems ended up maintaining competitors' equipment for free, because Binary's equipment logs couldn't handle the different lengths and patterns of competitors' serial numbers. As a result, there were no reliable records of what equipment was under warranty as part of a turnkey installation.

Binary's order entry system required a minimum three-day shipping cycle. This had been acceptable when every order essentially had to be custom manufactured, but it placed Binary at an extreme disadvantage in some businesses, such as computer supplies, where next-day delivery was the norm. Almost as bad, the software ordering system had been developed separately when the shift was made to unbundled software. Unfortunately, as a separate system, it was impossible to coordinate delivery of hardware and software at the same time. Sometimes, software would be delivered weeks ahead of a special-order cpu, then would be lost by the time the installers showed up.

The maintenance systems had been designed as a time-accounting system only, in the days when every Binary customer was on a maintenance contract. Today, when Binary management wants to provide preferential service to contract customers, all maintenance calls are handled identically because the system can't identify who is on contract and who isn't. Even worse, bills must be prepared manually—errors are common and adjustments difficult.

By far the most costly problem plaguing Binary is management's deeply impaired ability to make decisions. Product management was supposed to manage the overall profitability of their product lines, but most of the numbers on the income statements received were allocated on a revenue basis, rather than on actual expenditures. Because of the time needed to massage the reported numbers, monthly results came out 60 days after the close. Binary had gained the reputation of being slow to respond and competitors had stolen market share by judicious pricing actions.

When there were disagreements among Binary's management team, the two sides often couldn't agree on what the problems were, much less how to resolve them. Top management meetings to address key issues turned into debates on the validity of the numbers needed to make the decisions. Pre-tax earnings had fallen from 15% of sales in the late 1970s to barely break-even. Binary had been the dominant supplier in its key market segments, but it now finds itself in danger of slipping to number two in several of them.

Why Companies Don't See Discontinuity

How does a company get itself into a position like Binary's, and why doesn't management do something about it?

Part of the problem is that top management's recognition of the problem may be low. Organizations simply adapt to their systems limitations and may fail to recognize the hidden costs they create. When it comes time to make another change to the systems portfolio, the marginal cost of doing one more modification will always be lower than a major rearchitecture.

Even when management recognizes the problem—and Binary's eventually did—the cost and risk of doing something

**Companies have
two choices: the current
course, risking severe
disruption; or an ambitious
and difficult program
of strategic change.**



about it can be daunting. In a company of Binary's size, a major rearchitecture can cost tens, even hundreds, of millions of dollars. In very large companies, the cost can be measured in billions. What's worse, the outcome is far from certain. In Binary's case, several development projects aimed at fixing the worst systems problems had been attempted, and failed. Few CIOs—much less ceos—want to take on a major project, with all of the risk it entails, given a history of development failures.

Finally, few ceos realize that they have to be intimately and actively involved if their organizations are really going to fix these problems. A systems discontinuity requires changes not only to the systems themselves, but to the or-

ganization and management environment into which they are installed. Yet, because most ceos don't understand this, they delegate the solution to the IS chief, who simply isn't empowered to solve the total problem. Sensibly, few CIOs take on high-visibility, expensive efforts that are bound to fail. Instead, they try to do the best they can with the resources they are given.

Managing Discontinuity Successfully

AmCom is one of the 50 largest and most profitable commercial organizations in the world. Its traditional business is insurance marketed directly to consumers, but it has achieved dramatic growth of both revenues and earnings by improved quality of its customer base,

improved risk management, and selective diversification into related financial services, such as consumer credit. Despite its success, AmCom faced serious problems in the mid-1980s.

AmCom's systems development budget had tripled between 1982 and 1985. Maintenance, which had been 45% of the systems development budget, reached 70%. Installed MIPS grew at a rate of 40% a year, even though the real growth of financial transactions had been only about 5% (AmCom's revenue growth of 25% a year had been achieved by increasing the value of each transaction.) Even more important, however, the systems development function could no longer keep up with the rate of business changes demanded.

Following Successful Project Management Steps

Before insurance marketer AmCom undertook its major rearchitecture, it studied how other firms had negotiated systems transformations and emulated the practices that were instrumental in their successes. This is what AmCom found.

Keep the ceo and top management involved. Top management involvement is essential for success. But beyond the personal commitment of the chairman, the formation of a steering committee (made up of the chairman, the CIO, the project manager, and the head of each major business unit) makes clear to the whole organization top management's commitment and involvement throughout the project and forces organizational politics into the open.

Forge a business/technical partnership. In the course of a long-term project, complete control falls to technical management for about a third of the time—the time spent coding. For the balance of the schedule, technical management depends on the capabilities and cooperation of the user organization to help specify requirements and prototypes, perform functional testing, train users to use the new systems, and develop and implement modified procedures and practices. Ultimately, success depends not on the elegance of the technical implementation, but on whether the users and technical community break down the barriers between them and organize the project unconventionally. Users become full-time participants, just as the technical participants are. Users gain a deeper understanding of technical opportunities and constraints, and technical staff gain understanding of the business objectives underlying the specifications. By staying involved for the duration of the project, users can provide the business perspective to help decide the technical trade-offs that emerge in later stages, and help spearhead planning and management of the implementation effort.

Such a partnership also ensures broad support. Problems become the responsibility of the whole business to solve, not just the MIS manager operating without support or authority. And, after working together for months with a common purpose, users and systems developers have been known to actually trust each other.

Bring the best people into the project. Bring in the top achievers from all areas of the organization—from users to technical personnel. To get specific skills, supplement the team with outside hires. The overall project manager should be respected companywide and come from the business side of the organization.

Continue to develop the initial vision. While the initial vision serves to get a project chartered, it is too abstract to guide the project as it develops the details of the new strategies and systems. Instead of jumping directly to specifications, the project team should have time to focus on the underlying rationale and business strategies motivating the systems development. When the project views itself as the "keeper of the vision" (even after formal specs are developed and committed to code) and continues to develop that vision, it provides the organization with a reason and motivation for the extraordinary effort required.

The vision also becomes an essential management tool for controlling scope. There is a natural tendency, once the constraints of the existing installed base are removed, to attempt every possible systems improvement, which leads to disaster. Development initiatives, however attractive on a standalone basis, should be undertaken only if they implement an essential component of the vision. Additional capabilities can be implemented later, after the essential architecture and capabilities are up and running. Keeping the vision also ensures consistency between top management's objectives and what is actually implemented. Large projects sometimes lose sight of the forest for the trees. The vision serves in essence as a contract between the project and top management, ensuring that the investment actually achieves what is intended.

Empower the project team to make decisions. A rearchitecture entails literally thousands of decisions about a huge range of issues: from fundamental issues of business strategy to simple issues of placing data on a screen. These have to be made quickly because time is the enemy of success. Conventional decision mechanisms are usually too slow, and more than one project has entered a death spiral, whereby requirements become obsolete before implementation, staff turns over, and management commitment weakens. One source of delay triggers additional delays, so that the project never finishes. The project team must have the authority to proceed without requiring sign-offs from line organizations. The steering committee should have the final authority in handling disagreements.

Systems Discontinuity

Every two years or so, the board had approved a major new strategic initiative. For such crash projects, systems development was able to get the necessary systems enhancements running and integrated with AmCom's core systems. But nothing else could get done, and enhancement requests from the established businesses backlogged. High-priority requests took over a year, medium priority requests didn't get done at all.

Users began to demand enhancements that were harder and harder to do—systems that required integration across multiple databases and changes to more and more programs. Systems development was growing as fast as it could and had adopted code generators and other advanced tools. State-of-the-art software rejuvenation techniques were implemented. But each time systems development thought it was about to get on top of the problem, another board-level initiative came along.

AmCom's CIO had been appointed in 1982. He had spent the first two years of his tenure trying to accomplish two things: earn a reputation among top management as someone who was responsive and could deliver and educate the ceo about systems technology and the impact it was having on the business. By 1984, the CIO worried that the underlying systems problems would begin to damage his hard-earned reputation for getting things done. However, that same year the education effort bore fruit.

The chairman agreed to sponsor a comprehensive technology strategy review. With the chairman's support, top management of each of the business areas committed real time and energy to thinking through the kind of systems and technology support they would require in the future. After six months, the combined efforts of management, users, and IS staff produced the most comprehensive view of the future of the business that AmCom had ever attempted.

The study found that the individual changes of the past few years were really aspects of a larger and much more fundamental strategic change. AmCom faced new, low-cost competitors who were cherry picking some large, price-sensitive segments. They had developed a highly efficient delivery system from scratch that took advantage of the latest technology. To maintain market share and position, AmCom had to match these low-cost competitors in the basic product offerings, and then tailor more specialized and higher-margin products to higher-value segments. This would re-

sult in higher profitability with AmCom's best customers, and still permit low-priced, profitability offerings to other more competitive segments.

Design Incapable of Supporting Strategy

A detailed technical assessment of the existing systems found that their design did not support many requirements of the new strategies. The whole system had been designed around the now obsolete model of a homogeneous customer base and a single, high-cost/high-margin service standard. The data required to segment the customer base resided in seven separate systems, and additional data entities would be required that didn't exist anywhere. All of the main processes would have to be fundamen-

tally modified to deliver differentiated services to different customer and risk classes.

Altogether, implementing the new strategies would require modifications to over 1,000 programs. Some of these programs were 20 years old, were written in assembly language, and had been untouched in at least 15 years. In a few cases, source code listings and external documentation were lost, possibly permanently. The study team concluded that if it were necessary to fully implement the new strategies, it would be cheaper to start from scratch.

Moreover, even if the changes could be made, adequate performance was unlikely. Part of the new strategy was to give customers instant access to

British Telecom Starts from Scratch

British Telecom has just completed rolling out an ambitious new customer service system (CSS) to roughly half of its 29 districts, with the other half expected to be completed in 1989. Developed from scratch, CSS is part of a fundamental reorientation of British Telecom's business: from a centrally driven, functionally organized government monopoly to a locally managed, customer-focused, competitive enterprise. Supporting the management discretion and entrepreneurship of the newly created 29 districts was a major part of the strategy.

CSS—which currently has 3 million lines of code—replaces, with a single database-driven architecture, all or most of the functions of six major and separate systems. The old systems ran on more than three different vendors' hardware, five different operating systems, and three different database managers. The original systems had been specified by a functionally organized headquarters management, and existed more to funnel reports up to headquarters than they did to help deliver customer service.

Improved customer service was the immediate design objective of the systems, and very much reflects the vision of how British Telecom needed to change. CSS supports the creation of a front office, where a single group of customer service personnel—reachable from a single telephone number—can answer customer questions, make repair or installation appointments, or adjust problems with billing, repairs, or new service orders. The systems then drive the actual operations of these activities, establishing schedules and assigning resources.

Integrated management reporting fundamentally changes the role of middle and senior management. Instead of working from summaries of what did happen, filtered by successive layers of the organization, management can see what is happening, view on-line summaries of current status, and then move at will to successively greater detail—ultimately to the same information available to the frontline supervisor. Nationally, the system supports more than 45,000 terminals for use by the frontline operators.

CSS had unusually high levels of organizational commitment and user involvement from the beginning. The project was championed at the highest management level, both within the organization and to the outside world. High-level user specifications were developed by committees chaired by the newly appointed district general managers. These were further developed by teams of full-time users—many on the project for 18 months—working closely with IS personnel.

The project did experience some major problems, however. The scope of the project increased beyond the original charter, and proved too unwieldy to deliver. This caused some delays, and disappointment after the scope was cut back nearer to the original specification. In addition, the effort required for pilot implementation was badly underestimated, and schedules slipped. Nevertheless, British Telecom persevered through these problems, which might have killed a less important project.

Systems Discontinuity

their own policy and account histories. How could AmCom provide one-second response rates if data had to be pulled from seven separate systems, or how could data integrity be guaranteed if extracts were used?

At the same time as the study recommended starting from scratch, it also questioned AmCom's ability to successfully build the new systems following its traditional methods. The last major systems development project, a two-year attempt that began in 1980, had been only a fraction of the size required for this one and had run into serious problems. Despite meeting the written spec, users found the delivered systems didn't meet their needs. Systems development insisted this was not a technical failure, but a failure of management will, but to no avail. The systems had to be redeveloped, causing an 18-month delay and cancellation of three follow-on phases. Two earlier, smaller projects had gone only slightly better.

The cost, if ultimate success could be assured, was not the issue. Even though the effort would cost hundreds of

millions of dollars, the risk to AmCom's core business of not doing the project far outweighed this cost.

It took AmCom three months to decide. As part of the decision, the original study team was asked to investigate other organizations that had attempted major rearchitectures, and extract the practices that contributed to their success (see "Following Successful Project Management Steps"). The findings they presented to the board included a set of organizational, timing, and resource recommendations based on this work. These were implemented when the project started up, and were continually refined as AmCom went along.

The initial charter for the project was to develop a detailed vision for the new systems, and to report this vision back to the board within nine months, along with a specific timetable and cost estimate for completion. This was accomplished, and a 24-month development schedule and 24-month rollout schedule was approved. The effort was not without problems, but systems were rolled out within nine months of the origi-

nal schedule and satisfied all of the essential requirements of the original specification.

Major Discontinuity, Midsize Solution

Regional Life is a well regarded, U.S.-based life insurance company with a policy count of 600,000. The company's systems were developed over a 20-year period, the core of which had been written in unstructured COBOL, and documentation had been lost. Among many problems with the systems, key business variables such as prices had to be hardcoded into these unstructured and undocumented programs, so that responses to changing market and competitive conditions were glacially slow, and new product introductions were essentially impossible.

Regional Life's initial response was to try to build the new systems on its own, from scratch. A specification project was initiated—totally staffed by IS personnel. After 18 months and six man-years of effort, however, general management realized the effort was nowhere near completion and that optimistic estimates (which were no longer believed) for the project's implementation were pegged at seven years. A new team consisting of general management and outside consultants was brought in to evaluate the project's progress to date, and to make recommendations on how to proceed.

The new approach was radically different from the original. Short-term requirements for specialized products would be met by developing some stand-alone minicomputer systems, supplemented by quick fixes to the requirements. Over the long term, instead of developing a complete system from scratch, the core of the new systems would be a vendor-supplied software package. Regional's development effort would be spent in developing real competitive differentiators, not in reinventing basic processing systems. Specific plans were established for developing specialized analysis and marketing capabilities on top of the vendor-supplied solution, and for migrating the newly developed, standalone specialty systems.

Regional is now in the midst of implementation. Migration to the new environment is expected to take three years, at a cost estimated to be one third of the best estimates for the internally developed systems. A major rearchitecture was not a viable option for a company of Regional's size, but by using a vendor-

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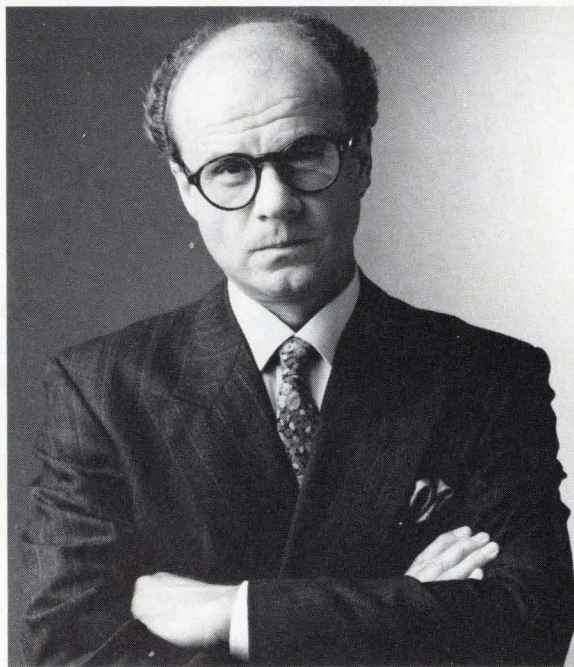
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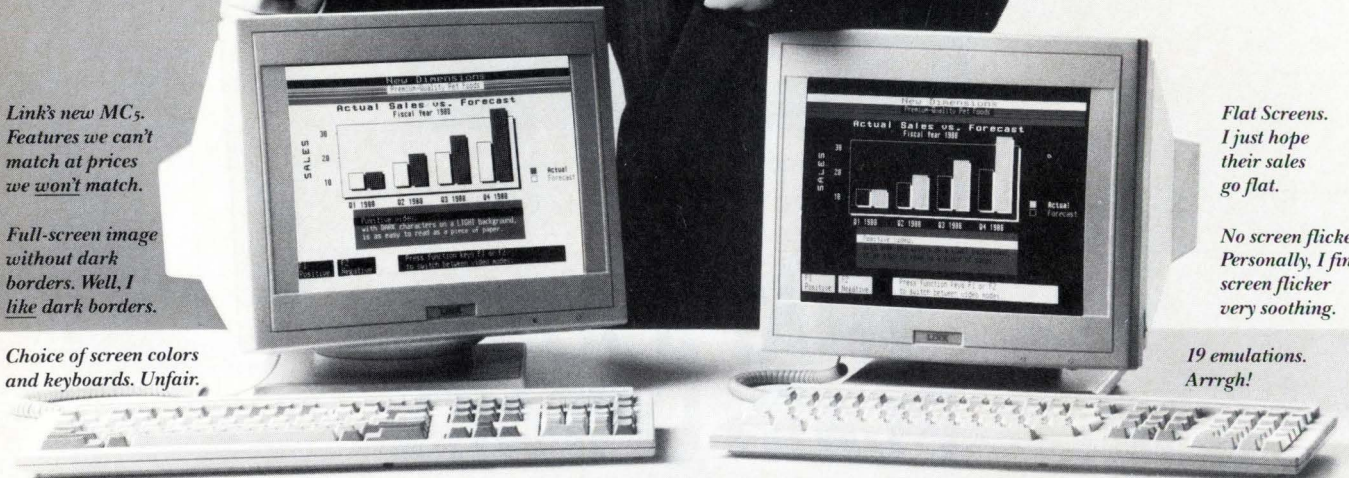
Full-screen image
without dark
borders. Well, I
like dark borders.

Choice of screen colors
and keyboards. Unfair.

Flat Screens.
I just hope
their sales
go flat.

No screen flicker.
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screen flicker
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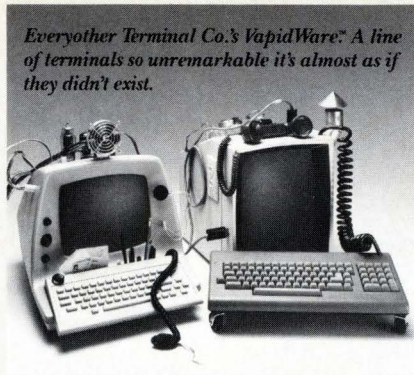
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Flat Screen for decreased glare and increased viewing area.
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are ahead of ours that makes me so mad, after all, we’re used to that. It’s that they’ve beaten us on features *and* quality *and* price. There ought to be a law. Or at least a law suit.

“Well, we’re not going to take this lying down. As soon as we finish this quarter’s financial posturing, we’re going to form a task group to study the situation, maybe make a few recommendations. But these things take time. While Link is totally dedicated to building terminals, we have more

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Every time I look at this chart, I feel like my head’s going to explode.

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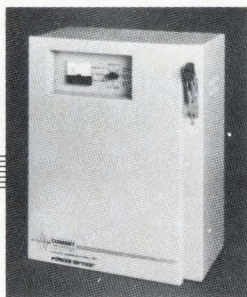
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Systems Discontinuity

supplied package as a base for its future systems, Regional has achieved what is, in effect, a major rearchitecture, while assuming only a fraction of the risk and expense of internal development.

Change Management Necessary

At all the firms represented by these case studies, change management was necessary. This is because all organizations tend to resist change, and a systems rearchitecture is fundamentally an exercise in change: changes in corporate strategy, changes in people's jobs, changes in required skills, as well as changes in technical knowledge and practice.

**A SYSTEMS
REARCHITECTURE IS
FUNDAMENTALLY
AN EXERCISE IN
CHANGE.**

Binary has not been successful, because management doesn't understand, and therefore can't face, the magnitude of the changes required. AmCom and Regional Inc have been successful because they recognized the stakes and took appropriate action.

Systems discontinuity represents one of the most critical strategic issues facing businesses today. Companies that are successful are likely to be able to leverage their existing strengths more effectively than their competitors, and possibly change the basis of competition. Companies that avoid making changes to their systems portfolio risk being left in an increasingly uncomfortable position. They may be forced into the stark choice of either making major, risky systems investments in a catch-up program or accepting continued deterioration of competitive and financial performance. ■

Michael Goldstein and John Hagel are consultants at the New York-based management consulting firm, McKinsey & Co. Inc. Paul Cosway, a consultant with McKinsey's Cambridge Systems Center, Cambridge, Mass., also contributed to this article.

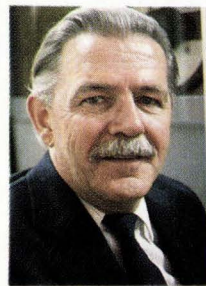
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"SUPRA and all the Cincom products work together to help us meet our corporate expansion and quality goals," Seate points out. "It's a set of tools that is very flexible, very easy to use and learn, and very capable of developing and supporting a wide variety of applications."

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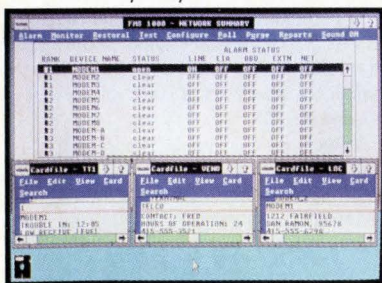
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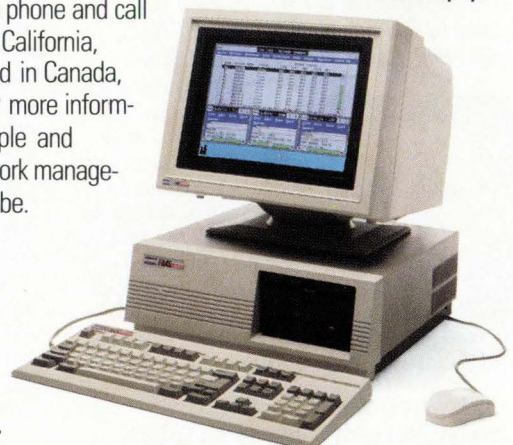


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Two independent surveys of DB2 users provide some insight into the use of DB2 at customer sites. Almost all installations use components of DB2, such as DB2 Interactive (DB2I) and Query Management Facility (QMF), but no vendor of DB2 support tools has yet managed to rise to the status of recognized standard. Most DB2 purchasers are irrevocably committed to DB2 as their primary database management system, and they are heavily involved in the development of DB2 applications.



BY HOWARD FOSDICK
AND LINDA
GARCIA-ROSE

In the three years that DB2 has been available to customers, IBM has established its dominance in the database management system market in a way it was never able to do with its earlier database product, IMS. Even well-established DBMS competitors such as Cullinet, ADR, and Information Builders have found it necessary to coexist with DB2.

And yet, little has been done to assess the ways companies really use DB2. Horror stories about DB2 exist, as do tributes to it. An accurate picture of the environments that companies establish to build DB2 applications, and the ways in which those systems are being built, has been lacking.

Two independent surveys of DB2 users now provide a picture of DB2 in the real world. One survey, conducted in April 1988 among members of the Midwest DB2 Users Group, received nearly 300 replies, representing over 150 different users of DB2. Two thirds of the replies were from DB2 user installations, the other third represented software vendors. The second survey, performed in January 1988 among members of the

DB2 Users Stand Up To Be Counted

New York-based Knauer DB2 users group, drew replies from 350 people representing 113 companies. All were users of DB2. Although these surveys were undertaken independently of one another, we have combined the results into what we believe is an accurate, composite picture of how companies are using DB2.

Profiles of DB2 Sites

A major task of the surveys was to profile the typical DB2 installation. What software do DB2 users install to develop DB2 applications and improve management of the DB2 environment?

Starting with DB2 support tools, we found that almost all installations use components of DB2 such as DB2 Interactive (DB2I) and Query Management Facility (QMF). Approximately one third of the DB2 sites use the separately licensed IBM products DBEDIT, the Data Extract Facility (DXT), and the DB2 Performance Monitor (DB2PM). IBM's migration aid, DBMAUI, was employed by 23% of the

New York users, and by about 15% of users in the Midwest.

Several DB2-related IBM support tools were shown to have minimal market presence: the Data Base Relational Application Directory (DBRAD), the Data Extract Assist Tool (DXTA), and Host

Data Base View (HDBV). Each of these IBM program products were used by 10% or less of the DB2 sites. Two IBM products we would characterize as currently unsuccessful in the DB2 marketplace (on the basis that they were employed by just a handful of the hundreds of survey respondents) are the IMS Data Dictionary-DB2 Interface and DB2/VSAM Transparency.

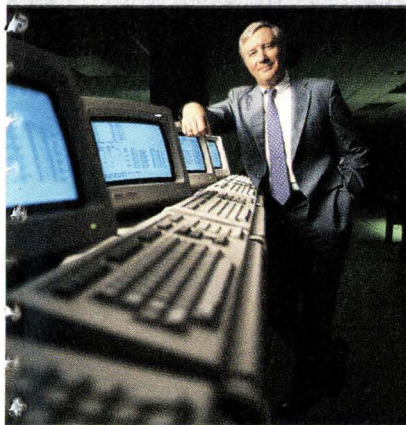
DB2 systems support tools from independent software vendors present an interesting situation. Survey respondents mentioned dozens of different products, but the only product used by more than 10% of the respondents was DB/ProEdit (from On-Line Software, Fort Lee, N.J.). The many other support tools each rated only a few mentions.

This confirmed our suspicion that no vendor of DB2 support tools has managed to gain status as a supplier of a recognized standard. Moreover, the Midwest group survey, which included responses from 50 software vendors, in-

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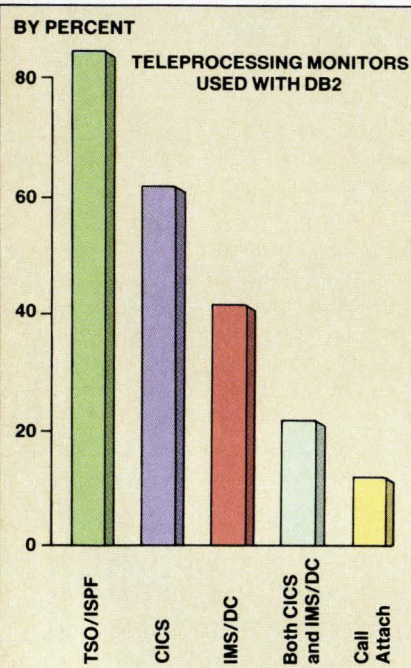
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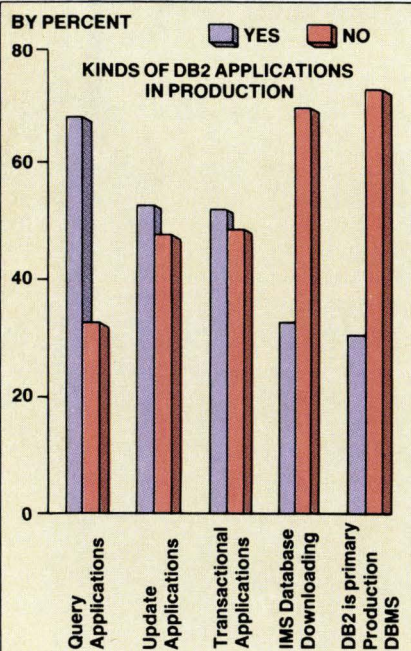
DB2 User Survey

TSO/ISPF Leads the Pack



Source: Knauer DB2 users group and Midwest DB2 Users Group.

Hot Applications



(These statistics are from Midwest DB2 Users Group only.)

Source: Midwest DB2 Users Group.

indicates that suppliers of DB2 support software will continue to flood the market with new products. It seems that DB2 users can look forward to a wide variety of software support tools, and the vendors developing these tools may face either very stiff competition or an unpleasant shakeout.

We also sought to discover which fourth generation languages, or applications generators, were used to develop DB2 applications. We found that almost all sites employ IBM's QMF, widely considered to be an essential part of the DB2 environment. Information Builders' Focus, Pansophic's TELON, and IBM's Cross Systems Product (CSP) were the next most popular applications development tools. These products were used by between 10% and 25% of the survey respondents. At 10% market share or below, we again encountered dozens of products, including IBM's Application Development Facility (ADF), Sage Software's Application Productivity System (APS), On-Line Software's DB/CLIST, IBM's Application System (AS), SAS Institute's SAS, and Nomad, Mark IV, Intellect, Ramis, Pacbase, and many others.

The 4GL picture is similar to that for DB2 systems support tools. Each of the three clear market leaders—Focus, TELON, and CSP—has 25% or less of the market. Dozens of other tools rate at 10% or less, with many being mentioned by only one or two respondents. So, beyond QMF, DB2 users do not yet recognize any particular applications development tool as a "standard."

Software vendors are enticed by a market that lacks resident market leaders, yet many find themselves unable to build market share once they enter the fray. That there are many products available benefits DB2 users when they seek tools, but it hurts them when they look for skilled personnel.

Among traditional programming languages, COBOL was the leading language employed in DB2 applications. The Midwest group's survey distinguished between VS COBOL and COBOL II, and found that the impact of the "new COBOL" has yet to be fully felt: more sites still use VS COBOL. Among DB2 users, PL/1 was the second most-used programming language, while many software vendors picked Assembler. Languages such as FORTRAN and APL2 are used by relatively few DB2 sites.

DB2 distinguishes itself from IMS database systems and VSAM files because it supports concurrent on-line access from three different teleprocessing mon-

itors: CICS, IMS/DC, and TSO with ISPF. TSO/ISPF was by far the most widely used on-line monitor because of its role in developing DB2 applications and its supporting relationship to QMF.

A Significant New Trend In Development

We also found evidence that many sites employ TSO with ISPF to build their own applications, a significant new trend in applications development. CICS was the most widely used transactional TP monitor, with IMS/DC in use at only one third of all DB2 sites. CICS's eclipse of IMS/DC for transactional applications continues a 10-year trend in the industry and appears complete with the ascendancy of DB2.

Use of multiple teleprocessing monitors with DB2 is quite common: the Midwest group survey found that a fifth of all sites use both CICS and IMS/DC. This new phenomenon was not possible before the advent of DB2, in the days of CICS/VSAM, CICS-DL/1, and IMS/DB-DC. The Midwest group survey also found significant use of the Call Attach Facility. However, such usage was largely confined to software vendors and was found in only a handful of end-user sites.

Another major area of interest in the surveys concerns the level of sophistication of DB2 users. Is DB2 used for on-line and transactional systems, or just for downloading data for querying? How many sites use DB2 as the primary production DBMS?

The Knauer survey judged the overall sophistication of DB2 usage from its finding that 10% of all DB2 sites are in a pilot project phase, while 50% are active in development projects. Only 40% actually have production applications, much fewer than one might expect.

The Midwest survey provides another perspective, asking for the numbers of applications in development and in production status at each site.

As expected, the responses vary widely, ranging from no applications in either status to installations having several dozen applications in both. The average site had 3.25 applications in development and 4.0 in production.

The number of applications developers at these sites also varies widely, but most staffs of DB2 programmers ranged from two or three up to about a dozen. Statistics from the Midwest survey shed further light on the nature of those applications in production. Fully 65% of DB2 installations had query applications in production, while about half of all sites had applications involving on-line

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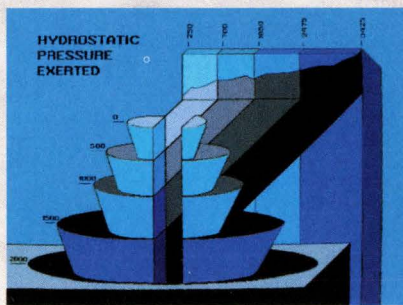
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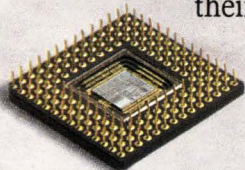
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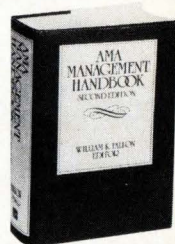
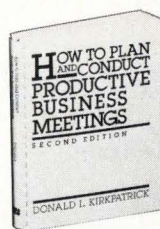
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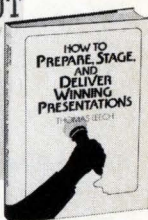
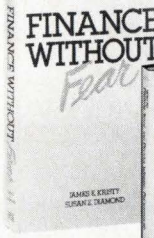
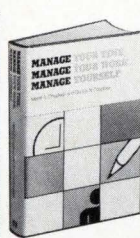
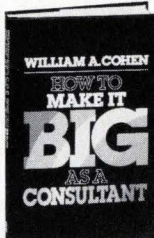
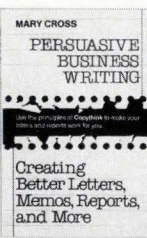
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data maintenance in production. The same percentage had applications they characterized as transactional in production.

Only one third of the users download data from IMS or other production DBMSs into DB2 tables for querying. About the same number of sites declare DB2 their primary DBMS for the development of new applications. In the Knauer survey, 75% of respondents indicated that their companies were committed to DB2 as their DBMS of the future.

DB2 Purchasers Are Committed to It

We interpret these results to show that most DB2 purchasers are irrevocably committed to DB2 as their primary DBMS, and that they are heavily involved in the development of DB2-based applications. However, given the relatively brief life span of DB2, and considering the lengthy development time for major new projects, many of the most ambitious DB2 development efforts are not yet complete. We expect many larger, more ambitious applications in the DB2 community to go on-line shortly. Meanwhile, the surveys' statistics confirm the sweeping extent of IBM's victory in selling DB2 to its mainframe accounts.

One of the most controversial topics related to DB2 is its performance. With directly contradictory claims reported by the trade press, vendors, and DB2 users, we hoped that our surveys would clarify the natures of these competing performance claims. Some of the confusion stems from the ill-defined nature of performance.

We found that DB2 readily handles very large tables and databases. Users in New York reported having a 44 million row table; 105 3380s holding DB2 data; three tables with 15 million rows; several applications with 1-million- and 2-million-row tables; and new applications with 12 3380s of DB2 data.

Another way to consider performance is from the standpoint of on-line response time. In this approach, it is important to distinguish between response time for transactions versus ad hoc queries. For example, one New York DB2 user has a 2.3-million-row table with seven indexes and about 350 bytes per row. CICS on-line response time is 3 seconds for trivial transactions, and 5.9 seconds for high-function transactions. In contrast, ad hoc queries average 34 seconds.

Another New York user provides a comparison of CICS usage versus IMS/DC versus TSO/ISPF as the DB2 teleprocessing monitor. For a 2.6-million-row table

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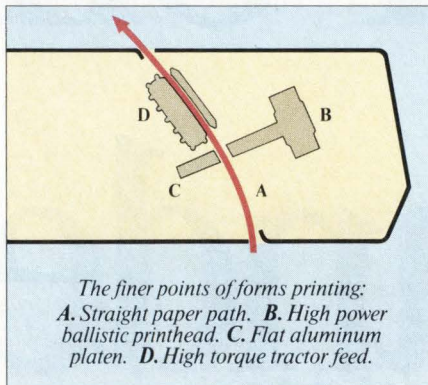
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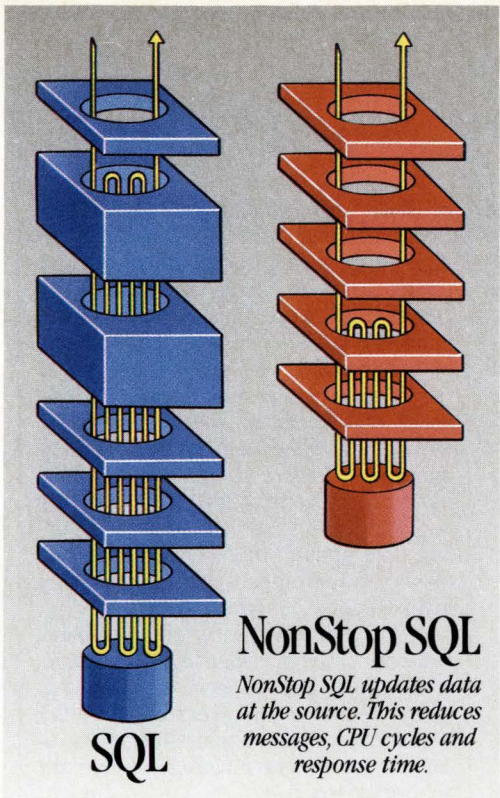
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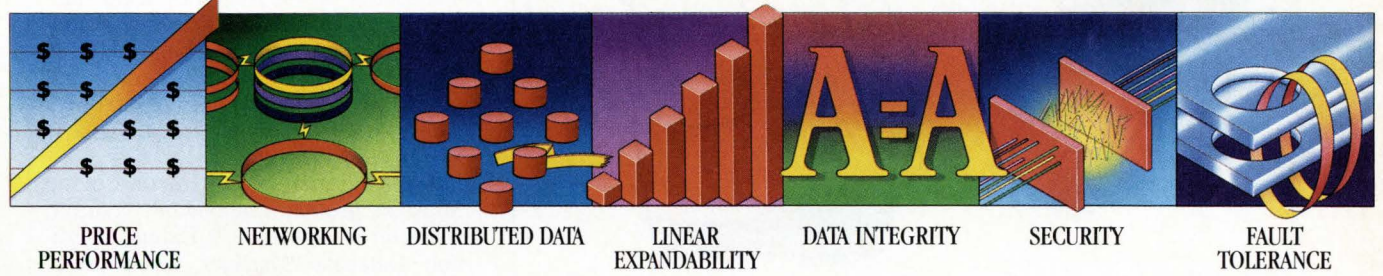
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DB2 User Survey

with four indexes, on-line response time for either trivial CICS or IMS/DC transactions is 1.2 seconds. This confirms R. Eberhard's research at the IBM General Products Div. Systems Engineering Laboratory, which demonstrates that CICS and IMS/DC support on-line response times in the DB2 environment that are extremely similar. The same New York

user mentions an on-line response time of 4 seconds to 5 seconds for typical TSO/ISPF interactions. This supports the widely held view that TSO/ISPF provides poor response times compared to well-designed CICS or IMS/DC transactions.

The surveys indicate that many DB2 users load large DB2 tables and are correspondingly careful with the kinds of pro-

cessing they permit against those tables. Relatively fewer sites have implemented high-performance transactional applications. However, such applications (including those featuring on-line data update) do exist and perform adequately in the view of their users.

The survey results suggest several areas of evolution for DB2. First, the number of applications in development indicate that there shortly will be many more production applications, especially those of a transactional nature with on-line data update. DB2 version 2 performance should speed this expansion in mainstream production use of DB2.

The high velocity of third-party software introductions will continue. CASE tools are especially intriguing: today, very few DB2 users employ DB2-based CASE. This should change drastically, if the prognostications of industry analysts are correct.

Will the industry standardize on one or two premier 4GLs? The evidence suggests that the fragmentation of the 4GL world has not been altered by the introduction of DB2. DB2 users employ the same crazy quilt of 4GLs that we have witnessed since their popularization in the early part of this decade.

Finally, what about the role of DB2 in distributed DBMS? Statistics from hundreds of DB2 users turned up only a handful that migrate either applications or data between DB2-based systems and SQL/DS environments. This holds true regardless of whether the SQL/DS host is VM- or VSE-based.

Furthermore, less than a third of the Midwest group's respondents indicate any interest in the OS/2 Extended Edition Database Manager; even fewer show interest in distributed database applications. While we are confident that this will change as the OS/2 product becomes better known, it would seem that DB2 users presently show tepid interest in truly distributed database environments.

Given that IBM has disclosed aggressive plans for distributed database through user groups such as GUIDE and SHARE and its marketing forums, the company appears ahead of the DB2 community in recognizing the need for distributed systems. ■

Howard Fosdick is president of the Midwest DB2 Users Group. Linda Garcia-Rose is coordinator of the Knauer DB2 Users Group, a nonprofit, vendor-independent user group sponsored by Knauer Consulting Inc.

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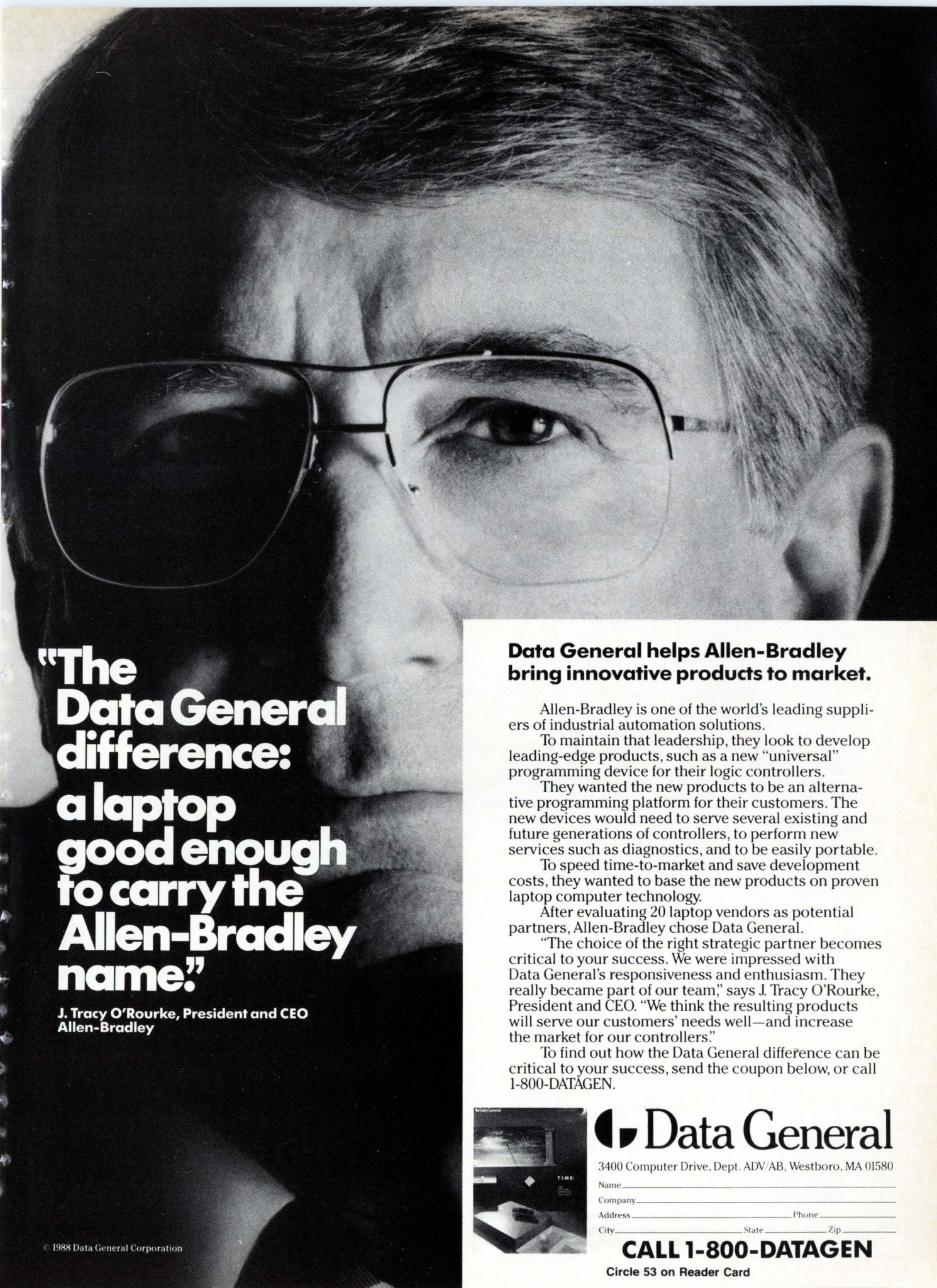
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"As a first time attendee—I was overwhelmed—the info, ideas, organization, and quality speakers. I'm already looking forward to attending the next conference." Richard Panneck, Chief, Internal Security Unit, Minnesota Dept of Jobs & Training

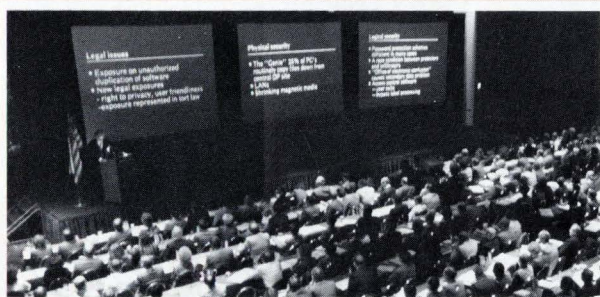
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5. Architectural Comparison of CA-ACF2, RACF, & CA-Top Secret: Pt. I
6. Planning & Implementing a Security Awareness Program
7. Multi-Level Security in a Commercial Environment
8. Computer Viruses, Part I—What They Are & How They Work
9. An Overview of Risk Management Tools
10. Introduction to Disaster Recovery Planning
11. Career Planning for Information Security Officers
12. Establishing & Managing the Security of Microcomputers
13. Data Security: Who "Owns" the Responsibility?
14. Security Considerations of Inter-Company Networking
15. Architectural Comparison of CA-ACF2, RACF, & CA-Top Secret: Pt. II
16. The Missing Link: Information Classification
17. Correlating Security "Incidents" to Deficient Organizational Policies
18. Computer Viruses, Part II—Protecting Your Systems
19. Controlling the Systems Programmer
20. Contingency Planning: What About Your People?
21. Management's Obligations: The Executive's Checklist for Information Protection
22. Outstanding Security Programs: Making Them Happen
23. Controlling Security Risks of Personal Computers
24. Network Security: A Primer
25. Computer Fraud: Effective Prosecution
26. Security Awareness for Government & Defense Contractors
27. An Introduction to VAX/VMS Security
28. Halon 1301: Can We Live With It?
29. Security Penetration Evaluation Methodology
30. Disaster Recovery Planning, Economy Style
31. Everything You Wanted to Know about Using Consultants
32. Achieving Support for Security: A New Communications Model
33. PC Products Evaluation: Part I
34. Security Implications of IBM's New ESA Environment
35. CA-Top Secret: For the Advanced Practitioner
36. Securing the MVS Environment
37. DECnet Security
38. Computer Viruses: The Law & Your Legal Liability
39. What the DSO & Auditor Should Know about Developing Secure Applications
40. Choosing & Negotiating with a Recovery Services Vendor
41. DP Risk Management Keyed to the "Business Purpose"
42. Security of Local Area Networks
43. PC Products Evaluation, Part II—Physical Security
44. Transborder Data Communications Security
45. RACF: For the Advanced Practitioner
46. Security & Control of VM Systems Software
47. VAXcluster Security Issues
48. The "Computer Security Act of 1987": Implications for Government & Private Standards
49. Controlling the Hacker Threat
50. Legal Aspects of Recovery Planning for Financial Institutions
51. Automating the Data Security Administration Function
52. Data Systems Crisis Management
53. Achieving Success: A 5-Step Program
54. PC-to-Mainframe Security
55. CA-ACF2: For the Advanced Practitioner
56. DB2 Version 2: Security Update
57. Case Histories of Recent Computer Break-ins
58. The Impact of Legal & Legislative Trends on Security Management
59. Auditing & Testing for Security Compliance
60. Organization-Wide Business Resumption Planning



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2. Applying Computer Security to Meet Organizational Objectives
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4. A Blueprint for Establishing Security Policies, Standards, & Guidelines
5. How to Conduct an Information Security Review
6. Introduction to Data Communications Security
7. Information Security in a DoD Environment
8. "Criminal Code"—Risks and Countermeasures
9. Network Security in a Digital Environment
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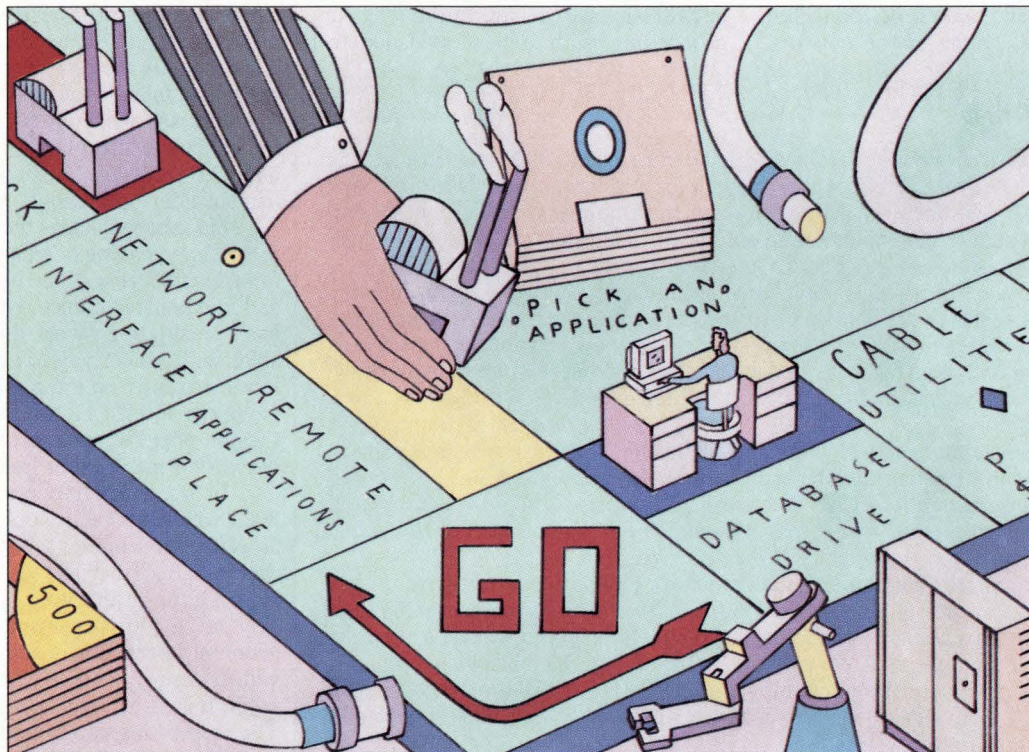
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A Head Start

Down the MAP/TOP 3.0 Road



You don't have to wait until MAP/TOP 3.0 products are available to start on your MAP/TOP network. You can plan the system now, so that when they arrive, you'll be ready: plan the cabling system and install cabling for one or two applications. Select the application with care—a new one that will affect all work cells is best. Develop it, test it off the plant/office floor, and begin the cutover process.

I BY ROBERT S. ELLINGER
t has been said that all things come to those who wait. A lot of waiting has been done for MAP/TOP: while 2.1 products are available, the next incarnation, 3.0, has yet to hit the market. Managements at many plants and offices are concerned that if they attempt any network installations or improvements before the next generation of MAP/TOP products arrives, their efforts will be largely wasted along with the investment. But too long a wait to build a MAP/TOP network might bring more than the eventual 3.0 products—it could bring certain disadvantages. By postponing network installation, you not only delay the benefits such a network can provide, but you postpone gaining network experience, which will be invaluable when MAP/TOP 3.0 comes.

The fact is, waiting is not necessary.

You can start right now on the road to successful network implementation, with hardware and software that, for the most part, can be integrated into MAP/TOP 3.0. You can plan the entire network cabling of your plant or office, and actually install cabling for one or two applications that you can develop and implement as a test of the system. When 3.0 products are available, you can complete the cabling and move ahead on the other applications on the model of the first few implemented and proved in practice.

Some network designers have created pilot plants cell by cell or department by department (see "Typical Pilot Implementation"). These cells are sometimes automated in groups while others are implemented singly. Such installations may be successful as stand-alones, but may not work in the final network. And, while they may provide optimum cell functionality, they usually suboptimize the eventual final network.

A Head Start On MAP/TOP

For real MAP/TOP success, implementations have to be coordinated right to the top, to the plant host level, and right from the start—otherwise, difficulties will crop up later in unifying databases and distributed applications.

Planning the Network

A safer approach is to use the “umbrella” strategy, whereby you choose the cells or departments to be connected, plan the entire cabling of the network,

and then develop several distributed applications that will serve as a model for the entire network. With this strategy, you avoid creating pilot plants that may or may not work in a MAP/TOP network. Instead, you will be creating completed, fully functional elements of an optimized MAP/TOP network.

Implementing the umbrella strategy may require the assistance of OSI networking specialists. In the long run, proceeding with expert guidance will

control your costs.

The goal of MAP/TOP and OSI-based networks is to allow different types of computers (mainframes, minis, pcs) from different vendors to interoperate. Fundamental to mapping out a complete MAP/TOP system is planning the communications cabling for cells or departments (see “Umbrella Pilot Implementation”). Cabling for MAP/TOP is like installing the electric utilities in a house, with electrical plans based on local building ordinances, which specify the type of wire to use, the method of installation, and the spacing of the outlets. Following MAP specifications for cabling a manufacturing plant, you have the option of choosing either broadband or fiber-optic cable.

Since broadband is the more mature technology, having been used in cable tv for at least 15 years, it is the most reliable and inexpensive choice. Broadband also has a wealth of network interfaces available, with voice, video, and data interfaces currently on the market; there are far fewer interfaces for fiber-optic, and the per-port connection to a fiber-optic network is more expensive.

In a factory environment, a MAP 802.4 token bus cable would be used. For an office environment, TOP specifies either 802.3 (Ethernet) or 802.5 (token ring). Of the latter two, Ethernet is probably the best to use in a multivendor environment because it is supported by the widest variety of office computing equipment. It is also the more mature product. The only wiring you'll need to do initially is for the one or two applications you select for design and implementation.

Your cable system should provide for any application on the network to be migrated to any work cell or cells. This will also be cost-effective in assuring that every application, including the first, is written only once, rather than in separate versions for each cell. It also assures that applications programs will be written in a uniform way that will support all work cells.

Choosing the Application

What application should you select first for development and implementation? On what basis should it be selected? Starting with a good application is important because the effectiveness of the entire network may be judged by the first few applications.

Since the network is designed to enable work cells to communicate with each other, consider only applications that need to use the network. Although there are many applications that are lo-

Tooling Up TOP

Let's consider a multivendor corporate engineering facility interested in installing a TOP network. At the facility, which designs printed circuit boards for the bank teller machines manufactured by the company, the engineers use distributed computer aided design (CAD) implemented on Sun workstations, and perform simulations and analyses on Hewlett-Packard minicomputers.

The engineering drawings developed at the facility (along with the supporting simulation and analyses data) have to be signed off and released to manufacturing by engineering management. At present, this review and approval process is performed manually, and takes several weeks to complete, at which time the drawings are delivered manually for input to the company's Digital Equipment Corp. VAXs.

The engineering facility also contains an IBM PC running a technical publications package and laser printer to prepare copies of final drawings and related specifications documents for use by customers. None of the different types of computers used at the facility is presently connected to any others or to the DEC VAXs.

The company would like to install a network to automate the sign-off and release process by making the CAD drawings available on the terminals of the engineering managers. Other functions that could be implemented would be inputting the approved drawings to the DEC VAXs and to the technical publications computer.

The time reduction in automating the sign-off and release process alone (down to hours from weeks) makes such a network highly attractive, greatly outweighing the cost of the system.

In the past, tying together all the computers involved would have been difficult and very expensive. But all of the equipment is TOP-compatible and TOP 3.0 products are available for them or soon will be.

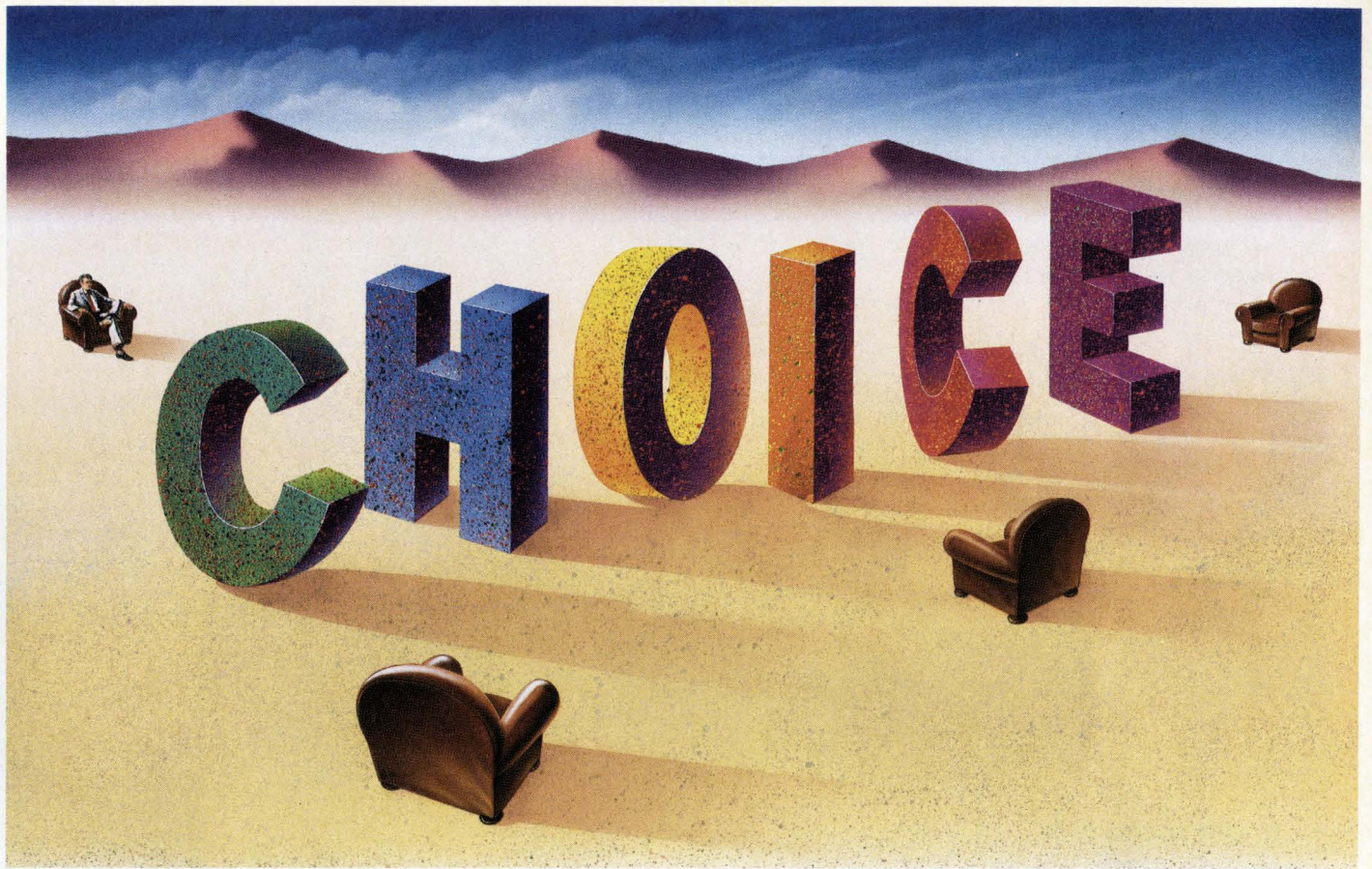
Using the umbrella approach, the first step toward integrating all the computers for a TOP network would be to design the total TOP cable system for the company and to install, initially, the cable needed to connect the various computers in the engineering facility application.

While the cabling is being designed and installed, the applications systems engineers and programmers would design and write the applications software, using File Transfer and Management (FTAM) communications drivers, and standardize the format of the data to be passed, possibly using Initial Graphics Exchange Standard (IGES).

The applications analysts and programmers will add TOP communications drivers to the existing CAD, simulation and analysis, technical publications, and manufacturing applications to allow them to communicate with the sign-off and release system. Then, the sign-off and release system will be designed, written (or purchased), and integrated.

The next step is to do a pilot test of the application, testing the sign-off and release system in connection with each of the other parts of the network. Once the pilot has been technically proven, all the stations can be brought on-line and additional functions, such as electronic mail, can be added.

Exactly how the network is brought on-line after pilot testing is completed is determined by management style and the nature of a particular application. Once on-line, the specific application implemented can serve as a model of how to proceed with other office applications.



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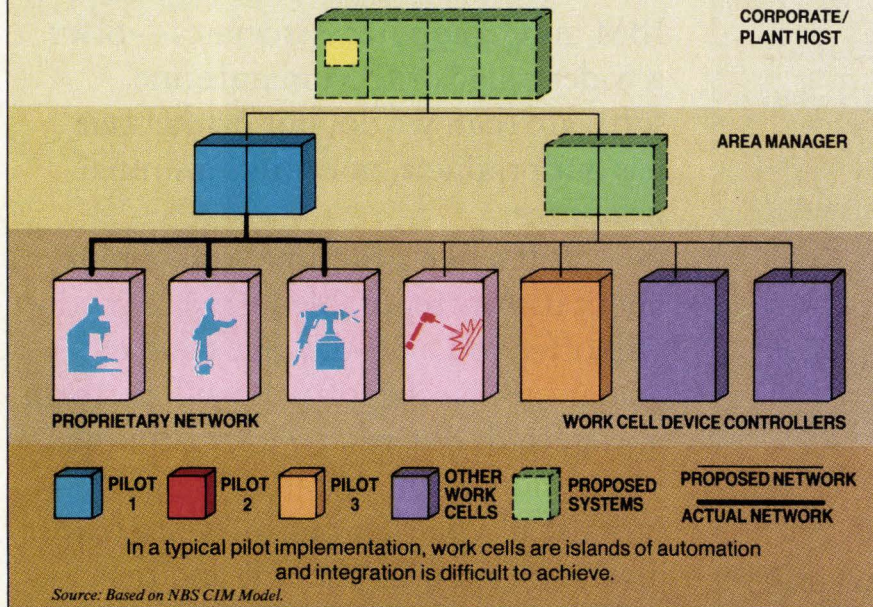
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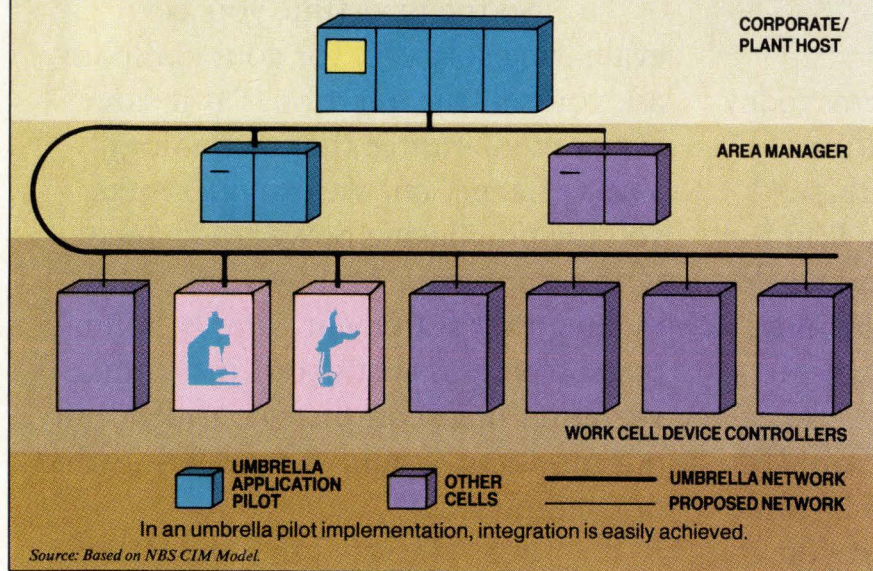
Typical Pilot Implementation

(Shown as part of functional hierarchy)



Umbrella Pilot Implementation

(Shown as part of functional hierarchy)



calized (optimized) for just one work cell, you should choose an application that affects all work cells, because it is more economical to develop one that can be used throughout the organization than it is to develop one that can be used in only a few areas. Also, it will be more visible and have a higher impact. Typical applications candidates that require communications are the central information

database in the plant, and electronic mail in the office. But any application that requires file transfer might be selected.

The target application should be one that is not already communicating across a proprietary data communications network. An application presently going to the shop floor on paper would be an ideal candidate because of the productivity gains produced by computeriza-

tion. Since it is likely to be automated at some point, it can be developed for the network from the beginning, rather than retrofitted to it.

The technological advances of the OSI network also facilitate development of a new application, making it simpler than retrofitting an existing application would be. An existing application would, in all probability, include functions routines that currently have to be performed by proprietary networks. These functions would have to be decoupled from the applications programs without destroying the rest of the application, a difficult and time-consuming job—unless structured program methodologies have been employed in writing the original application.

The target application could also be an existing application that is most in need of upgrade. A good candidate would be an application that is cpu-intensive or that requires considerable program maintenance, or constrains growth. Developing this application would not only enhance reliability, it would also move the application into a new communications environment.

Alternatively, if there are no applications that meet the above criteria, you could consider an application that requires the least retrofit, minimizing risk. An application currently on a proprietary network that has many of the same functions as the umbrella network would be less risky to retrofit than one that does not use networking.

In developing or redeveloping an application for MAP/TOP, the main thing is to write a separate module that communicates from the application to remote databases and applications on the network. This structural separation isolates, for example, the communications functions. As understanding is gained of an existing application layer protocol, or as a new protocol becomes available, only the communications routines (drivers/interface) will have to be changed. With this approach, MAP 2.1 and other protocols can be modified to MAP 3.0.

Just waiting for the appearance of MAP/TOP 3.0 products is neither desirable nor prudent. Positive action can be taken now to prepare the way for MAP/TOP, gain experience in the network and applications, and have your plant and/or office in the right condition for the final system. ■

Robert S. Ellinger is a senior communications planner at Grumman Data Systems in Bethpage, N.Y.

Executive Issues

3

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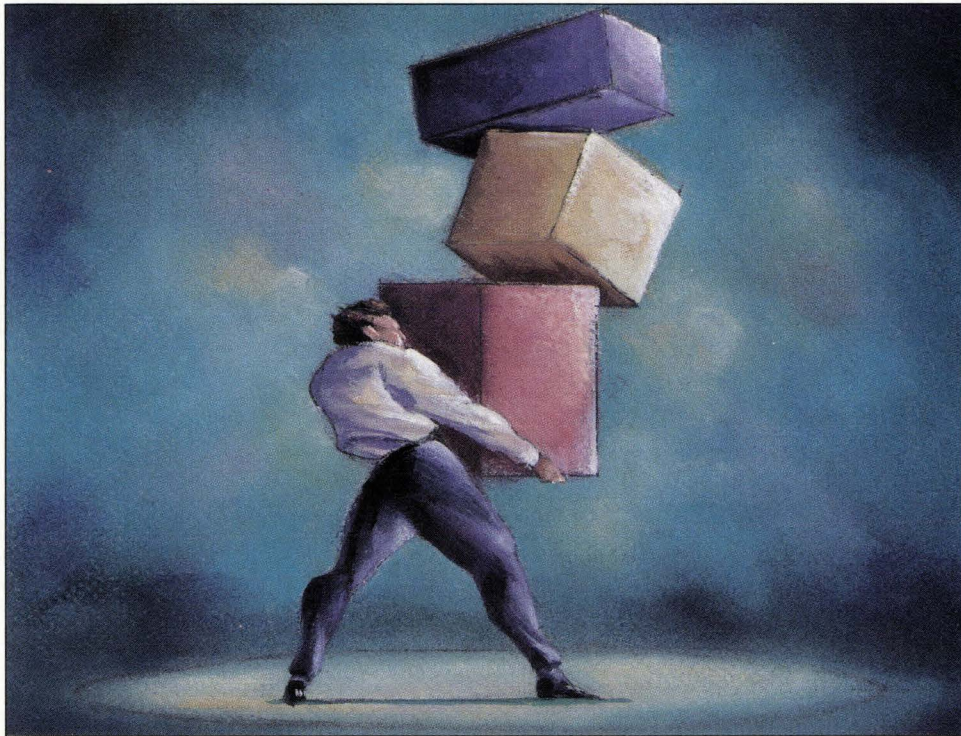
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Circle 59 on Reader Card

Pursuing One Peripheral



Printers, copiers, scanners, and faxes have many technological elements in common. Given that, why haven't these functions been combined into a single unit? So far, the market has seen only fax-copiers and pc fax boards that double as modems. The biggest technological obstacle to a truly universal peripheral seems to be the ability to uniformly communicate and output the multitude of data formats. Still, digital printing and copying technologies are moving closer together. As communications and print standards converge, the promise of conserving the space that peripherals require could be realized.

BY DANA
BLANKENHORN

A laser printer is a digital copier without an original. A digital copier is a fax machine that sends its results via modem. A fax machine is a modem with a scanner on top of it. A scanner is a laser printer in reverse.

Given the similarities in these peripheral devices, when will users be able to buy one box that does everything?

Two worlds exist in peripheraldom today—printing and communications. To date, units that effectively bridge the two worlds with quality output have yet to emerge. Fax-copiers, for example, are fine as faxes, but they are poor substitutes for standard copiers. Pc fax boards deliver data by fax, but conflicting data standards have precluded their providing efficient support for printing out and displaying that data. Even integrating some functions from the same world, such as printing and copying, presents technological problems. It will be years before anything like a universal peripheral hits

the market. Probably before the technological improvements are ever realized, users must prove to manufacturers that there's a need for all of these devices to be integrated seamlessly.

Conversely, users won't put a scanner-fax-modem-printer-copier on their desks until attractive equipment that really works reaches the \$5,000, \$2,000, and \$1,000 price levels.

But there's a pot of gold at the end of the rainbow for the companies that create hybrid units to meet consumer needs, and many are taking up the quest.

Interim Combination Products Abound

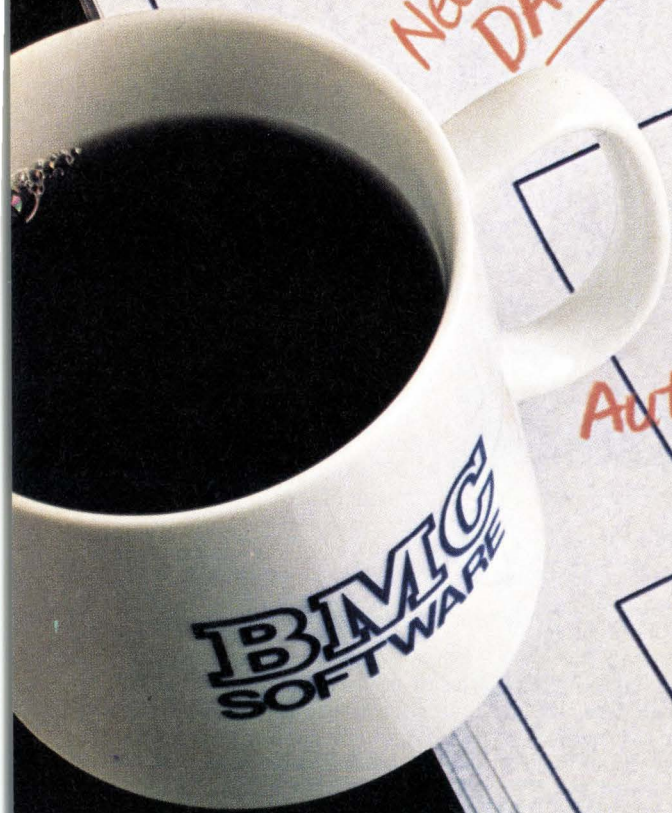
Between here and there lie dozens of interim combination products, hundreds of choices about standards, thousands of arguments about the merits of various technologies, and millions of marketing plans, business plans, and magazine articles.

Still, in 1988, users can buy peripherals that share some functions, such as fax-copiers and fax boards for pcs that double as modems and that, sometimes, provide links to scanners.

The fax machine is the first successful, integrated peripheral. Here, a single box combines many functions. There's a scanner—which transforms the page you're sending into a 200dpi (dots per inch) raster image—a modem to transmit that image under a standard format called Group III fax, and a thermal printer for incoming fax messages.

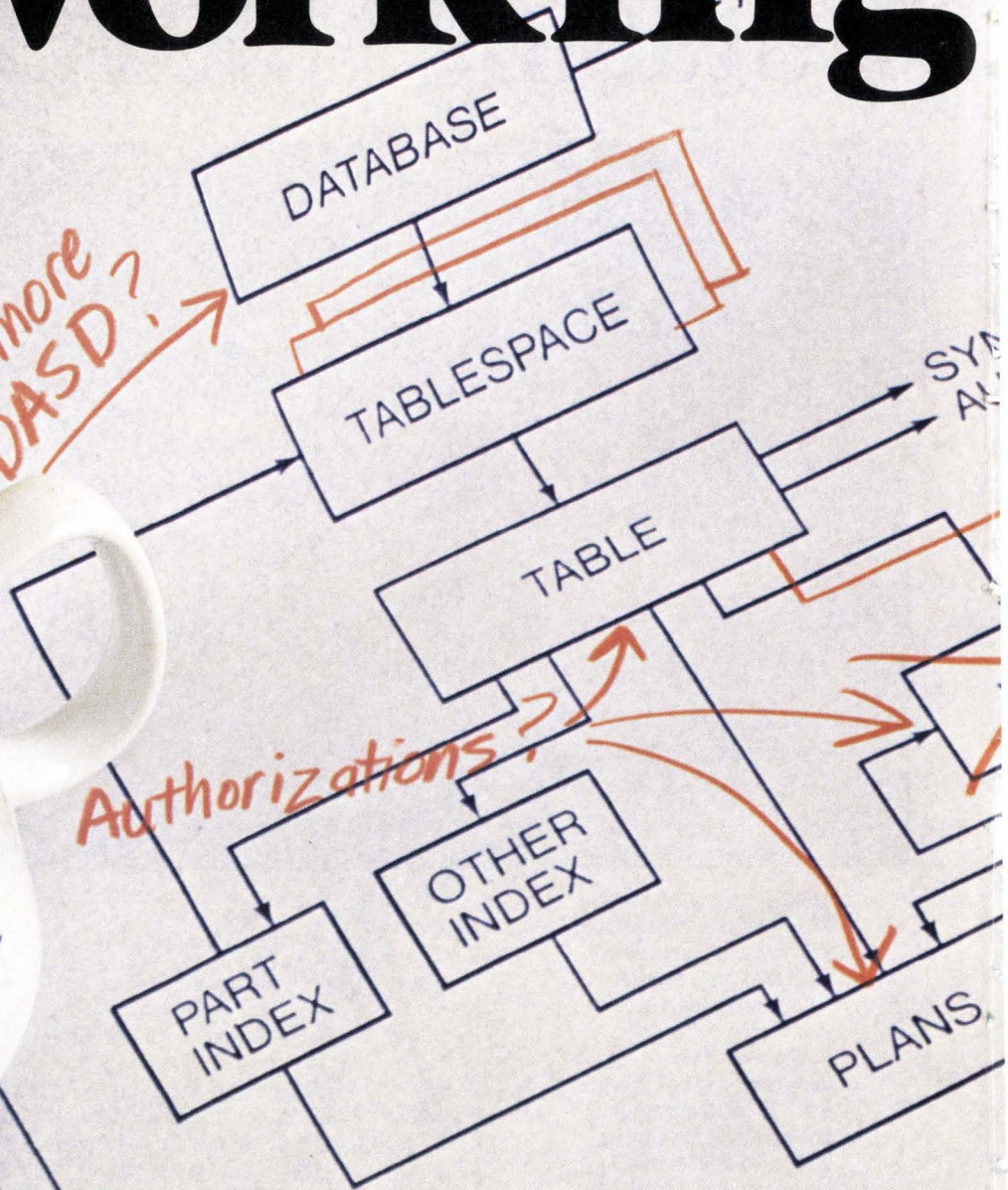
The market for this integrated peripheral is huge, says Don Ryan, director for image communications at CAP Inter-

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Pursuing One Peripheral

national, Norwell, Mass. "Last year," Ryan says, "sales were 475,000 units. This year, we're estimating 910,000. Next year, we're expecting 1.1 million to 1.2 million units to be sold." Dataquest Inc., San Jose, similarly estimates the fax machine market to have been 417,000 units in 1987, 785,000 units in 1988, and 1.2 million units in 1989.

Fax machines that copy are relatively simple machines, adds Bob Sostilio, associate director for copying and duplicating industry services at Dataquest. "If you took a photocopier and ran a chain saw halfway down," explains Sostilio, "the bottom half would be a regular photocopier, and the top half would be a digital scanner [something a fax already has], which replaces the mirrors and lens in an analog copier. The laser takes the place of optics." Sharp, Ricoh Corp., and Canon U.S.A. Inc. all manufacture fax machines that can be used as rudimentary copiers.

Russell Shaw, an Atlanta freelance writer who owns a Sharp UX-80 fax-copier, is thrilled with the unit he bought for about \$995 a few months ago. Shaw says the relatively poor quality of fax-copier copies is good enough for his purposes.

Turning a fax machine into a fax-printer that produces quality documents will require a more advanced printing engine than the thermal technology in use today. Canon comes close to having the engine for such a machine in its plain-paper fax, priced around \$6,000. Julie Weiss, a facsimile analyst for Dataquest, says of the Canon types of devices, "Theoretically, the price could come down, but the research we've done is that people aren't trading up to plain paper for [current market] price." Only when plain-paper copiers become inexpensive will there be a hardware platform on which to create a fax laser printer, she concludes.

Copiers as Printers

What about a printer-copier? Digital office copiers and laser printers use the same technology. The biggest obstacle to combining the two functions in one unit is that copiers must handle a heavier-duty cycle than their printer cousins.

"Desktop printers do not have the same high-duty cycle as a centralized copier," notes Les Wilson, corporate manager for electronic imaging technology at National Semiconductor Corp.,

Santa Clara.

According to Wilson, the market is not demanding the two tasks be combined. "You can copy at 25 pages per minute on a Kodak copier, and [even at that speed] there are people behind you waiting for that copier," so adding laser print work to that load would be absurd.

John Rizzo, vp of marketing for Weitek Inc., Sunnyvale, Calif., agrees. "It's easier for a copier to become a laser printer than vice versa—mechanically. But if you run a laser printer all day, as businesses run copiers, it will burn out."

Developers are working on two ways to bridge the performance gap between laser printing and digital copying technology, Rizzo adds. Some oems are building heavier-duty laser print controllers using new advanced printing chip sets from Weitek and National Semiconductor and integrating them into printers for desktop publishing.

Printers upgraded in this fashion would, with a speed of about eight pages per minute, help create the demand for even higher-duty laser print engines, such as those found in digital copiers, Rizzo says. Once the duty cycles for the two devices reached parity, it would be an obvious step to combine both functions in the same device, he adds.

Another way to bridge that gap, Rizzo says, is to put enough intelligence in the pc that documents could be sent electronically to any output device, including copiers. This intelligence, he says, could come from the same kind of pc add-in cards.

Xerox Corp. is already considering integrating the main copier function of its 4045 with a printing feature, according to John Caldwell, manager of advanced product planning in Webster, N.Y. As with other digital copiers, the 4045 needs only some chips and software to become a printer unit. Caldwell says this printing copier could be brought to market easily at just a 30% to 50% premium over the cost of a copier alone. "I think there's more value here than just the combined functions. We [users] are running out of space to put things," says Caldwell.

It would also be easy to make the 4045 a scanner-copier-printer, Caldwell says. "It has a light lens and laser printer in the same mechanism," he explains. "We're thinking of getting rid of the light lens, converting to a scanner array that could communicate to a pc."

Caldwell believes that such universal peripherals will appear first as a work group tool, not a workstation tool. "I'm talking about a server with a small work

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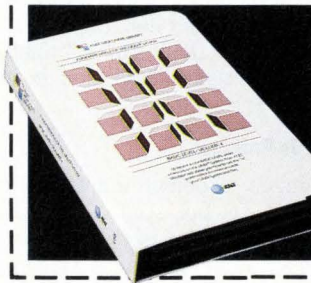
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group," he says, "either a token ring network or some other shared device. You'll find that the copier functionality [in that server] will become more elegant and capable than you'd find in something next to the workstation.

"These devices will be in the marketplace in the next year," and Xerox will have to hustle for that market against Canon and Ricoh, Caldwell predicts. "Such devices would start in the \$5,000 to \$10,000 price range, but if you spread that cost over eight workstations it's very economical."

Integrating Devices Via a Pc

While Japanese manufacturers are struggling to put increased functionality on the peripherals themselves with extra software, American manufacturers are planning to put this intelligence into pcs.

Thus, the fax board market, despite an entry from Panasonic, remains a predominantly American preserve. Fax board makers are "selling a board that goes into a pc," notes CAP International's Ryan, "and they sell software which lets you integrate a scanner and printer [connections] with the fax board."

Jim McNaull, vp of strategic planning for Datacopy Corp., Mountain View, Calif., discusses the technology involved in Datacopy's PC Fax, a fax board that doubles as a modem. With it, the pc can act as a fax machine using a synchronous, 9,600-baud, binary modem, and it includes an asynchronous, 1,200-baud, Hayes-compatible modem.

Linking the faster fax modem to the Hayes standard isn't possible, McNaull says. "The problem is that the chip set you use for the fax modem is not standard with the standard 9,600-baud protocol, V.32." Using the binary fax modem effectively will require standards that are not quite in place, he admits.

McNaull says that Ryan of CAP International has been directing meetings of fax board makers to settle on a binary standard that would make a fax board's modem available for any data transmission. "Fax boards would then appeal to a much larger market," McNaull says. "People who use the fax board could use it for large files, like desktop publishing files, or software engineering files. With a 9,600-baud modem, you can send 800 kilobytes of data in five to six minutes, with error correction. It might take almost an hour at 1,200 baud."

So far, the fax board market has failed to meet its expectations of a fax in every pc, McNaull admits. "I would guess there were around 10,000 boards sold

last year, maybe 12,000," he says. "I would think if you include the lower-priced boards, sales could double this year, to 25,000 to 30,000." Estimates of the fax board market by Dataquest aren't far from McNaull's. The firm estimates sales of 10,000 units in 1987, 22,000 to 23,000 in 1988, and 30,000 to 35,000 in 1989.

"Fax boards will be the next big boom," says Vincent Buccilli, national sales manager at the systems division of Canon U.S.A. in Lake Success, N.Y. But the boom isn't here yet. "They're not selling a lot" of fax boards, he admits.

Lee Cannon, vp of marketing for peripherals maker The Complete PC, Milpitas, Calif., believes that pc fax board prices of around \$600 could jump-start



USERS ARE RUNNING OUT OF SPACE.

the market and increase the number of units sold in 1989.

McNaull also has a problem with the idea of the fax board supporting scanners used in desktop publishing. "We put drivers in our software for most scanners," he says, but the plethora of competing scanners makes standardization impossible and support difficult.

Scanner maker Dest Corp., Milpitas, Calif.—which bought fax board producer GMS Inc. in 1987—and The Complete PC are two other vendors trying to improve the fax-scanner link. Larry Orr, vp of marketing for Dest, says, "I think you'll see more tight integration in a year."

The Standards Problem

The biggest problem in creating a peripheral that can fax, scan, print, and transmit any document is the number of page description languages (PDLs), graphics, and text file formats that desktop publishing and word processing systems emit.

Among PDL standards are PostScript and Document Description Language; for graphics, TIFF and PCX; and text formats such as Microsoft Word or WordStar. Microsoft also licenses the TIFF format to, among others, Aldus for

its PageMaker product. PCX was created by ZSoft Corp., Marietta, Ga., for its PC Paintbrush product.

ZSoft writes the translation software that lets users manipulate faxed document images with their existing applications. "In the fax card markets we're involved in," says Jeff Albertine, R&D program manager for ZSoft, "we've made a new DCX file format," allowing users to easily string together pages of graphics for transmission. Other translation utilities on the market, which allow users to move between file formats, include Hijak from Insight Systems, Danbury, Conn. Hijak "can go to TIFF to PCX, PC to Mac, all sorts of formats," he says.

The dueling standards become an even greater problem when text is involved. "I don't know of anyone who tries OCR [optical character recognition] on a faxed image," says Albertine. The 200dpi resolution is too low for the OCR readers, he adds, and really to be sure that your text and graphics are getting across the line for reuse, you need to strip out the text and accept some degradation in the characters.

Buccilli agrees with Albertine on the difficulty of using faxed images effectively in a desktop publishing editor. "That would be real sophisticated," he notes. "Even the largest newspapers I've talked to hardly do that."

It is obvious that, once the hassles in faxing graphics and text are met, Federal Express starts to look cheap. Advances could be coming on these standards, however. In August, Intel announced what it called a "worldwide standard for communications" that it claims would allow, for one thing, any fax or modem to transmit any image or text regardless of its resolution. It would use a "stacked" approach to supporting protocols and it features a consistent user interface.

Many desktop publishing systems, such as Xerox's Ventura Publisher and Canon's Desktop Expression, are attempting to combine all of the peripheral functions—scanning, faxing, printing, transmitting, copying—into a single system. None of them, however, are integrating these input/output functions into a single box.

As print and communications standards come together over the next few years, however, the possibility of realizing one person, one peripheral looms large. ■

Dana Blankenhorn is a freelance writer based in Atlanta.

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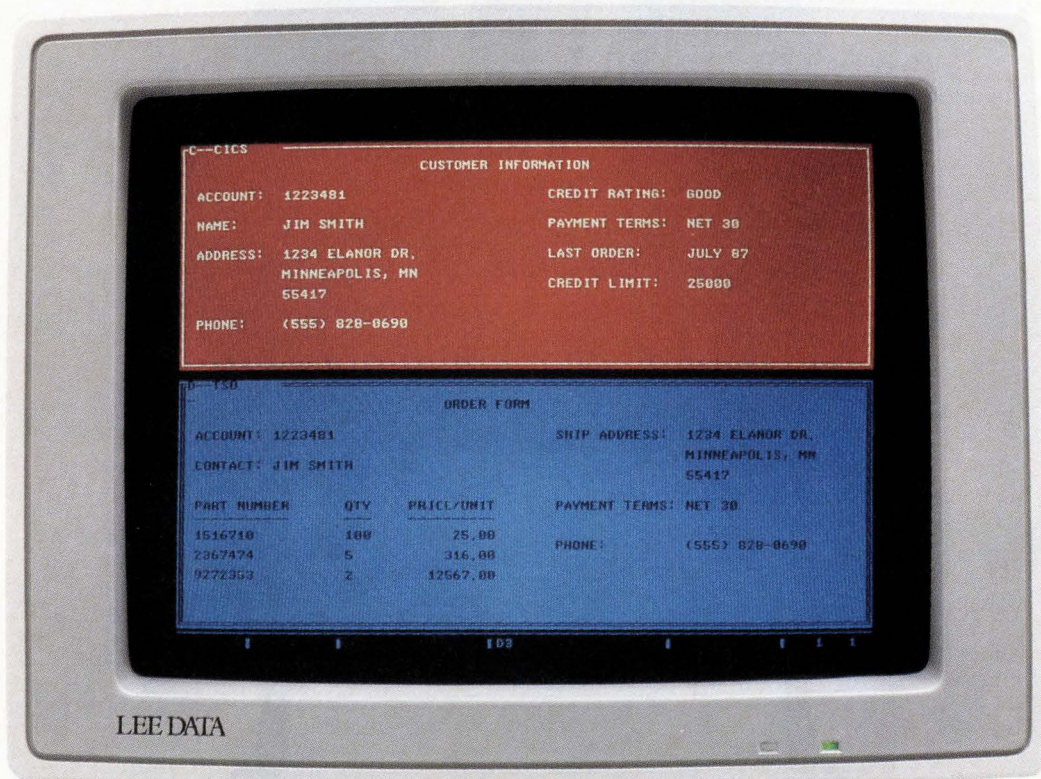
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Today's IS managers have at their disposal an unparalleled collection of tools for building new systems. Here's how the Cincinnati Gas & Electric Co., the Veterans Administration, Manufacturers Life Insurance Co., and Home Box Office are exploiting the latest technologies.

Innovative In-house Development

BY EDWARD J. JOYCE

Never before have IS managers been blessed with such a wealth of tools for building automated systems. For software, there's computer aided software engineering (CASE), fourth generation languages (4GLs), expert systems, reusable code libraries, and smart editors, to mention a few.

On the hardware end, developers can now choose from optical disks, high-performance pcs, graphics workstations, voice synthesis and recognition devices, local area networks (LANs), and reduced instruction set computer (RISC) architectures, among other new technologies.

DATAMATION surveyed major innovative development efforts in different industries to assess what new tools are being brought to bear on automation problems. The approaches taken by four IS shops to improve their businesses through the imaginative use of the latest computing technology are profiled here.

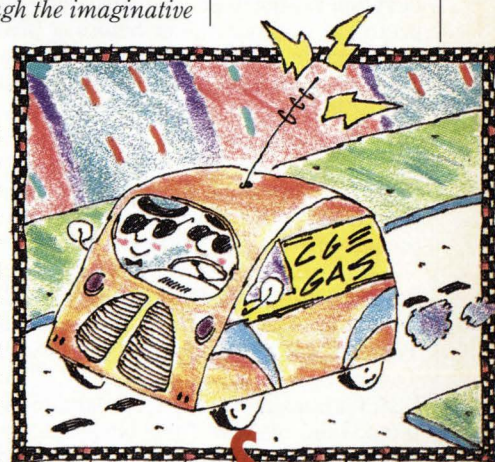
CINCINNATI GAS & ELECTRIC CO.

In October 1986, CG&E set out to make customer service its "top priority." The goal, inaugurated by newly appointed president and ceo Jackson H. Randolph, was to "demonstrate to customers that we should be their energy provider of choice." As part of that effort, Randolph backed a comprehensive multimillion dollar overhaul of the company's customer information system.

To get users in on the ground floor of the revamping of CG&E's customer information system, the company formed a new department called Customer Systems. It's comprised of 60 IS staffers and 16 end users, says department manager Irma Thoma. "Our old systems had been installed between 1969 and 1974," she explains. "In one application, we were

actually a beta test site for IBM's CICS. Today, those systems are extremely inflexible. The programs require a lot of rigging to respond to even relatively minor changes in corporate and governmental reporting requirements."

CG&E surveyed customers to determine how service activities could be changed and expanded to best meet customers' needs. Thoma's group, working with the results of those surveys, spent one year in design and analysis before it wrote a single line of code. Programming began in the summer of 1988, but some design activities



SERVICE CALL REQUESTS CONCEIVABLY CAN BE SENT TO A VEHICLE IN 10 SECONDS.

will overlap program development for the next six months. The new system totally revises billing, customer inquiry, and accounting, among other functions. "Besides addressing existing IS operations," says Thoma, "this system extends automation to new areas. For example, service vehicles will have on-board pcs that communicate directly with the mainframe by radio transmission. When a customer calls our offices to request service, the request can conceivably be transmitted to a service vehicle within 10 seconds."

Development work, estimated at 180 man-years, began on the new customer information system in 1987 and is scheduled for completion in 1990. At peak periods, 105 people will be assigned to the project. CG&E is supplementing its IS staff with contract analysts and programmers from Computer Systems and Applications Inc., Houston, and Computer Sciences Corp., Washington, D.C.

The software, designed to run in a CICS/DB2 environment and to handle up to 1.5 million customer records, is being developed with structured design techniques and the latest CASE tools, reports Thoma. "We've been very formal about our methodology, paying attention to software reusability and stubbing in prototype software," she states. "In one case, we have a routine that is reused 400 times throughout the system."

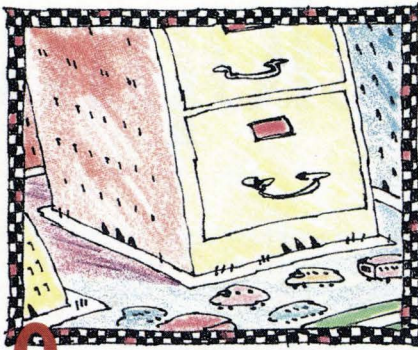
Through stubbing, or the use of partially written programs with stubs rather than fully written implementations, the developers can test user reactions to prototype software long before a program has been completed. "For example, we considered a multipage bill format because customers wanted more documentation," says Thoma. "They reacted against the format. So we used a slightly wider page, a redesigned page layout, and condensed laser printing to fit the information on a single page."

In the CASE area, CG&E is relying on graphics workstations from Apollo Computer Inc., Chelmsford, Mass., running Teamwork CASE software from Cadre Technology Inc., Providence, R.I. Tim Lister, a consultant with the Atlantic Systems Guild of New York widely recognized as an expert in software management, says CG&E is using CASE technology in a "serious" way. "This is not a half-baked investment," says Lister. "The CASE tools alone probably cost at least half a million dollars. I don't know anyone else exploiting software reuse concepts and CASE design tools to the extent CG&E is."

VETERANS ADMINISTRATION, U.S. GOVERNMENT

At the VA, a veteran is known by his or her claims folder, a sheaf of papers containing educational, medical, insurance, and pension benefit forms that together may be up to a foot thick. With more than 17 million active claims folders at 58 offices across the country, the storage costs are staggering. In the Manhattan office for example, the file bank takes up a complete floor of a building occupying an entire city block.

The glut of folders and proliferation of paper led the VA to begin developing an electronic, folderless file system in 1984. But instead of just stripping raw informa-



OPTICAL DISKS STORE FILES THAT OCCUPIED ONE CITY BLOCK.

tion from paper documents and storing it as text in a computer, the VA went a step further: actual images of the documents are stored on optical disks.

"We looked at all the storage alternatives, including magnetic tape, conventional disks, and microfiche," says Mary Leyland, a deputy director in the VA's department of veterans benefits. "Optical disk, although relatively new, was the cheapest."

Optical disk storage is now feasible, continues Leyland, due to disk "jukeboxes" that store and retrieve arrays of optical disks. The VA application is based on the Document Image Processor from FileNet Corp. of Costa Mesa, Calif. A document enters the system through a scanner that can read a page-sized image in one half to five seconds, and is stored on a 12-inch WORM (write once, read many) optical disk. Graphics workstations linked together in a network provide access to the stored documents.

The VA contracted American Management Systems Inc. (AMS), Arlington, Va., to piece together the various components of the system and interface it to ex-

isting IS operations. "One of the most challenging aspects of the design was the integration of three distinct data processing systems at one terminal," says Wick Keating, an AMS vp and manager of the VA project. "We developed a windowing scheme so a user could simultaneously access electronic folders on optical disks, the VA's financial system on a Honeywell mainframe, and word processing on Wang minicomputers."

Observing that "Congress doesn't like to hear that veterans are not getting good service," Keating mentions that software for the new system was developed within six months under fairly tight deadlines. "FileNet has a 4GL tailored to document processing. It makes applications development straightforward."

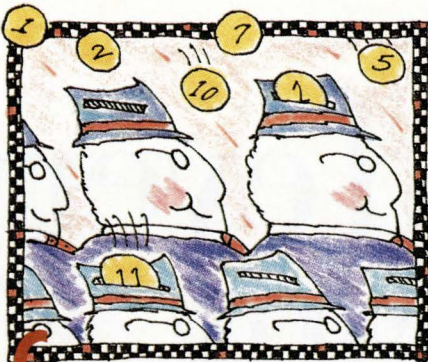
The hardware and software were just as critical in the success of the system as was the implementation strategy, stresses Leyland. "We didn't bite off more than we could chew. The optical disk system was installed in December 1987 and now handles only educational claims made under the Montgomery GI Bill." The bill, passed by Congress in 1984, is an educational benefit program for veterans.

By designing the first optical disk application around a new program, VA officials could capture claims forms on optical disk as they are filed. In 1987, 800 claims were filed and stored on optical disk. This year, that number is expected to be 10,000; by 1990, it is estimated to grow to 82,000. Leyland sees optical disks as a technology that will serve the VA's needs well into the next century. "So far," she says, "the system has been a startling success. We'll definitely be exploring other applications."

THE MANUFACTURERS LIFE INSURANCE CO.

For Manufacturers Life Insurance Co., Toronto, (ManuLife), Canada's largest insurance firm in assets, paying agents is a major operation. Through its agency compensation system, which consists of several hundred computer programs, it tracks agent compensation, issues commission checks, and monitors the performance of branch offices. Michael Innell, director of application and network technologies, says this system, developed about 20 years ago, had become a "very expensive operation."

Innell says the agency system represented a classic case of a deteriorating IS application. As business needs



**CASE TOOLS AND DB2 HELP
TRACK SALES AGENT COMPENSATION.**

evolved, the software was changed over the years, radically departing from the original design in some cases. "Expedient" solutions that conflicted with the underlying system architecture were sometimes implemented to meet pressing needs. A treadmill of escalating maintenance costs forestalled required modifications and improvements.

Last year, the company finally chose to rewrite the agency system, spurred by the system's high operating costs and the availability of new software methodologies. "A few years ago," recalls Innell, "we didn't think CASE tools and new databases like DB2 had the sophistication and performance to handle a large, complex production shop like ours. That's no longer true."

The new agency system, a 44-man-year effort, will be developed under Netron/CAP for an IBM DB2 database environment. "DB2 has matured considerably in the past six months," notes Innell. "We benchmarked it in small pilot applications against our existing IDMS database from Cullinet. In some cases, applications work that required three days in IDMS was finished in three hours under DB2. It will give us the capability to respond quickly to changes in the business." Innell describes Netron/CAP, made by Netron Inc. of Toronto, as a CASE product for prototyping, developing, and maintaining applications in COBOL. He expects overall programming productivity improvements from CAP in the range of 20% to 50%.

"CAP is quite different from what people are accustomed to doing," explains Ian Cannell, a systems manager at ManuLife. "It usually takes an experienced programmer or analyst six weeks to become conversant in using CAP, but once they know it, they like it."

"The approach is different," agrees Innell. "Users are involved throughout design and implementation. For exam-

ple, this fall we'll start an iterative prototyping process in which screen, report, and data prototypes will be introduced every month or two for review by headquarters and branch office personnel. In the past, we'd disappear for six months before the user would see any working part of a system." Innell and Cannell predict that the \$2.7 million (in Canadian currency) investment in the new agency system will reduce expenses by 35% and pay for itself within two years.

"We've made a long-term commitment to the CAP/DB2 technology for all new development," states Innell. "We plan rewrites of several major systems, an endeavor estimated at 91 man-years. This is forcing us to change our approach to developing systems, but it will [be] significant to the company's prosperity."

HOME BOX OFFICE, INC.

HBO, the pay-tv programming and marketing subsidiary of Time Inc., recently installed an order entry system called STAR (Satellite Television Activation Request).

"Under STAR," says Abe Cytryn, HBO's director of information services, "a satellite customer's tv set can go from snow to a clear picture within 60 seconds of placing a telephone order for HBO, Cinemax, or other pay services. It still boggles my mind to think that our IBM 3090 mainframe here in New York can effectively address hundreds of thousands of satellite dishes across North America."

The need to address satellite dishes individually stemmed from unauthorized use of satellite-transmitted programming by motels, bars, and other commercial enterprises. To restrict delivery of HBO broadcasts to paying subscribers, HBO scrambled the signal. A \$400 descrambler box and a monthly subscrip-

tion fee are required to receive a clear picture. "The heart of the system is the microcircuitry in the descrambler box," explains Cytryn. "It starts descrambling after receiving a turn-on signal from the satellite. Each box has its own unique address, so it will only respond to on signals meant for it."

When scrambling began in 1986, HBO relied on an outside service bureau to activate and deactivate descrambler boxes. As more and more dish owners subscribed to HBO, however, the company decided to develop its own order entry and activation system.

"Seven people spent nine months developing our system," continues Cytryn. "We used Mantis to write 99% of the code which runs under CICS. Mantis let us easily build user-friendly pc-like interfaces with pop-up windows and color-coded displays on terminal screens." He adds that Mantis, a 4GL product from Cincom Systems Inc., Cincinnati, cut overall development time by 40% and makes the software much easier to maintain.

With the new order entry system, installed in February 1988, a customer places an order with an HBO-affiliated cable tv company that relays the order to HBO's telemarketing center in Chicago. A customer service representative keys the order, along with the customer's descrambler ID code, into one of 12 terminals attached to an IBM 3090 in New York. The mainframe sends the descrambler code to a computer at General Instruments Corp., La Jolla, Calif., which transmits an encrypted activation message to HBO's uplink center in Hauppauge, N.Y., where it is beamed to a satellite and echoed back down to earth.

Descrambler boxes, designed by General Instruments and attached to satellite dishes, decipher encrypted messages. The addressed box responds to the activation message. From the time the customer places an order, the entire process may take less than a minute.

With sources predicting 24-inch \$400 satellite dishes capable of two-way communications (compared to the present-day 72-inch dishes, which cost a minimum of \$2,000 and possess receive-only capability), the direct market ultimately may explode. General Instruments, for one, appears to be moving that way: its boxes are ready to handle personal e-mail, facsimiles, and other two-way communications when satellite operators support those functions. ■



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Edward J. Joyce is a consultant based in Lexington, Ky.



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IBM The Bigger Picture

Up and Running: How to

Most disaster recovery plans, when put to the test of a real disaster, fail to serve the corporation. Commitment and integrity are key ingredients in designing and maintaining an effective plan. It is important to recognize the inherent limitations of testing, and to devote some attention to avoiding disaster in the first place.

YBY PHILIP J. ROTHSTEIN
ou can imagine the movie advertisements: "A sea of flames engulfs telco switch... phones dead... even beepers bite the dust... it's... *The Telco Switching Center Disaster*." Somehow, it's difficult to believe that even an all-star cast could make it a box office hit.

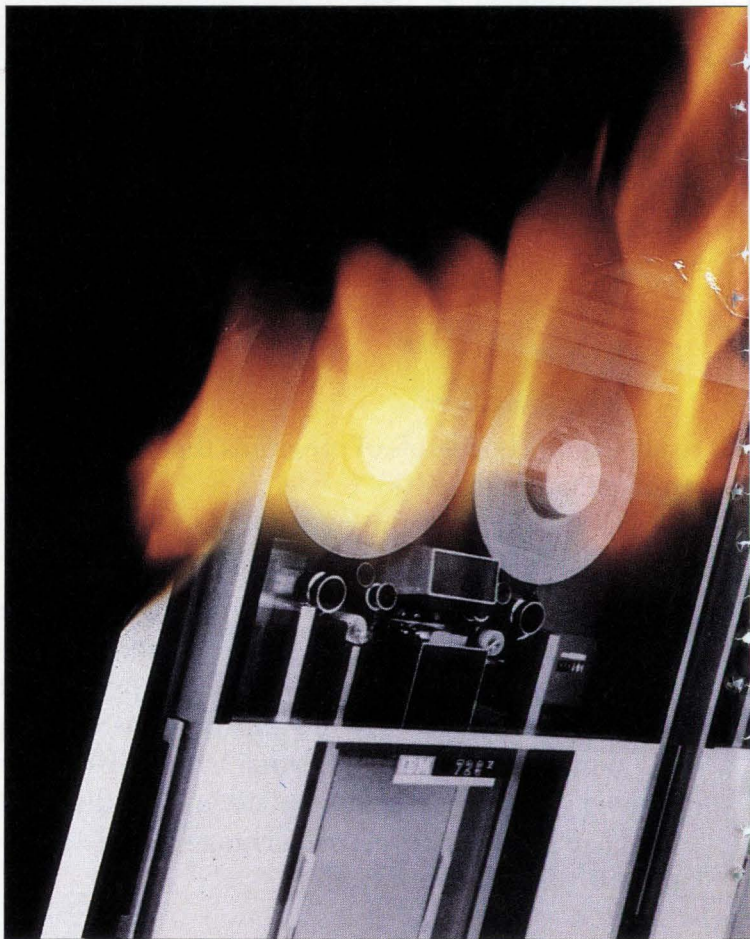
The fact is, the cause of most computer room disasters is far more mundane than the images of towering infernos and devastating floods conjured up by the word disaster. Nonetheless, when a recent fire damaged a telephone company switch in Hinsdale, Ill., business at dozens of Illinois companies was severely disrupted. While such a fire may not have much dramatic potential, it could have grave implications for those companies affected.

Unfortunately, most companies are ill-prepared to recover from the typical computer disaster, as mundane as its origins may be. Indeed, despite the best of intentions, significant investment, and mass quantities of documentation, most disaster recovery plans are likely to fail just when they are needed most. Despite positive test results, few plans succeed on their own merits. More often than not, luck plays as large a role in successful disaster recovery

as skill and effort.

Jack Bannan is the manager of information security for General Electric and the cofounder and president of the Delaware Valley Disaster Recovery Information Exchange, the oldest and perhaps largest user group in this field. He points to a "residual situation... where plans are written to satisfy auditors or outside accounting firms, and really don't do an effective job. The plans are just put on a shelf." He admonishes: "Don't just give it lip service."

In the simplest terms, a disaster recovery plan ensures a business's survival in the face of a traumatic IS disruption. A good disaster recovery plan, like a good insurance policy, will be most effective if all the risks and threats are



Ensure Disaster Recovery

carefully and realistically assessed. Unfortunately for some businesses, this is not always the case.

In the most fundamental of terms, the components most often missing from such plans are commitment and integrity. Answering the following questions should help you ascertain the viability of your plan in this regard.

At what level in the organization is the commitment to disaster recovery? Is there an explicit, documented, corporate mandate to protect critical business functions?

In the corporate environment, for disaster recovery to be effective, commitment must come from the highest level and permeate every area of the organization. If the disaster recovery

mandate comes from the ceo, president, or board of directors, it stands a much better chance of success than if it originates within IS, audit, or another line organization. According to Bannan, "Very few board chairmen, presidents, or general managers would run a business without insurance. And yet [they] don't look at disaster recovery planning in that same light . . . or even as a meaningful function."

Is the disaster recovery function adequately funded and staffed or is it constantly struggling to survive?

Many contingency planning/disaster recovery departments are in a constant battle for budget and staffing. In the face of more glamorous new development projects, disaster recovery often

takes a backseat, especially during lean times. While it is perfectly reasonable to review the cost-effectiveness of the contingency planning function, the disaster recovery plan should not be justified primarily on the basis of cost-effectiveness, unless it is done in a truly broad sense, just as someone would evaluate insurance coverage. Justifying a disaster recovery plan within the context of insurance premiums, policy coverage, probability, and the scope of loss may be particularly effective.

An ongoing commitment of resources and dollars defines the difference between a functional disaster recovery

plan and an ineffectual one. The commitment clearly should include maintenance, testing, and auditing, which are likely to be overshadowed by the major expenses of a hot-site agreement and off-site media storage.

Was the development and implementation of a disaster recovery plan preceded by and based upon a business impact analysis?

There isn't a whole lot of protective value to a disaster recovery plan if it is based on an incomplete picture of what is being protected, and of what is likely to be a threat. A business impact analysis thoroughly and objectively examines all of a firm's risks and obligations, identifying and prioritizing critical processes, functions, and resources. All too often, the mere survivability of the data center is the myopic focus of the plan. You have to be aware, however, of how all facets of the business interrelate and what the role of IS is in relation to them. The business impact analysis process is likely to uncover areas or resources that may not have been addressed by the disaster recovery plan.

Is disaster avoidance an integral aspect of the plan—that is, has there been a sincere effort to ensure that the integrity of the firm is not unnecessarily compromised?

Very few disaster recovery plans focus directly on disaster avoidance, which can minimize the probability of activating the plan in the first place. Disaster avoidance combines engineering, maintenance, reliability, safety, training, and testing (see "Disaster Avoidance: Taking the Preventive Approach"). If effectively implemented, the disaster avoidance plan will pay handsome dividends through the improved level of reliability and quality brought to day-to-day business functions, in addition to the reduced exposure to major outages. Another bonus of an aggressive disaster avoidance program is the enhanced ability to recover from a disaster—that is, the recovery process is likely to be a whole lot less painful.

Are disaster recoverability and disaster avoidance integral to planning throughout the organization?



Photograph by Walter Wyck

Ensuring Disaster Recovery

The least painful way to achieve a reasonable and appropriate level of recoverability, as well as a prudent, minimal level of risk, is to include contingency planning in any new business or functional plans. Aside from obvious activities, such as the startup of a new data center or turnover of a new production application, any substantial functional, technological, and business change warrants a fresh examination of the exposure to disruption, as well as the possibility of creating new sources of threat.

Are there adequate, impartial controls and reviews of the disaster recovery plan's effectiveness?

The internal or external audit role is crucial to the integrity of the plan. In addition, the use of impartial, external consultants to review the technical, technological, business, or organizational aspects of the plan may detect weaknesses that are not obvious from within.

Is your disaster recovery plan preceded by a realistic assessment of your needs or has it evolved as a function of vendor offerings?

Many firms elect to use external hot-site vendors that provide access (for a fee) to fully configured backup data centers and even office facilities. These firms provide a valuable service to many companies. Unfortunately, in all too many cases, the commitment to a hot-site approach or vendor comes before a full awareness of the business contingency requirements.

It should be clear that a hot-site agreement is only a basic tactic for providing a backup; the focus should first be on what kind of strategy to use in the disaster recovery plan. It may be that a physical second site is a more appropriate solution for your business.

Is the plan maintained, updated, and tested continually and effectively?

Creating a disaster recovery plan without a commitment to periodic testing and ongoing maintenance can actually be worse than doing nothing at all. There is the tendency to assume that the plan is the company's salvation when disaster strikes, but a poorly maintained or inadequately tested disaster recovery plan is certain to fail when the going gets tough. Even such seemingly obvious aspects of the plan, such as telephone contact information or configuration details, can quickly become outdated, impeding recovery efforts. Without exercise, a disaster recovery plan, like the human body, is likely to become flabby and ineffectual.

Where in the organization does the

responsibility for disaster recovery and contingency planning reside?

In the typical corporate setting, disaster recovery is headquartered in the IS organization. The risk to the company, however, is not confined to IS. The bottom line is this: survivability of the organization in the face of a catastrophe is the responsibility of every single employee. The most effective contingency plans are based upon an organizational commitment to integrity and survivability. This is often initiated by a clear, concise management mandate, which is incorporated into the job descriptions of all employees.

Does the contingency planning func-

tion have enough clout to rise above the politics and personalities?

Objectivity is critical to the success of a disaster recovery plan. Too often, the politics overshadow the pragmatic considerations of disaster recovery. In one major Wall Street organization, a small, highly visible group with a potential financial exposure on the order of \$50,000 to \$100,000 a day, obtained a commitment to support processing recovery in a matter of seconds after a disruption. Meanwhile, a bread-and-butter, back-office department with a financial risk considerably over \$1 million for each day of an outage was positioned to recover in a 36- to 48-hour period.

Disaster Avoidance: Taking the Preventive Approach

An ounce of disaster prevention may be worth a pound of disaster recovery cure, but fewer than 50 sites nationwide have included disaster avoidance concepts in their risk-management planning. In most organizations, disaster avoidance is such an obvious issue that it is everyone's responsibility, and yet no one is in charge. Kenneth Brill, president of Computersite Engineering of Cambridge, Mass., and a pioneer in the emerging field of disaster avoidance, says, "Avoiding a disaster in the first place must be given an even greater priority," than planning disaster recovery. "Physical disasters don't happen randomly. They are caused by pre-existing, identifiable, disaster-prone conditions . . . Every data center has physical vulnerabilities, which are often unknown to senior dp management," he warns.

For example, every year, water abruptly shuts down hundreds of sites, sometimes for days at a time (35% of all data center insurance claims relate to water damage, according to consultants Contingency Planning Research Inc., Glenwood Landing, N.Y.). The problem rarely originates within the computer room, but the computer room is affected because inadequate planning enables the water to get in. Broken pipes, backed up drains, failed condensate pumps, roof leaks, ground or flood water, or discharging fire sprinklers can deliver hundreds of gallons of water per minute. Where will it flow? If your computer room is at the low point on the floor, you know where! Lest you suffer a similar soggy fate, give these questions some thought:

Does your computer room have dams, moats, pumps, and alarms?

Do they work?

When was the last time someone checked?

If water were to leak from overhead, are the openings between floors for piping and electrical wiring sealed?

How would you know if water were under your raised floor before an electrical short circuit crashed processing?

How would you get the water out?

Where are the emergency water shutoff valves?

Do you have water pipes that run above the electrical equipment or panels, or above the computer itself?

Do you have tarpaulins to cover equipment?

According to Brill's research, over 75% of the sites declaring disasters could have avoided major losses had they had a disaster avoidance program in place. Brill advocates a multidisciplinary, proactive approach to the process of avoiding disaster, which includes such diverse considerations as engineering and functional design, physical security, fire protection, preventive maintenance, operational procedures, personnel policies, equipment selection, and so forth—in short, all of the factors that contribute to the operational reliability and integrity of the data center, as well as to the business areas. He stresses the need for an annual physical audit in addition to plan review, updating, and maintenance.

Clearly, avoiding a corporate heart attack makes a lot more sense than the risk, pain, and expense of an attempt to recover after one strikes.

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Planning for Protection: User Group Support

Odds are that any contingency you might need to plan for (not to mention those you might not expect), has been encountered by someone before. These user groups foster the valuable exchange of contingency planning concepts and practices. Since new groups are forming all the time, this list is not exhaustive.

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The corollary risk to politics is personality. Face it, in establishing business priorities for recovery, how many employees or managers would come out and say, "I'm not very important"? You are dealing with human nature: the "me first" syndrome can overwhelm what should otherwise be an orderly procedure. The effective contingency planner will work through the scenario where every process is assumed to be the first priority.

Is the disaster recovery plan concise, directed, and effective as implemented?

The most effective disaster recovery plans are often the least impressive. One insurance company's contingency planner recently pointed with pride to five, 3-inch binders containing that company's disaster recovery plan. It is not impossible for a plan that big to be effective, but it becomes exceedingly difficult to maintain a plan so large and complex.

Clearly, there are benefits of both effectiveness and cost in keeping the plan simple. One of the best ways to do

this is by integrating disaster recovery plan-related functions, responsibilities, and maintenance directly into the day-to-day business environment. For example, maintenance of the emergency contact information for employees and vendors could be routinely handled as part of the company phone directory maintenance. Restart/recovery and control information for production processing could be captured at production turnover of new or modified systems. Management of off-site data backup could be largely automated.

Is the disaster recovery plan activation or declaration process and responsibility explicitly defined?

The best plans are worthless if not activated when calamity strikes. Many disasters do not involve obvious physical destruction. Some may be essentially invisible, such as the corruption of critical data or a major computer failure. Experience has shown that the tendency of many professionals, particularly technical and operational personnel in these

kinds of situations, is to deny the extent of a disaster initially: "We'll be back to normal in an hour... maybe another three hours," etc., until time is measured by the calendar, not the clock.

Declaration of a disaster is a business decision, not a technical decision. Therefore, the individuals responsible for declaring the disaster should be identified by name and function and the declaration process should be explicitly documented.

Clearly, some flexibility will be built into this process; the caveat is to ensure that this flexibility isn't fatal. While there is usually a significant, direct cost—as well as risk—associated with declaring a disaster, odds are that denying the disaster will increase the costs and risk exponentially.

Upon a disaster declaration, the corporate hierarchy is going to be shaken mightily. Unusual skills, methods, strategies, and relationships will be needed. The traditional hierarchy simply will not work—a crisis management organizational structure must be defined explicitly, and that new structure must be empowered through a mandate from the highest level.

Activation of the disaster recovery plan does not necessarily mean, in the case of a hot-site subscription, incurring large vendor declaration fees. It may be nothing more than advising the vendor to stand by, and beginning the preliminary processes, such as locating backup media and warning key vendors and staff. However, an understanding of the escalation process and the timing must be clear to all parties.

Is the human element consciously and explicitly considered in the disaster recovery plan?

Human nature presents many conflicts in an actual disaster, the major implication being unpredictability. Explicitly allowing for the uncertainty introduced by the human element is the best way to deal with this issue. Providing fallback options is another.

One company's recent experience after a physical disaster exemplifies the human element. One of the key technicians needed for the initial recovery was contacted by phone. His wife took the call and assured the caller that the technician would be told immediately. For whatever reason, the wife didn't mention the phone call. As a result, several hours were lost in recovering to a backup site.

A few companies are actually being advised to incorporate an industrial psychologist into their disaster recovery



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plan development and testing process. The psychologist can be particularly valuable in attending to the human dimension of disaster recovery, namely, stress. This can be the result of either physical injury that may have been suffered by others or of the extended, unreasonable demands placed upon individuals during the recovery process.

Fatigue, frustration, anger, denial, resentment, even guilt and depression, are very real and potentially devastating aspects of recovering from a disaster.

Providing a nurturing and supportive environment for the recovery team can make or break the recovery process. Even the slightest creature comforts should not be overlooked; individual

needs, including support in handling personal or family issues, should be addressed, preferably through a dedicated staff position.

Does the disaster recovery plan address the management of exceptional risk during the recovery period, as well as restoration of operations following a disaster?

Most disaster recovery plans focus on the critical initial period of recovery of basic operations following a catastrophe. Once the initial recovery period is over and the backup-mode operation is reasonably stable, the focus needs to return to restoration—that is, going back to the way things were before the catastrophe.

The disaster recovery plan should explicitly address the considerations and steps in this reverse process. After all, the transition back can be as fraught with risk as the precipitous cutover to backup operation had been. Even physical restoration of damaged premises, documents, media, or equipment should be considered. A further risk during both the recovery and restoration phases is, simply, too few warm bodies. Key people are stretched to the breaking point; nerves are frayed; more often than not, there simply aren't enough hands to get everything done.

An explicit triage function should be staffed to address damage assessment and salvaging, in parallel to the teams supporting recovery. This team will be particularly valuable in coordinating the rollback once the crisis has subsided.

Is your contingency planning function staffed by professionals?

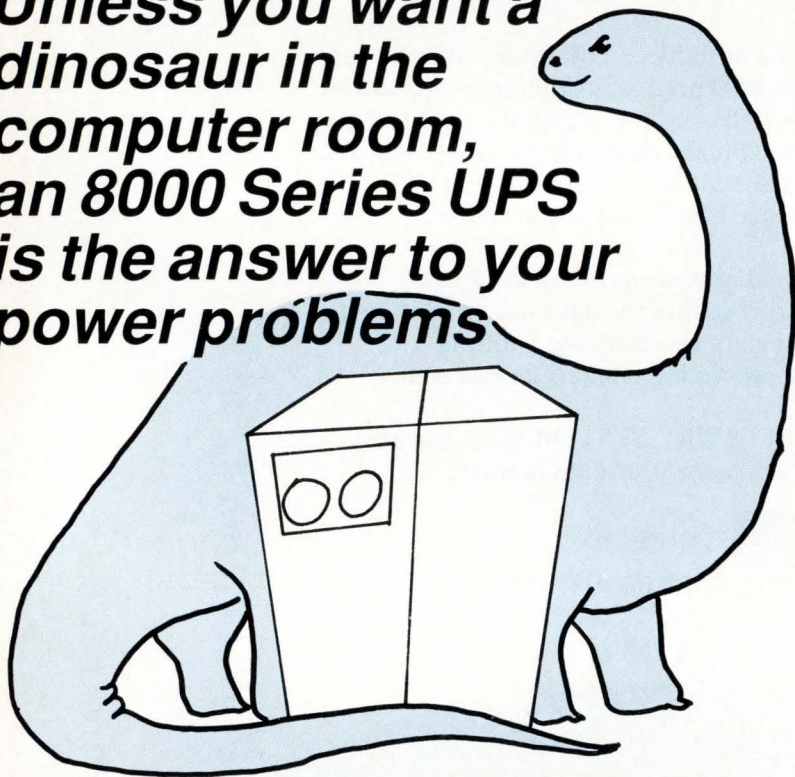
Frequently, newly appointed contingency planners are former operations, tech support, or line personnel. In any other technological or business role, training and experience make the difference between success and failure; contingency planning is no exception. Support contingency planners with training and external consulting; provide opportunities for growth through a contingency planning user group.

The bottom line is this: whether or not your business exposure is significant, and regardless of the existence or lack of an explicit disaster recovery plan, it is better to deal with the issues of disaster recovery from a position of knowledge than from one of assumptions. The "it can't happen here" mentality is not going to help you or your company when "it" happens. ■

Philip Rothstein is a consultant based in Ossining, N.Y., and is president of Rothstein Associates Inc.

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New Products

TRENDS

AMERICAN VDTs MAY GET SAFER, whether or not local legislatures follow the lead of Suffolk County, N.Y. Its Resolution 378-1988, "A Local Law Providing Employee Protection Against Video Display Terminals," went into effect this year, intensifying the debate over terminal worker safety (see "Suffolk Law, New Studies Reinvigorate VDT Debate," Aug. 15, p. 39). But while a national employees' association reports that attempts to pass similar laws in 24 states have failed, one company is finding a strong domestic market for its new terminal that exceeds even stringent European standards.

The MC5 VDT from Link Technologies Inc., Fremont, Calif., is based on custom VLSI technology. It has a 14-inch flat screen and 78Hz screen refresh, which, the company claims, is the fastest in the industry, and, more important, completely eliminates screen flicker. Display overscan allows the full screen of the display to be used, eliminating distracting borders. Characters are constructed using a 10-by-16 dot matrix to provide very precise character definition. Further, the reverse mode screen is touted to be easier on the eye, as no adjustment is necessary in going to the screen from paper.

Charles Lejsek, president of Link Technologies, reports that the company strove to meet the European standards to be competitive there, with an eye to a stateside payoff later. "A lot of trends in ergonomics start over in Europe and find their way here," he says.

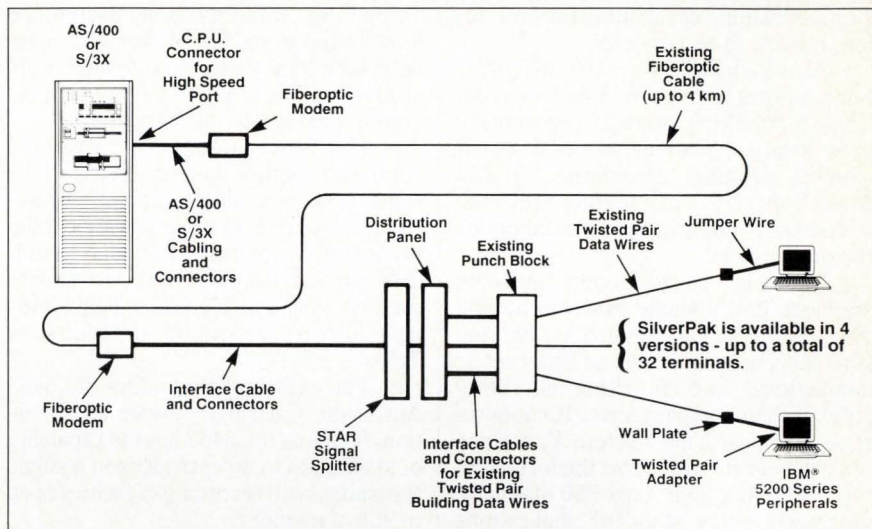
But Link may not have to wait. "There has been a lot of publicity over the legislation that came out of Suffolk County," observes San Jose-based Dataquest analyst Greg Blatnik. With employers more sensitive to ergonomics issues, a terminal that meets the most stringent standards could be an attractive buy. Blatnik says Link's strategy "certainly is a good move."

Indeed, Lejsek reports 20 major oem deals in the U.S. already, with 20 more expected. "We're very bullish on our next generation," he says.

The MC5 is a multisession, multiple-emulation terminal designed for ASCII, ANSI, and pc use, as well as local peripherals. It provides 17 different emulations for a variety of host environments and can function as a virtual terminal for similar or dissimilar hosts. It's available now and is priced at \$549.

If you'd like additional information about products covered in this issue's hardware Trends, please circle 207 on the reader service card.

HARDWARE



New Connectivity Package For AS/400 & System/3X

Fibronics product uses fiber-optic and twisted pair technology.

BY ERIC BRAND

In many cases, cabling costs exceed the cost of the devices being interconnected. Fibronics International Inc. has introduced a fiber-optic and twisted pair connectivity package that aims to address this very issue.

SilverPak, designed for IBM's AS/400 and System/3X computers, is a package of matched components available in nine different versions—four are local and five are remote.

The remote versions use fiber optics to connect AS/400 and System/3X peripherals up to 2½ miles from the computer. Fibronics says this eliminates the requirement for the remote control units and the associated performance degradation. The local versions, used for the attachment of peripherals up to 1,000 feet from the computer, use existing twisted pair wiring. All versions use a star topology and connect up to 32 terminals.

Pricing for the SilverPak begins at \$1,100 for the local versions and at \$1,990 for the remote versions and ranges up to \$6,450. All are available now. The offering comes complete with a money-back guarantee with every purchase. FIBRONICS INTERNATIONAL INC., Hyannis, Mass.

CIRCLE 202

Multiuser Machine

80386-based, entry level computer supports one to eight users.

Altos Computer Systems' latest addition to its 80386-based multiuser family is the Altos 386 Series 500, positioned as the entry level member of the clan. The Series 500 supports up to eight users and runs on MS/DOS 3.3 or Altos System V (compatible with Unix V.3). As a result, says the company, users can run all Altos vertical market software.

The Series 500 is being offered in four configurations, with from 2MB to 16MB of main memory and 40MB to 70MB of hard disk storage. Options include eight serial I/O ports and a 60MB streaming tape drive. Prices range between \$4,000 and \$10,000. ALTOS COMPUTER SYSTEMS, San Jose.

CIRCLE 204

Network Communications

LAN and controller from Harris are based on Intel 80386.

Harris Corp. has promised that on Nov. 1 it will make its first shipments of its new SuperNet Series, a family of networking products based on the 386 running Unix System V. Family members include a high-end pc local area network with pc

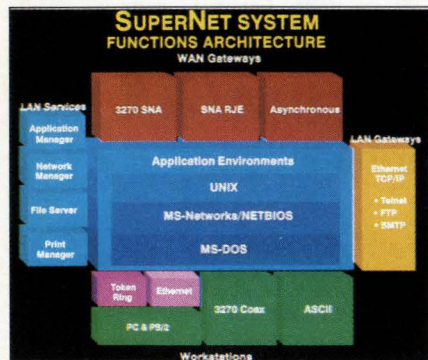
New Products

BRIEFS

communications capabilities for both token ring and Ethernet LANs.

Also included is a 3270 controller that supports both co-ax A and ASCII devices with multiple protocol communications, local applications processing, and spooled printing capabilities. Harris claims SuperNet can integrate previously disparate communications functions into one system.

The LAN, called Super Gateway, combines into a single system multiple SNA gateways, full NetBIOS PC file and print serving, token ring and Ethernet pc connections, and an Ethernet TCP/IP gateway, the company says. It supports up to 128 pcs. Unix System V, release 3.0, will migrate to support the forthcoming AT&T/Microsoft Unix-386 standard, which will allow standard applications that run on an AT&T 3B mini to run with-



out modification on Super Gateway, says Harris. They can be accessed by networked pcs and directly attached ASCII and 3270 terminals.

The SuperNet Controller provides standard 3280 SNA/SDLC full-duplex host communications for 3270 terminals, ASCII terminals, and for pcs on both token ring and Ethernet LANs. It can communicate with four SNA hosts concurrently, with line speeds of up to 64Kbps each, says the company, and it supports up to 32 co-ax 3270 terminals and printers.

Harris says that prices for SuperNet range between \$14,000 and \$21,000, depending on the configuration and the options chosen by individual users. HARRIS CORP., Dallas. CIRCLE 203

Tape Subsystem

Memorex Telex Corp.'s peripheral device is 3480-compatible.

A magnetic tape subsystem is now on the market for current IBM System/38 users and for select models of the AS/400 by the year's end. The 5461, from Memorex

Telex Corp., attaches to any System/38 model supporting IBM 3430 or 3422 magnetic tape transports. No software or operation modifications to the host are required to integrate the subsystem.

The 5461 packages an integrated controller, with either one or two tape transports, in a single cabinet. A two-channel switch is available, as are configurations that comprise from one to four transports. It uses the same cartridge as the IBM 3480 and Memorex Telex 5480 tape drives, according to Memorex Telex.

The company also offers the 5463 Automatic Cartridge Loader as an option. It claims the 5463 has the capability of staging up to 10 cartridges to a single transport, with recording capacities of up to 2GB of memory.

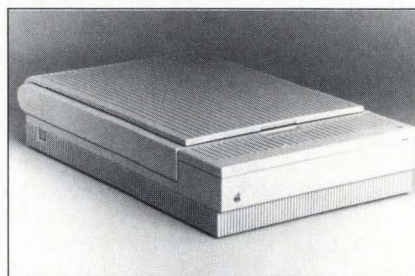
The single-unit price of the 5461 is \$42,509, with a one-year maintenance agreement. The optional 5463 costs \$4,252. MEMOREX TELEX CORP., Tulsa, Okla. CIRCLE 205

High-Quality Scanner

Macintosh device is for line art, halftones, and gray-scale images.

The Apple Scanner is an optical image scanner that allows the user to integrate high-quality line art, halftones, and gray-scale images into Macintosh applications, according to its manufacturer, Apple Computer Inc.

The 8½-by-14-inch flat-bed scanner uses AppleScan and HyperScan software and is capable of importing previously



created images and graphics in any popular painting, drawing, or page layout application supporting Picture File Format, Tag Image File Format, or MacPaint. Using an SCSI interface for high-speed data transfer, the device can scan at resolutions of up to 300 dots per inch. Gray scale can be captured in 4-bit/16 levels per scanned pixel.

The Apple Scanner is yours for \$1,799. APPLE COMPUTER INC., Cupertino, Calif. CIRCLE 206

Maximum Storage Inc., Colorado Springs, has announced a new high-speed 5¼-inch, write-once, read-many **optical disk subsystem** designed for the permanent storage of valuable data. The 500MB Maximum APX-4000, in an external-mount version, costs \$4,450, and, in an internal-mount version, costs \$4,250. CIRCLE 208

Radio Shack, Fort Worth, is offering adaptive devices for Tandy computer users with special needs. The Unicorn **Expanded Keyboard** for easy access costs \$325. The **Pneumatic Dual Switch** for oral control costs \$220. Each requires the PC Serial A.I.D. interface, which costs \$300. CIRCLE 209

Niwot Networks Inc., Boulder, Colo., has designed a **plug-in card** to bridge NetWare-based LANs into a wide area network over 1.544Mbps T1 facilities. For \$3,000, the AT/T1 provides D4 framed T1. CIRCLE 210

Hyundai Electronics America, Santa Clara, has announced a 10MHz **IBM XT compatible**, the Super-16TE. It supports both 3½-inch and 5¼-inch floppy drives, features 640KB RAM, five expansion slots, one parallel and one serial port, and a real time clock. Pricing starts at \$1,045. CIRCLE 211

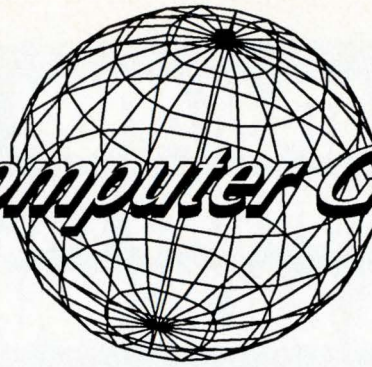
Cipher Data Products Inc., San Diego, has unveiled its range of 3000i half-inch **cartridge tape drives**. The drives, which provide 320MB of storage on a 3480-type cartridge, sell to oems for between \$1,380 and \$4,400. CIRCLE 212

Zirco Inc., Wheat Ridge, Colo., has introduced the **Laptop Car Seat**, which secures laptop computers for use while driving. Available only in black, the device costs \$69.95. CIRCLE 213

3X, Mission Viejo, Calif., has made available the Twinax Printstation, a dual-session, dual-port, twinax attached **printer controller** for IBM midrange systems. The three-pound, standalone device is priced at \$995. CIRCLE 214

Western Graphtec Inc. has announced the GP2100-JC, an **eight-pen, pinch roller plotter** with a speed of 25 inches per second. Accommodating media sizes A through D, it has a resolution of .001 inches and a repeatability of .0035 inches. It's priced at \$3,995. CIRCLE 215

Regional Computer Graphics Expo



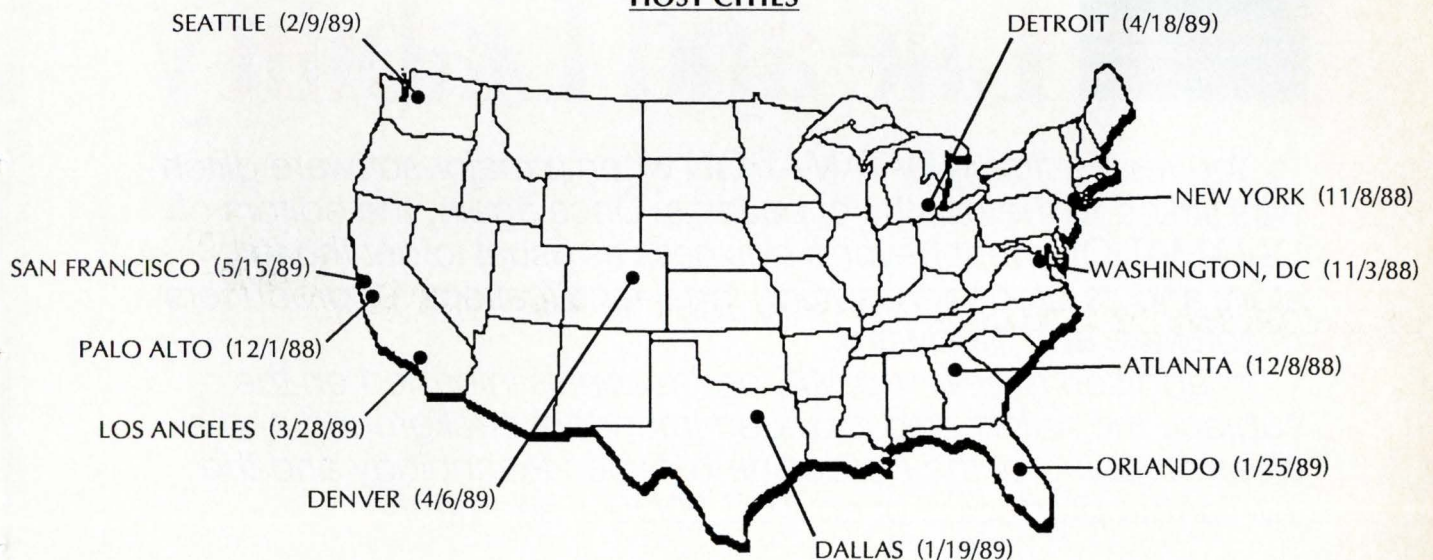
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OR YOU CAN WAIT UNTIL JULY, 1989 AND GO TO — BOSTON

BUT, in fact, while you're waiting for others to present the latest and greatest in Computer Graphics technology in cities remote to you — some time next year — how are YOU staying current with the rapid growth of products in your industry? Reading the trades? Attending trade shows? Countless hours with visiting sales reps? If you've time left and enough money saved, you can travel a long distance — sometime next year — to see what's "in vogue" in Computer Graphics.

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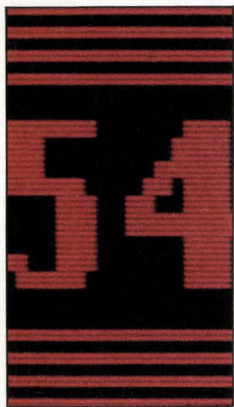
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Software Bugs: A Matter of Life and Liability

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In addition to keeping MIS professionals informed on the subject, the article also provided important background and a clear mapping of the borderline between technology and the law for the producers of an ABC 20/20 tv segment.

DATAMATION - The Leader in Information Technology Coverage

New Products

TRENDS

Flood. Fire. Lightning. Terrorist Attack. Armageddon. There's no predicting what form a disaster will take. But when it does, you've got to be prepared. Traditionally, disaster recovery plans centered on the dp center—after all, that's where the computers were. But with the pc revolution, the advent of departmental computing, and the addition of newer and more widespread applications to IS's workload, a corporatewide disaster recovery system makes sense (see "Up and Running: How To Ensure Disaster Recovery," p. 86).

One company has developed just such a system. RecoveryPac, from Profile Analysis Corp., Ridgefield, Conn., takes a database approach to disaster recovery planning, allowing the development in one place of any number of disaster recovery plans, utilizing a central set of corporate data. This facilitates coordination of the plans, says the company. Further, any change in the corporate data would be distributed to the various plans, guarding against human oversight.

"What RecoveryPac has done," says Jeff Maronstein, vice president of Contingency Planning Research Inc., a Glenwood Landing, N.Y., disaster recovery consulting firm, "has been to take a database system and interface it to a project management system."

The pc-based RecoveryPac, which runs under Paradox database software, requires 640KB. It includes guidebooks, forms for data collection, project management capabilities, and documentation. RiskPac, Profile Analysis's data collection product, can be included in a package with RecoveryPac.

Profile Analysis claims that the database approach it uses in RecoveryPac is unique. It is evidently popular, too: the company reports 30 sales since March. Maronstein expresses no surprise. "The trend set by this product is where the market will have to go," he says.

Contingency Planning Research has an agreement with Profile Analysis to supply one of its products to RecoveryPac clients. "Contingency Planning Strategies/90" is a 150-page source guide developed by the consulting firm. According to Contingency Planning Research, the document includes a listing of available technologies and a reference guide to disaster recovery, and reflects field testing of every disaster recovery product on the market.

If you'd like additional information about products covered in this issue's software Trends, please circle 271 on the reader service card.

SOFTWARE



Ultrix-32, version 3.0, provides increased ability for applications to run on computers from multiple vendors, says Digital Equipment Corp.

DEC Unveils New Ultrix And Ultrix/VMS Products

Upgraded OS is touted as complying with all industry standards.

BY ERIC BRAND

Digital Equipment Corp. has announced a new release of its Ultrix operating system and connectivity and resource sharing products for Ultrix and VMS users.

Ultrix-32 is an enhanced, native-mode, Unix-based OS, which includes over 200 commands and utilities, such as program development tools and compilers. The just-released version 3.0 complies with all major industry standards and specifications, according to the company, allowing applications to run on computers from multiple vendors. Those standards include the IEEE 1003.1 Posix standard, the National Bureau of Standards interim Posix FIPS, the base-level specification X/Open Portability Guide (XPG2), the System V Interface Definition (SVID) release 2, volume 1, and Berkeley Distribution 4.3 enhancements. Ultrix-32 prices range from \$2,100 on the MicroVAX 2000 to \$56,058 on the VAX 8820.

The following are the new products integrating Ultrix and VMS:

Ultrix Worksystem Software provides a single, common X User Interface running across all major DEC workstation platforms and is the first implementation of DECwindows. Prices range from \$1,575 on the VAXstation 2000 to \$3,150 on the VAXstation II/GPX.

The VMS/Ultrix Connection provides VMS services to Unix users by adding TCP/IP and NFS on VMS, enabling a VAXcluster system to act as an NFS server to Unix-based workstations. It's priced from \$7,500 on the MicroVAX 3600 to \$126,000 on the VAX 8978 or equivalent VAXcluster systems.

Ultrix Mail connection V1 provides a connection to DEC's MAILbus message transfer service. It enables Ultrix Mail users to exchange messages with users of All-in-1; VMS Mail; other X.400 systems; IBM PROFS and DISOSS/Personal Services; and non-DEC Unix-based systems. On the VAXstation 2000,

New Products

it fetches \$656 and ranges up to \$15,876 on the VAX 8800.

DECnet-Ultrix V3 enables users of Ultrix to create networks that tie their Ultrix systems to all operating systems supported by DECnet Phase III/IV; it supports the VAX 6210/6220 and VAX 8810/8820 systems. Pricing for the product ranges from a low of \$525 on a VAXstation 2000 to a high of \$9,870 on the VAX 8820. DIGITAL EQUIPMENT CORP., Maynard, Mass. CIRCLE 260

Desktop Presentation

Versatile Xerox package comes out of alliance.

Xerox presents Xerox Presents. If the big office machine company has its way, that won't be as confusing as it sounds. Xerox Presents, a software product that is designed to produce high-quality, full-color or black-and-white business pre-



sentations on IBM PCs, is Xerox's bid to conquer the desktop presentation marketplace.

Operating in the Microsoft Windows environment, Xerox Presents provides WYSIWYG (what-you-see-is-what-you-get) display and output. The user interface employs a combination of pop-down menus, dialogue boxes, and movable icon-based menus to simplify the process of managing visual materials for presentations and outputting on such media as overhead transparencies, 35mm slides, videotape, and paper.

The package is the first of new graphics software products for IBM PCs resulting from Xerox's alliance with Cricket Software of Malvern, Pa. Cricket is known for its Apple Macintosh software, and Xerox points out that Xerox Presents is the first such product to bring Mac features to the IBM PC world. Those features include the ability to reorder, add, copy, delete, and incorporate visuals from other presentations. Other features include a full-function word processor that allows creation of bulleted lists, out-

lines, and columns, and 256 adjustable color palettes to support gradient shading. The price is \$495. XEROX CORP., San Diego. CIRCLE 262

Coattail Languages

Two compilers are now available for the new Ultrix.

On the tails of DEC's introduction of the latest release of its Ultrix OS, Philon Inc. has announced that its Fast/COBOL and Fast/Basic-M languages are now available for Ultrix-32, version 3.

Fast/COBOL is an ANSI '74 compiler with extensions to provide RM/COBOL compatibility. Additional features include record and file locking facilities to support random, sequential, and indexed sequential files, as well as the ability to call C subroutines. For VAX/Ultrix systems, prices range from \$2,800 to \$15,000.

Fast/Basic-M is a true compiler that conforms to ANSI standards and is compatible with Microsoft Basic. It features separate module compilation, the ability to call Ultrix utilities from within a program, and user-selectable IEEE or BCD arithmetic. For VAX/Ultrix systems, prices range from \$1,000 to \$12,000. PHILON INC., New York. CIRCLE 261

LAN and Pc Connector

Networking products allow connection to several environments.

Rabbit Software Corp. has introduced a family of local area network products, called RabbitGate II, intended as a LAN and pc connectivity environment for the end user. According to the vendor, RabbitGate II enables a user at a DOS workstation or on a LAN to connect to SNA, X.25, BSC, and DFT Coax mainframe sessions simultaneously from multiple windows, with concurrent DOS and notepad.

Standard RabbitGate features include editor-based host file transfer, multiple gateway connectivity, pooling of sessions, and IBM send/receive file transfer. Features added or bundled into the company's SNA element of the family include greater LU capacity; a gateway monitor; a configuration display; Novell's IPX LAN interface protocol support; CICS IND\$FILE file transfer support; and RabbitScript, a high-level, BASIC-like language interpreter. RabbitGate II for SNA is \$2,395 for an eight-session gateway, \$5,995 for 40 sessions, and \$7,995 for 64 sessions. RABBIT SOFTWARE CORP., Malvern, Pa. CIRCLE 263

BRIEFS

AGS Management Systems, King of Prussia, Pa., has announced version 1.2 of PAC EV, the **cost and performance measurement system** for IBM VM/CMS and MVS/TSO. This version, which as a mainframe system sells for \$44,000, provides greater flexibility in producing detailed cost and performance trend analysis, says the vendor. CIRCLE 264

Claris Corp., Mountain View, Calif., has introduced Claris CAD, a **two-dimensional CAD** software program for the Macintosh. The vendor says Claris CAD merges the Mac's graphic interface with the full range of design and drafting tools for engineering, architectural, and graphic design. It costs \$799. CIRCLE 265

Emerging Technologies offers several products providing **wide area network packet switching datacom** for the IBM PC, XT, and AT using Western Digital's WD4025A X.25 adapter board. Prices range from \$195 to \$695. CIRCLE 266

MVS Software Inc., Houston, has added an **end-user automation facility** to its automated system operations product, OPS/MVS, which makes it possible to automate functions requiring an operator to use an MVS, JES3, IMS MTO, or NetView console, freeing help desk or computer operators, the vendor claims. OPS/MVS is priced from \$9,500 to \$95,000, depending on cpu size and features. CIRCLE 267

Control Data Corp., Minneapolis, has released a federally validated **Ada compiler for the Cyber** family. Ada/VE supports the entire mainframe line, which runs the Network Operating System/Virtual Environment. It costs \$25,000 on a Cyber 930-11. CIRCLE 268

General Information Services Inc., Philadelphia, is marketing Simplefax, which, the company says, allows **fax transmission from Wang VS** systems. Simplefax consists of image generation and transmission equipment attached to a tty-compatible TC port and to an outbound phone line, as well as proprietary software loaded on the VS to provide menus on screen. It costs \$5,700. CIRCLE 269

Relay Communications Inc., Danbury, Conn., has begun shipping version 3.0 of Relay Gold, its **pc communications and micro-to-mainframe software**. It includes the Adaptive Computer Technologies' CommPressor compression algorithm. The price is \$295. CIRCLE 270

Departments

CALENDAR

OCTOBER

Software Productivity Conference.

Oct. 17-20, Arlington, Va. Contact Conference Staff, U.S. Professional Development Institute, 1734 Elton Rd., Suite 221, Silver Spring, MD 20903, (301) 445-4400; FTS Users (202) 445-4400.

Electronic Printing and Publishing Conference.

Oct. 19-21, San Jose. Contact CAP International Inc., 1 Longwater Cir., Norwell, MA 02061 (617) 982-9500.

American Society for Information Science.

Oct. 23-27, Atlanta. Contact American Society for Information Science, Exhibits Management, 1424 16th St., NW, Washington, DC 20036, (202) 462-1000.

Northeast Computer Faire.

Oct. 27-29, Boston. Contact The Interface Group Inc., 300 First Ave., Needham, MA 02194, (617) 449-6600.

Ninth International Conference on Computer Communication.

Oct. 30-Nov. 4, Tel Aviv, Israel. Contact KENES USA, 271 Madison Ave., Suite 903, New York, NY 10016, (212) 986-8300.

Unix Expo.

Oct. 31-Nov. 2, New York. Contact National Expositions Co. Inc., 15 W. 39th St., New York, NY 10018, (212) 391-9111.

DPMA Dallas '88.

Oct. 31-Nov. 2, Dallas. Contact DPMA Headquarters, 505 Busse Hwy., Park Ridge, IL 60068-3191, (312) 825-8124.

NOVEMBER

Excelsator User Conference.

Nov. 1-4, Boston. Contact Index Technology Corp., 1 Main St., Cambridge MA 02142, (617) 494-8200.

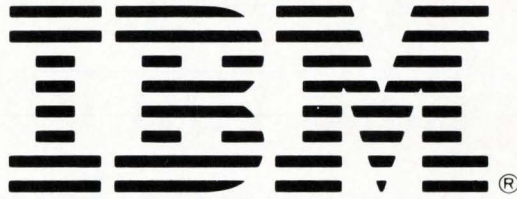
European Hard Copy Supplies Conference.

Nov. 2-4, Amsterdam, the Netherlands. Contact Martha Johnson, CAP International Inc., 1 Longwater Cir., Norwell, MA 02061, (617) 982-9500.

Comdex Fall '88.

Nov. 14-18, Las Vegas. Contact The Interface Group Inc., 300 First Ave., Needham, MA 02194, (617) 449-6600.

Programmers



SOFTWARE DEVELOPMENT OPPORTUNITIES

Banking Environment

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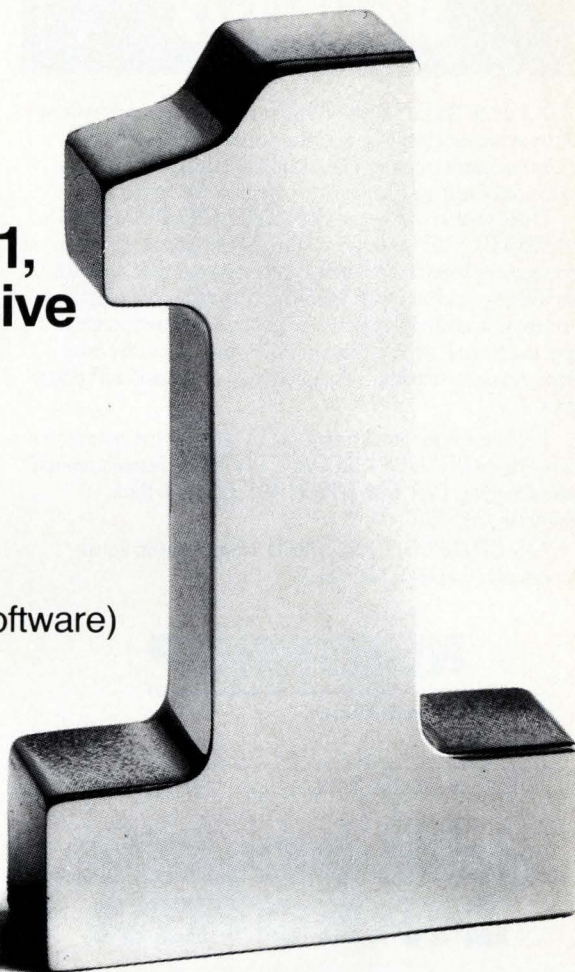
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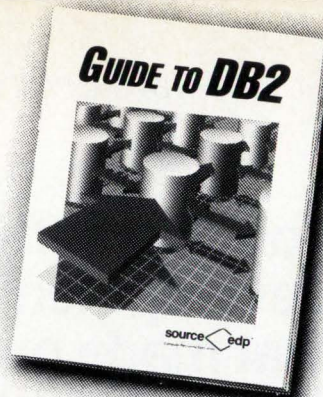
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