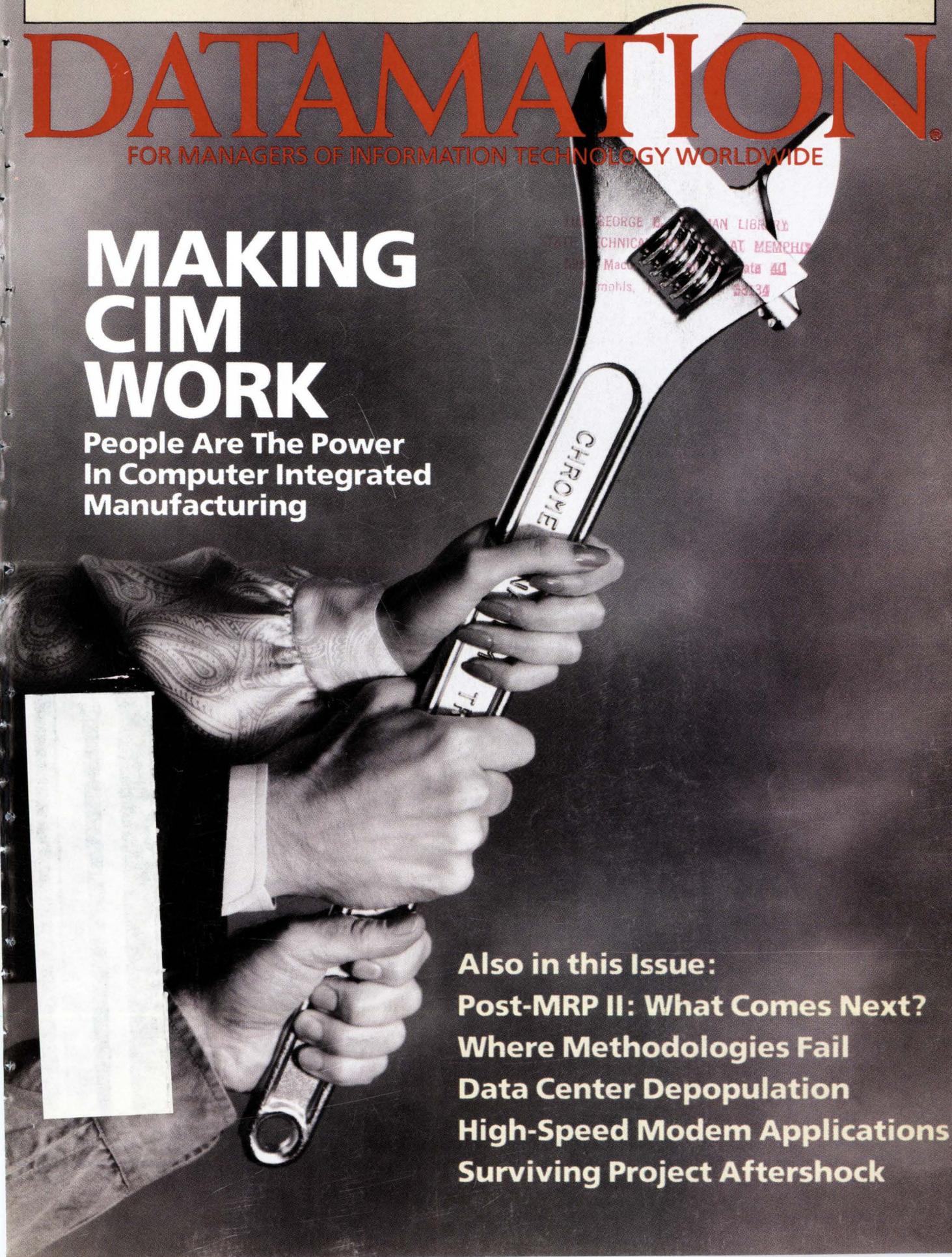


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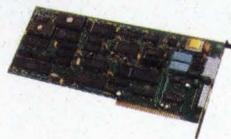
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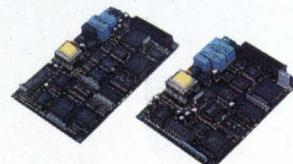
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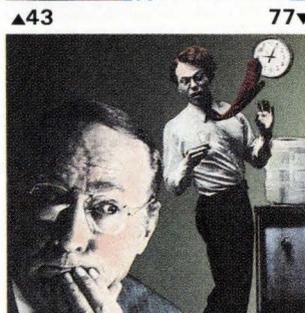
Making CIM Work 18

BY WILLIE SCHATZ Investments in computer-aided manufacturing are soaring as companies rush to compete globally. This year U.S. companies invested \$5.2 billion in CIM. But successful CIM users report that returns on CIM dollars depend more on the people implementing automation efforts than on the technology itself. Says one CIM user, "You're not just changing your computer configuration, you're changing your methodology. You're changing the way you do business."

Cover Photography by Peter Neumann

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BY MARY JO FOLEY Except for MRP II, users find few software packages to automate other parts of the manufacturing process. So CIM pioneers write most such software themselves or work with systems integrators. But packaged modules with customized interfaces are gaining favor.

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BY RALPH EMMETT CARLYLE The biggest problem in software development is faulty methodologies for moving from one generation of technology to another. Lacking solutions from the vendor community, some large users go it alone. An Apologia from IBM 44

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The Speedy Contenders, a vendor listing 66

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BY JANET RUHL If you're designing a complex system for professionals, be prepared for post-implementation aftershock. Once users learn their way around the system, they will test its limits, setting off shock waves that could devastate an otherwise successful project. But if it takes steps to prepare itself, post-implementation aftershock need not be fatal. Monitoring Aftershock 80

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BY RUSSELL PIPE The world's telecom policymakers are thrashing out rules for who should control value-added network services.

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Users Expect Fewer Vendors and Lower Costs 3

BY PAUL TATE A DATAMATION/Price Waterhouse survey shows that while many European users don't expect the pan-European standardization of 1992 to affect their plans, many expect the European industry to change.

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Cassoni Shakes Olivetti: Reorganization on the Way 7

BY JANETTE MARTIN Poor profit figures, product line problems, and power shifts have made Vittorio Cassoni heir apparent at the troubled Italian giant.

APPLICATIONS

Computing for Art's Sake 9

BY JANETTE MARTIN Michelangelo's frescoes, Leonardo's "The Last Supper," and the ancient city of Pompeii now rely on computers for their preservation. The imaging technologies used are attracting interest among commercial users.

INNOVATIONS

BY LAUREN MURPHY ICI Imagedata announces a new paper-based storage system; Memorex WORM for IBM mainframes. 15

The Schatz Factor

In this issue's cover story on CIM (page 19), Willie Schatz writes that a successful CIM strategy must be "of the people, by the people, and for the people. . . ." Successful magazines aren't very different. And of the people who contribute the most to DATAMATION's success, few can claim more credit than Willie Schatz. This issue's CIM story is an example of Schatz's skill at telling the stories that matter. Schatz gets the word on CIM from successful users—and, for comparison, tells why some failed to succeed in the past. He talks to vendors, consultants, and academics to fill out the story of this \$50 billion-plus automation market.

For more than a decade Schatz has been writing for DATAMATION, first as a freelancer, more recently as Washington Bureau Chief covering government computing, the international technology trade, and, for the past several years, factory automation and supercomputers.

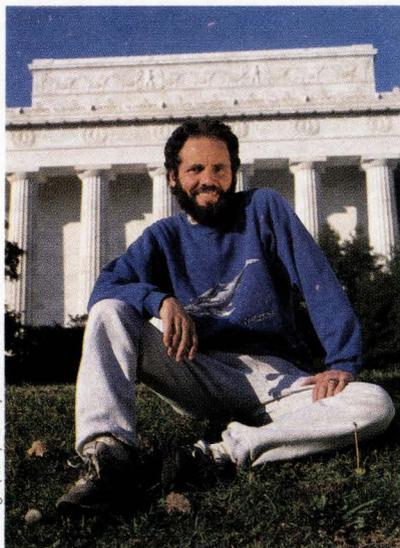
Schatz does more than cover these fields: he wins prizes for the way he covers them. He takes complex technology topics and strips them of pretension and pr hype. Few people in the U.S. know more about the supercomputer industry and the issues it involves than Schatz. In the last two years he has taken home two Neal Awards, the most coveted prizes in trade magazine publishing; and in the most recent Computer Press Association competition, he was cited for writing the Best News Story of the year for a story he broke about Japanese firms "dumping" supercomputers in the U.S.

Away from the PC on which he writes, winning is also important to Schatz, particularly on the tennis court. While he is no stranger to 18-hour days when on a story, there always seems to be time for sports. Schatz is sports-crazed, both as witness and participant. At off-site editorial meetings when other DATAMATION editors are seeking solace from the day's first cups of coffee, Schatz is likely to be finishing his first set of tennis—after he's swum his laps—still managing to appear, on-time, for 8:30 a.m. meetings.

Schatz grew up on Long Island, New York, and after getting a law degree, he aimed himself at writing. His first professional writing jobs were—fittingly—covering sports, first freelance for the *Washington Star* and then full-time for the *Miami Herald*. But no matter where he lives or writes, Schatz's loyalties do not easily change: the New York home teams possess his apparently unwavering devotion.

Even more colorful in speech than in print, Schatz has been known to turn the air blue with invective when his high standards for journalism are not met. For the rest of us at DATAMATION, Willie Schatz's insistence on the best is one of the reasons this magazine can, after more than three decades in business, still stake a claim to the loftiest ideals in computer journalism.

Parker Hodges
—Parker Hodges, Managing Editor



Photograph by Kathryn Lambert

SCHATZ in a rare attitude of repose.

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OCO Revisited

It would appear that most of the objections raised against IBM's proposed policy of shipping Object Code Only (OCO) boil down to a case of whose trade-secret ox is being gored.

Granted there are some cases where an end user (as opposed to a software developer) will be adversely affected by an OCO policy by IBM. These users must decide for themselves whether their system software requirements are truly unique enough to place their respective companies at risk with the maintenance and upgrade problems associated with source-level modifications. However, the majority of the complaints against OCO seem to come from software vendors who fear that the lack of available IBM source code will hamper their development efforts.

IBM should not be required to subsidize companies intending to do direct competition with IBM. IBM, like any developer, should have the right not to aid the competition, if it so chooses. Certainly most of the same vendors who cry the loudest have never released any source code to their products (and would probably laugh in your face should you try to license it). I can only recall one vendor in my 10 years of dealing with system software who has provided source code to the product he delivered. I guess the others feel that their trade secrets should be protected, while IBM's code should be public domain.

It would be very interesting if DATAMATION would do a survey of third-party software vendors to find out just how many of the OCO-objectors even allow licensing of their product source code. I think you would find that these vendors, in fact, actually embrace the OCO philosophy—as long as they can use it and IBM cannot.

Tom R. Donnelly

Systems Programmer
Loral Electro-Optical Systems
Pasadena, Calif.

Reluctant to Face Risk

Your lead article on risk (April 15, p. 58) highlighted one of the most important issues in data processing today. However, one of the largest risks is the reluctance on the part of management to face the problem. This attitude must change so that risk is looked on not as the shackle that prevents progress, but rather as the spur that encourages users to be more aware of their dependency on computer systems, and thus make contingency plans.

A structured approach to risk evaluation always benefits an organization by identifying vulnerabilities, but further, it assists in future dp development by base-

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As suppliers of the Security By Analysis method mentioned in your article, we know what the profits are if the subject is addressed positively. We also know the consequences of ignoring the situation.

Adrian Goulding

Director
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Reranking in Japan

Your ranking of the top 10 IS companies in Japan ("The Japan 10: Yen Drives Growth," Sept. 1, p. 48-1) is incorrect. The revenue figures you have used to determine ranking do not correspond to any known published figures at any exchange rate, and they contradict the rankings accepted by every leading publication in Japan. Your readers should be aware that, based on domestic dp revenue, IBM Japan is ranked number 3, not number 4, and by a considerable margin. Furthermore, the gap between the top three is much smaller than your figures indicate.

Masaomi Satoh

Manager of Communications
IBM Japan Ltd.
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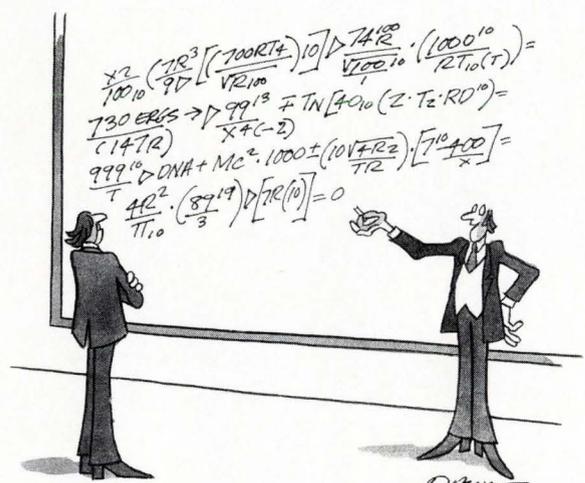
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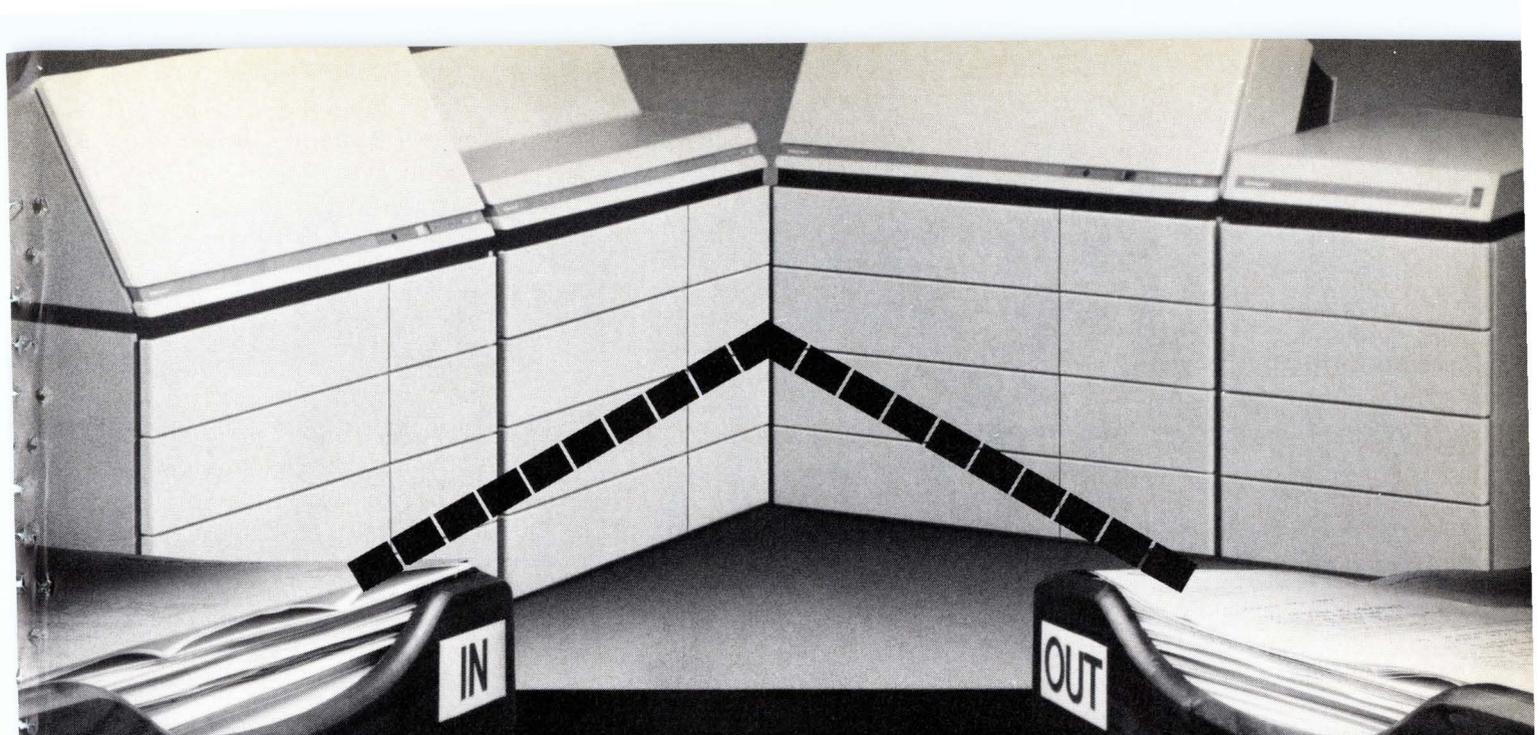
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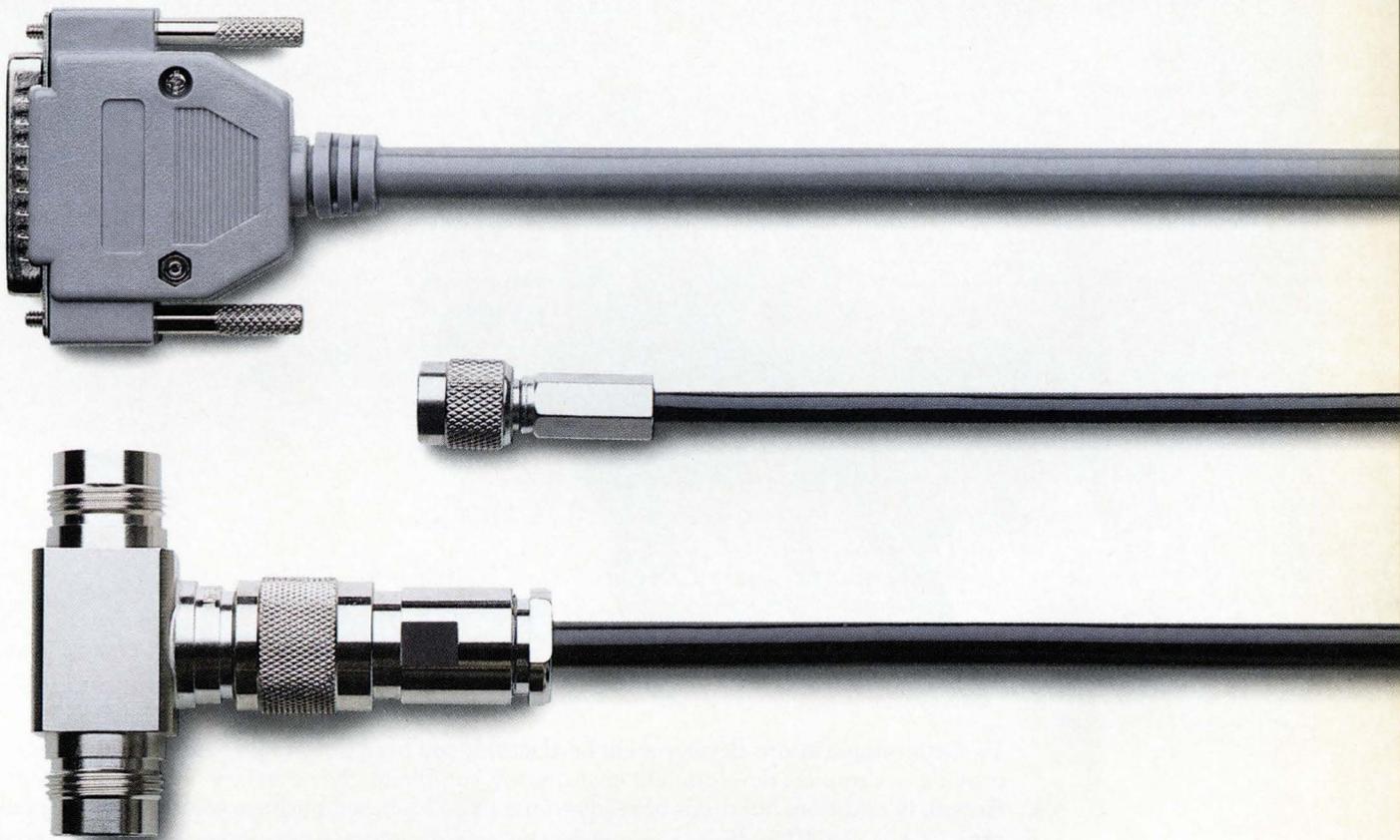
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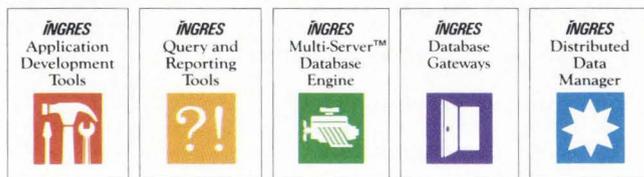
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DA

Tough Times For Users

Martin Marietta Data Systems, Bethesda, Md., has decided to bow out of the commercial software business. As a result, many MAS users are switching software packages, and the user group's membership roster is dwindling. Group president Larry Cram says it will exist for only another year or two. Though users have tried to persuade Martin Marietta management to change its mind, says Cram, the decision is final and is based on the fact that MAS was not profitable. While company management says it will continue to support customers, users are considering a third-party maintenance contract as an alternative solution.

OCO Is No Problem, Say Users

user group survey of 1,164 installations. Group president Cecilia Cowles says that some 67% of MVS customers and 53% of VM sites using products that run on these operating systems indicate that IBM's OCO policy has had no effect on them. IBM, which should receive the survey data soon and won't comment on it until it does, tells DATAMATION that 50% of all its software products are now in OCO form since the policy was announced in 1983. OCO will eventually embrace even large-scale operating systems such as VM, which has been heavily modified (more so than MVS) by IBM's customers. The survey of VM sites reveals that 43% of respondents claim OCO has had a negative effect on their business, as opposed to 27% at MVS shops. IBM has often been criticized for the allegedly poor quality of some OCO products, but even those critics have confessed that, as a lynchpin of more automated technology, it is inevitable. SHARE is considered more radical than the other large IBM user organization, **GUIDE**, and has an increasingly vocal Unix element that will be the subject of an upcoming survey, says Cowles.

Ford Using Image Four Ways

cerns of Ford's North American automotive operations. All four will use the same standard specification for exchanging raster data, which was originally developed by Ford and the vendors. The company, which believes image is complementary to CAD technology, will make the specifications and testing guidelines available to interested users before year-end, says Prasad. **IBM** and **Sysscan** (Cupertino, Calif.) are developing a Corporate Technical Publishing System (CTPS) for between \$3 million and \$5 million, which will create process illustrations from Ford's computer-aided design (CAD) data, and convert all of Ford's CAD formats to an internal CTPS format. Another is a records management application for corporate staff that runs on the

STERLING, VA.—Some members of the **Martin Marietta MAS** (Modular Application Software) **User Group** may be left in the lurch soon because of a policy change at the company.

CHICAGO—What is the impact of **IBM's** Object Code Only (OCO) policy on customer business? None at all, according to the majority of answers to this question in a recent **SHARE**

Wang Integrated Image System (WIIS). For that system, a spokesman says the department's existing Wang 7310 has "just barely enough capacity" to handle image, so it will probably upgrade its VS 100 to another 7310. The third system, from **Access Corp.** of Cincinnati, is an image distribution system for Ford's power train group. It will capture quality and process information and facilitate the addition of graphics to make information readily available on the plant floor. The fourth project being examined is an on-line system that will allow parts depot analysts efficient access to product designs.

IS Shop Dismantled

BRIDGEPORT, CONN.—While other companies are adding information systems centers, **Bridgeport Machines Inc.** is dismantling its IS operation as part of its cost-cutting program. Starting this December, **Information Systems Inc.** (ISI) of Farmington, Conn., is performing the information systems functions for Bridgeport Machines, using the same MSA and ADR software packages. The data will be processed by Pittsburgh-based **GENIX Corp.**, which is under contract to ISI. The move is expected to save Bridgeport Machines 20% of its IS operating budget. Further additions to the bottom line will occur when its IBM 4341 is sold, and leased equipment returned.

IBM Pilot Project

MILFORD, CONN.—**IBM's** Applications Systems Division is working on a pilot project that, if successful, will lead to the development of a one-stop customer support system for both IBM and IBM-business partner software installed on IBM machines. If the pilot is a success, the division plans to formalize the software support system sometime next year. According to Howie L. Hungar, director of software vendor operations at ASD, the repair and support system will, in SAA fashion, be available on all IBM systems, from PS/2s to mainframes.

It's Time For Unix

SUNNYVALE, CALIF.—**Amdahl** clearly believes the time is ripe for large **IBM**-based data centers to start embracing Unix-based mainframes. Having killed its Aspen interactive operating system project, the company has transferred the ill-fated OS's SNA connectivity code (LU 6.2 peer-to-peer software) over to its Unix UTS development—already a burgeoning 1.55 million lines of code in its own right. Support for **Sun's** NFS remote file system is also included with a host of new extensions to UTS, say Amdahl insiders. A 100MIPS+ Unix mainframe, which will possibly be called the UTS 590, featuring version 4.0 of AT&T's Unix System V, could be announced late next year, these same sources reveal.

Remember Us?

WASHINGTON, D.C.—The Land Grant Committee on Higher Education and Technology, which is part of the **National Association of State and Land Grant Colleges**, is set to tell the **National Science Foundation** that NSF's five supercomputer centers shouldn't be the only game in town. The committee has written a report, which should hit the street this month, saying that there is currently a two-tier

supercomputer structure—the five centers first and the other 20 universities second. The report acknowledges the importance of the centers, and argues that those five facilities are supposed to be state-of-the-art. But the second tier no longer wants to be treated in a second-class way, especially when the NSF hands out checks. "We want to be sure they remember we're around," a committee member says. "I'm not sure anybody's going to pay a hell of a lot of attention to this, but we'll see that it goes to the right people." Great, but don't hold your breath. This is Washington we're talking about.

Defections From IBM

DALLAS—So how goes IBM's push to get users of its nonstrategic 8100 midrange system to migrate to one of its SAA-approved platforms—the AS/400 or the 9370? Not so well, if you believe a recent comprehensive report authored by former IBMer, now consultant, Brian R. Blackmarr of Dallas. Blackmarr, who estimates the value of replacing the 15,000 installed 8100s at \$1.8 billion, says before IBM started shipping the AS/400, over 70% of 8100s were being replaced by non-IBM hardware, DEC's VAX being the big winner. Since the AS/400, Blackmarr estimates, about half of the 8100 users upgrading are going non-IBM. Defections are heaviest at financial and insurance concerns, such as **American Express** and **Aetna**, where the 8100 was most widely used. Blackmarr says many users are choosing the VAX site's superior functionality. DEC has been actively courting 8100 users, and has gone so far as to offer software that translates 8100 DPCX files to the VAX file structure.

EDI Net Launching

SINGAPORE—Next month Singapore launches what it claims is the world's first nationwide paperless trading network. The government expects the new EDI net to save local traders at least 1 billion Singapore dollars in its first year. Access software for the network will be based on the Interbridge EDI product from U.K. designers **SD-Scicon**, which is based on the EDIFACT standard.

Nynex, ICL Venture

NEW YORK—ISDN services and technologies are to be the subject of a joint research project by **Nynex** and U.K. mainframer **ICL**. Based at Nynex's White Plains Science and Technology Center, the project will test ICL integrated workstations in ISDN networks and links between ISDN nets and Nynex services. Nynex agreed to market the ICL workstations in the U.S. earlier this year.

Utility Considers System

RYE, N.Y.—The **New York Power Authority**, which controls the generation, distribution, and transmission of power throughout the state, is considering Fault Analysis Simulation (FAS-TEST) for evaluating new relay designs and troubleshooting misoperations. The software is expected to be released by **Power Programs Inc.** (Rye, N.Y.) in January, and will run on IBM and compatible PCs with 512KB of RAM. It is designed to test protective relays, which help pre-

vent blackouts in the utility system. By modeling the power system using the actual load and fault conditions encountered in the field, FAS-TEST can determine the correct voltage and current quantities the relays will see when in service. That output is fed from an RS232C port to computerized test instruments, which apply the load and fault voltage and current quantities to the relay under test. FAS-TEST can model a power system event to analyze what happened and will enable what-if modeling on lines receiving new equipment to see how devices will perform.

Irish Go With DEC

DUBLIN—When the **Irish Futures and Options Exchange** goes live early next year, it will be the latest to use a DEC-based package—called Automated Trading System (ATS/2)—from the **International Commodities Clearing House** (ICCH) in London. Based on an earlier product that now runs in the London and New Zealand exchanges, ATS/2 will also be used to support the Barcelona futures exchange in Spain, which is due to be set up later in the year.

Spanish Software Growth

MADRID—Europe's fastest expanding market is Spain. An **Electronic Data Systems** analysis reveals that the Spanish market grew by a phenomenal 24% rate during 1988 and that by the end of 1990 the Spanish software and services market alone will have doubled to almost \$2 billion.

Koreans Automate

SEOUL—The **Korean Ministry of Post and Communications** plans to begin automating 900 branch post offices this month. The new systems are based on the Olivetti Personal Business workstations. Around 1,500 workstations have been ordered as part of an \$11 million deal.

Raw Random Data

Our spies inside **Intel** tell us that the chipmaker has been demoing an advanced workstation for select customers. The configuration, we hear, is a 486-based processor, 30MB of main memory, and fiber-optic token ring LAN support, all running OS/2 and Unix (AT&T's, that is), priced at \$5,000. Get the impression Intel wants to break into the workstation business next year? . . . **Gould Inc.**'s Imaging and Graphics Div., Fremont, Calif., plans to buy a graphical user interface to its image processing system from some academic users who developed it as an alternative to Gould's existing user-unfriendly LIPS interface. It runs on the MicroVAX GPX and will be ported to Sun workstations, says director of marketing Arif Janjua. . . . In an effort to give a push to distributed applications, **Novell Inc.**, Provo, Utah, this month will announce a set of tools called NetWare RPC (for Remote Procedure Call). The idea is to generate code to distribute applications across different transport mechanisms such as NetBIOS, Named Pipes APPC, OS/2 MAP, and TCP/IP. In this way, independent sections of programs can be executed in separate machines across different computing environments.

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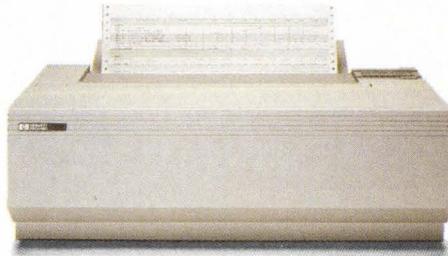
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MAKING

Investments in computer-aided manufacturing are soaring as companies rush to compete globally. But returns on CIM dollars depend more on the people implementing automation efforts than on technology.

BY WILLIE SCHATZ

If a company's computer-integrated manufacturing strategy isn't of the people, by the people, and for the people, there is little chance that it'll increase productivity, lower costs, add efficiency, or deliver any of the other promises associated with factory-floor technology investments.

"CIM is really a cultural change," says Bob Ratcliff, a lead analyst for CIM services at farm machinery maker Deere & Co., which has spent a lot of time working on how to manufacture tractors more efficiently using systems. "It's really a way of life. You're not just changing your computer configuration, you're changing your methodology. You're changing the way you do business. You're changing mind-sets."

Or, as Arthur Andersen & Co. says: simplify, automate, integrate. But that's far easier said than done. CIM doesn't happen overnight. Even when it's properly conceived, a strategy that automates a significant portion of a company's manufacturing operations takes years to implement. "A lot of people are going for the big win," comments Vincent Jones, author of *MAP/TOP Networking* (McGraw Hill Book Co., New York, 1988). "People are always in a rush. Management wants to see the whole problem solved today."
Manufacturing compa

CIM WORK

nies worldwide are pouring vast sums of money into automating their operations. Boston-based Harbor Research Inc. estimates CIM investments will nearly double to \$91 billion in 1992 from this year's \$52 billion, with transportation companies leading the way.

But before those investments produce the kinds of returns manufacturing executives and their IS counterparts are banking on, companies have to thoroughly examine the entire manufacturing process. "Too many people automate [without thinking about what they're doing]," Jones asserts. "Step one is [for] the company to change its way of thinking. Understand the process, document the process, simplify the process, then automate. Automation is the last step, not the first."

Users agree. "CIM is a journey," says David Rea, director of the manufacturing systems division of Weyerhaeuser Information Systems Div., Tacoma, Wash. "It's a means to an end, not an end in itself. It's not something that you do in a year."

Or maybe even in a decade. Weyerhaeuser has been playing the CIM game since 1978. After an initial skirmish in 1978 and a second round in 1982—both of which were limited by the available technology—the company finally solved its CIM problem in July 1985 with an in-house system called ProSmart. ProSmart, a set of VAX-based software tools (including a database), furnishes real-time production information, as well as considerable savings. In fact, ProSmart has been so effective for Weyerhaeuser, saving more than \$1 million annually at its Longview, Wash., pulp and paper mill, that the firm is marketing it commercially. "We made the tool rather than buy it, because we looked at the marketplace solutions and there weren't any [for us]," Rea says.

Today, manufacturers have a much broader choice of commercially available software to use as a base for their CIM efforts, especially in the MRP (material resource planning) II arena (see "Post MRP II: What Comes Next?" p. 24). "CIM programs are more readily available than five years ago," agrees Kreg Brown, vice president, Oriole Software, a CIM software manufacturer in Towson, Md. "Users are saying to vendors, 'Get me the functionality to do my job and we'll worry about the platform later. What software will give me the best benefit for my money? What will it take for me to get and stay competitive?'"

As with everything else in business, investment in manufacturing is driven by competitiveness. But competitiveness means different things for different industries, and that makes for a variety of CIM applications. So it's a question of how, not whether, companies gain a manufacturing advantage. Most still approach CIM with the chief objective of improving the quality of their plant processes and the products they manufacture, according to the 1988 North

American Manufacturing Futures Survey conducted by the Boston University School of Management. Also among the top CIM goals of those companies surveyed is the speeding up of development and production, and increasing the flexibility of manufacturing operations.

But none of the companies surveyed are going anywhere in CIM without some serious soul-searching. "Companies have to break old habits so they can take advantage of the new environment," says Jeffrey Miller, professor of operations management at Boston University and director of the survey. "CIM is a process of discovering how to simplify the entire manufacturing process. The best firms aren't even doing MRP any more. Since MRP is really an IT reflection of the entire physical process, they've simplified the environment that MRP controls. A factory that MRP controls is automatically a better factory. It's a question of attacking root causes."

While some companies are able to identify manufacturing problems before they begin to hurt profits, others don't begin to seriously seek CIM solutions until their businesses begin to suffer—either due to external market conditions, internal inefficiencies, or a combination of both.

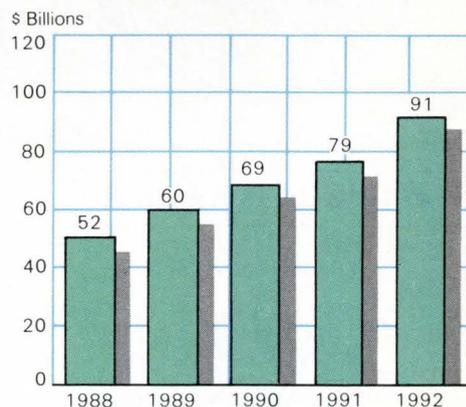
The farm crisis, for example, motivated the \$4.1 billion manufacturer Deere to plow into factory automation, albeit late. "We became real lethargic during the '70s," remarks Ratcliff, CIM analyst at Deere's tractor factory in Waterloo, Iowa. "For so long the attitude had been that whatever we did was right, and the marketplace reflected that. So we saw no reason to change it. We were Deere the institution, not Deere the business."

The severity and length of the downturn in U.S. agriculture in the early 1980s forced Deere to focus on its core business. Tractor production had dropped to as low as 10% of the previous level, resulting in layoffs, salary reductions, early retirements, and all the other signs of a business on the brink.

"We took a crash course in CIM," Deere chairman

The Worldwide CIM Market

Manufacturing systems and software sales are projected to double.



Source: Harbor Research Corp.

Photograph by Peter Neumann/Charts by Catherine Francis

and CEO Robert Hanson said at the recent AUTOFACT conference in Chicago. "That's 'crash' as in when the bottom falls out. We were lucky in a perverse sort of way. Other companies see the drip-drip of slowly eroding market share and put off dealing with the inevitable. When you get hit like we did, you can't do that."

Many of the early retirees were succeeded by younger, more aggressive managers who were not afraid to confront Deere's problems. They formed the nucleus of a computer-integrated manufacturing task force, whose sweeping recommendations in 1986 included the formation of a CIM services group comprised of seven members from different quarters at Deere's Waterloo works. The chief suggestion of the task



DEERE'S RATCLIFF: "CIM is really a cultural change."

force, which emphasized the merits of decentralized operations, was that the plant's middle managers should find new ways to make their individual departments more productive. Implicit in the task force's thinking was the conviction that there was a need to reform the ways those plant managers obtained information.

"We were taking on a large, powerful centralized mainframe IBM IT shop," says Ratcliff, describing Waterloo's IS dependence on relatively meaningless data generated by IBM mainframes at Deere's headquarters in Moline, Ill. With the CIM initiatives, "we were going to have to redirect the emphasis on how to collect and manage data. Everything in dp was going to have to be by and for the end user, not the systems or-

ganization. We had to drive computer ownership, design, and use to the lowest possible level. That meant distributed, localized computing with a great deal of flexibility."

That also meant a totally different approach. "Any change means a fundamental and terrifying attitudinal adjustment," Hanson asserts, "but if your company's going to be competitive, it's got to change its corporate will so it has the gumption to make timely and difficult decisions. We changed not because we were forward looking, but because of the big [competitive] bang."

"Now we're not afraid of change, we can see the forest for the trees and now we know that in manufacturing integration you have to emphasize the people, not the technology. However dazzling the hardware, the 'software' between the ears must be updated first."

And that's not easy. Despite this absolutely top-level support, Deere's progress to date has been slow. "We've spent the last 15 months just getting to the point where some people are listening to us," Ratcliff says. "Classic CIM is our end goal, but a lot has to happen before we put in massive amounts of hardware . . . The frustration comes because we want to run, not walk. But at least we're moving."

Rolling Out the CIM Carpet

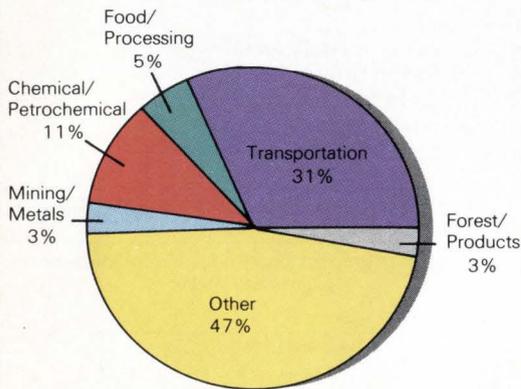
Monsanto Chemical Co.'s journey down the CIM path was faster. Challenged by corporate management in 1984 to increase productivity by 50% in three years, the company's largest manufacturing plant responded by forming three "Plant of the '90s" operating committees that involved every department in the plant—accounting, data processing, research and development, engineering, finance, and operations. Management asked the committees to develop one CIM plan for the site, located on 2,000 acres in Pensacola, Fla., so the costs of implementing it could be factored into capital planning for the next decade.

The committees generated 800 ideas for how to achieve productivity breakthroughs at the plant, which primarily makes nylon carpet yarn. Those ideas were eventually reduced to three key CIM projects, all of which are intended to improve access to systems by any of the plant's 2,500 employees:

- A local area network to integrate the plant's current IBM, DEC, and HP systems, including some 300 PCs. Monsanto so far has invested about \$1 million in

Where CIM Counts Most

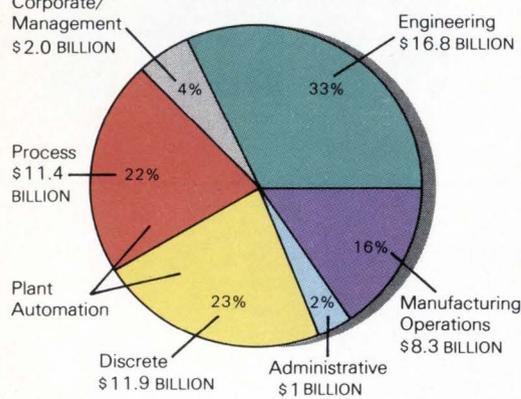
Automakers drive factory automation movement.



Source: Harbor Research Inc.

How CIM Is Applied

Plant automation and engineering attract most CIM attention in 1988.



Source: Harbor Research Corp.

Photograph by George Ceoliar/Black Star

"CIM is not a panacea. It's just another manufacturing tool, a mechanical way of putting people 10 feet away from each other so they can communicate."

Ethernet- and broadband-based networks to do so.

- Separate database management systems for its yarn and chemical product lines. The company has decided to implement Oracle DBMS software as a result.
- A partnership with DEC and Fisher Controls to develop a prototype architecture and application for optimization of all resources at the site.

Monsanto Chemical's plant must be doing something right, because productivity has increased 47% as measured by a complex CIM formula that includes the following variables: raw materials, capital, energy, labor, supplies, and maintenance. Moreover, the company has already recouped some of its CIM investment costs, although the average payout is two or three years.

"The most important part is planning how you're going to be doing business in the '90s," declares Carol Holmes, supervisor of information and systems technology at the Monsanto plant. "Without that cross-functional, visionary plan, we wouldn't have done anything. There were no territorial turf wars and [there was] no jealousy from the dp group . . . [which was] not in a position to set priorities. Those have to be determined by the user groups. If

ing to cut it," he continues, referring to the company's \$65 million hodgepodge of equipment and software that had been designed for specific functions but that was unable to work together.

"So we decided to analyze what information we really needed [for production]. We discovered that there were real good gains to be made by providing a manufacturing database [developed in-house] that could offer flexibility to other parts of the organization. We never set out to use CIM. We were just looking at improving our production process."

Committing to a Single, Unified Database

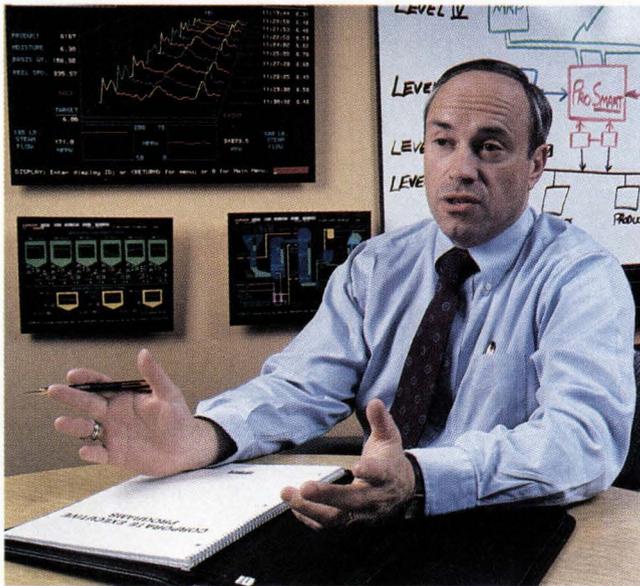
Bentley didn't start out with CIM, but by the time it had invested millions of dollars in Compaq 386s, AutoCAD, and CADNETIX software, it had certainly finished with it. The process was hardly painless. Bentley restricted its initial database investments to its engineering departments, which alienated other departments from the CIM cause and yielded little improvement to overall productivity. The company realized its mistake and made a commitment to create a single, unified database that would serve all departments, not just engineering.

"It's absolutely essential that you have one database," Biggs stresses. "If you've got multiple databases, it's a lock that one's wrong. We did an awful lot of grinding on each other until we got the system down. You've got to have an active methodology that promotes the involvement and coordination of all the parties concerned."

Database technology has also keyed Weyerhaeuser's success in CIM, although it experienced two failures in automating its 1,300-worker Longview factory before hitting on its ProSmart solution. "We missed the mark in '78 and '82 because we thought data was the problem," Weyerhaeuser manufacturing director Rea confesses. "With ProSmart we took a people-focused approach, not just a [technological] one. The main business driver was still global competitive pressure, just as [before]. But it was easier the third time because we took the lessons learned and carried them forward."

Unfortunately, a significant number of manufacturers aren't even experimenting enough with CIM to be learning any lessons from it. Many are reluctant to change their ways, especially when some plant capacities in the U.S. are approaching 85%. The old "if it ain't broke, don't fix it" philosophy could be a costly one, however. "Those who pay CIM lip service will continue to be less competitive," networking author Jones warns. "The Japanese don't pay CIM lip service, and they're beating the pants off [U.S. manufacturers]."

"Sure CIM is a lot of work," Jones continues, "and it's not a panacea. It's just another manufacturing tool. But the essence of CIM is really very simple. It's a mechanical way of putting people 10 feet away from each other so they can communicate."



WEYERHAEUSER'S REA: "CIM is a journey."

we [had] waited for dp to do it, we'd still be waiting."

So would Bentley Nevada, an industrial instrumentation maker in Minden, Nev. The company realized there had to be a better way to fly when an audit showed that it took 3,500 blueprints to produce one product—that's about three times too many—and the blueprints took about five times longer than they should have to translate into the product. Trying to get a product to market was like trying to swim through quicksand.

"We'd made a corporate decision that it [automation] was absolutely necessary for us to be competitive in the '90s," says Dave Biggs, Bentley's vice president of product development. "It was becoming pretty obvious that our information system wasn't go-

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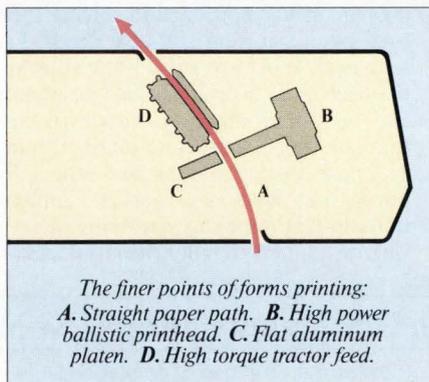
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Post-MRP II: What Comes Next?

Except for MRP II, users find little packaged wisdom when automating manufacturing. As a result, the pioneers write most such software themselves. But packaged modules are gaining favor.

BY MARY JO FOLEY

In the discrete manufacturing world, many users have come to equate computer-integrated manufacturing (CIM) with MRP II. However, as automation pioneers are discovering, areas such as quality control, cell control, scheduling, simulation, and maintenance are equally important pieces of the CIM puzzle. Yet, compared with the MRP II world, where packages for all types of users across all price ranges abound, these other segments are in their infancy in terms of the

number of application packages available.

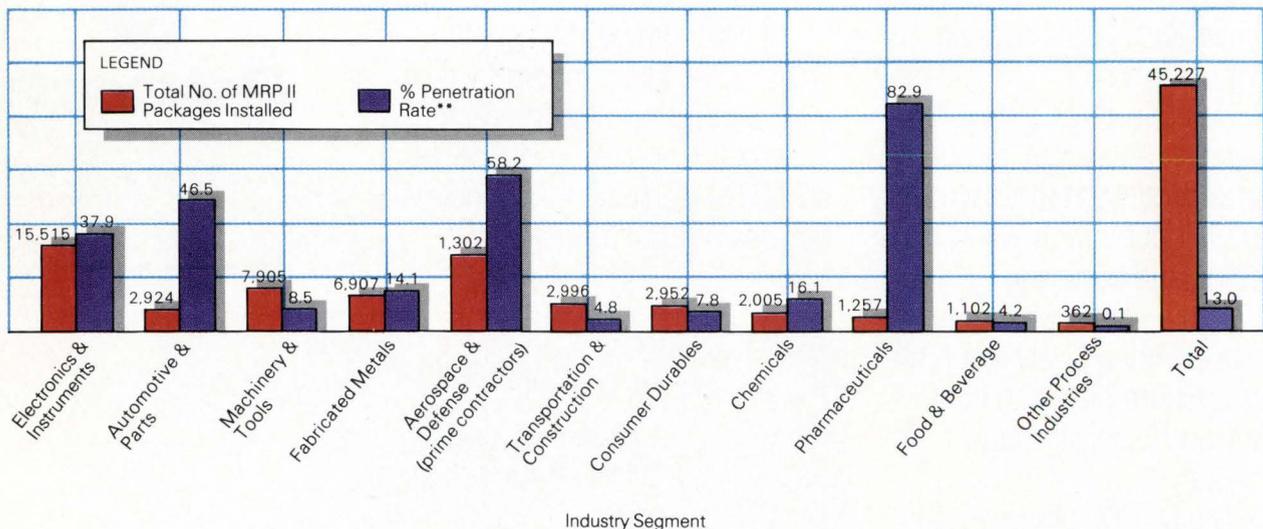
As a result, customers have been left to take an ad hoc approach to solving their total manufacturing software needs. Far and away, most are writing the software themselves or working with consultants and/or systems integrators to devise custom solutions. A growing number, however, are testing the market waters by purchasing third-party tools and applications and, in some cases, working directly with developers to tailor the interfaces on

those packages to make them more applicable to their operations.

At least in the discrete manufacturing arena, MRP II is often the first type of system customers install. Currently, a sizable portion of U.S. discrete manufacturing companies have some type of packaged MRP II system up and running. (This is not true in the process industries, where MRP II has only recently begun to take hold. The pharmaceutical industry, with an estimated 83% penetration rate, is the only

Which U.S. Manufacturers Use MRP II*

Pharmaceutical firms (82.9%) lead all other segments in use of packaged Manufacturing Resource Planning II software.

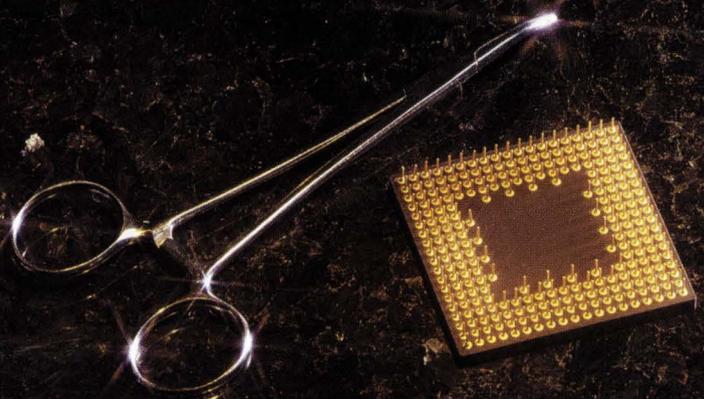


* Figures do not include systems developed in-house or extensively customized packaged systems.

** Penetration rate has been adjusted to reflect actual MRP II usage rather than merely vendor-installed base counts.

Source: Plant-Wide Research Corp.

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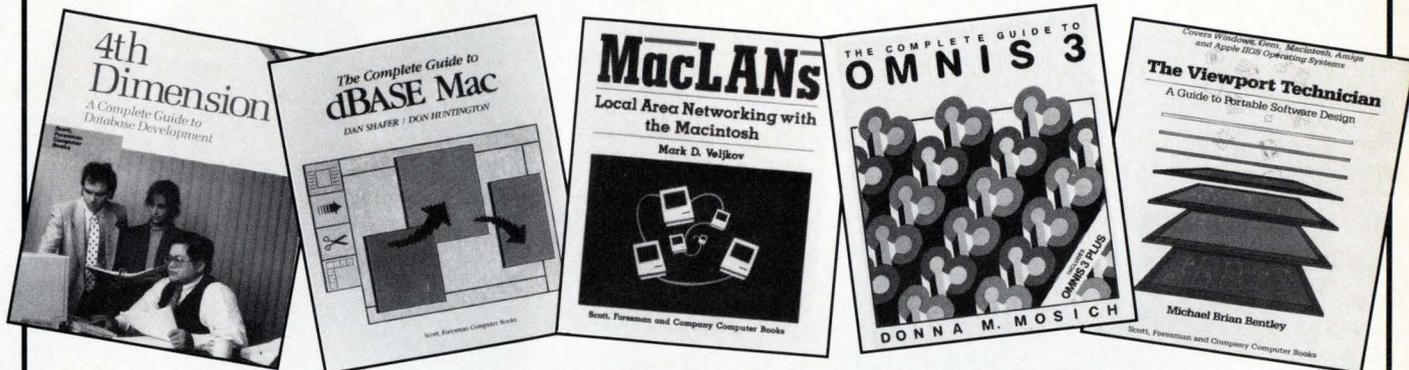


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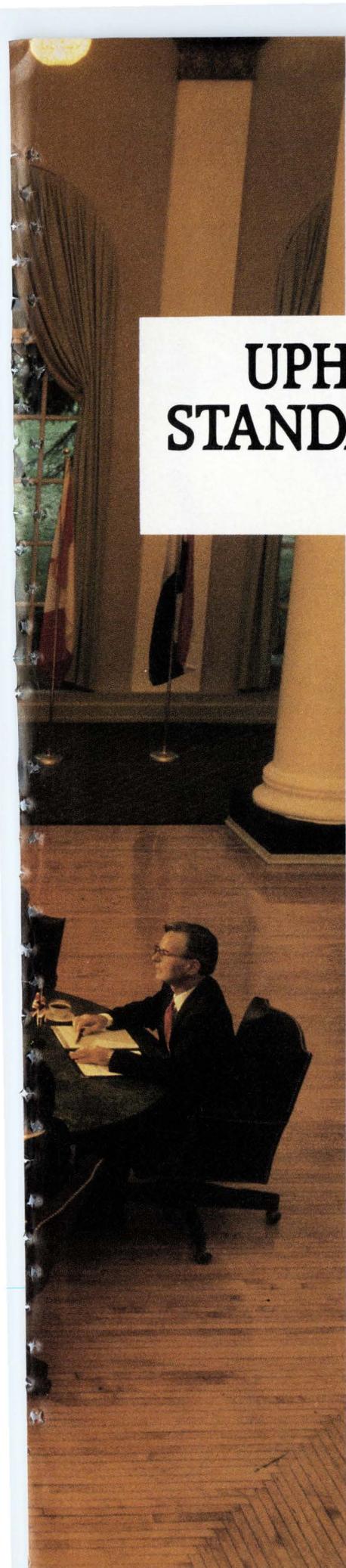
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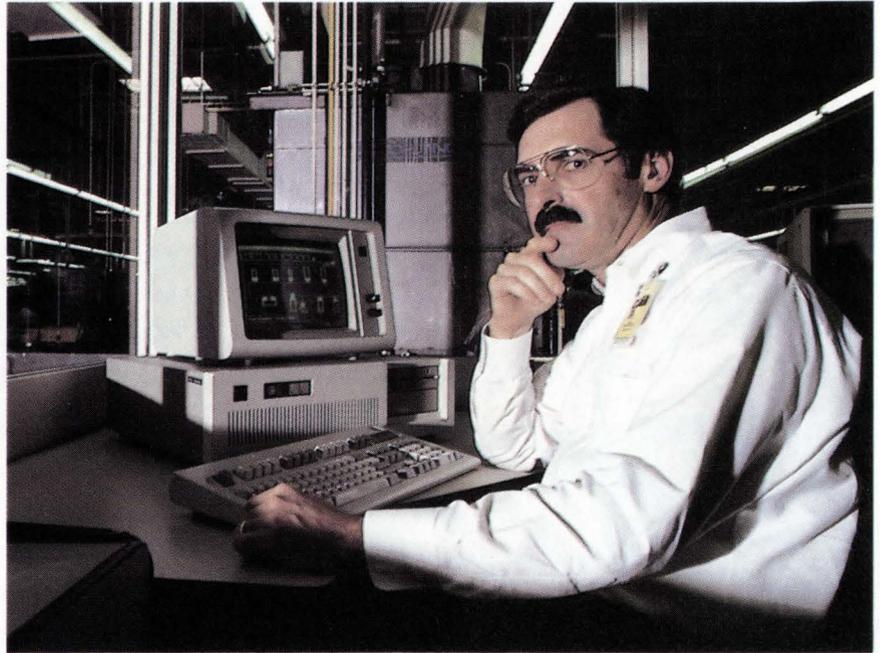
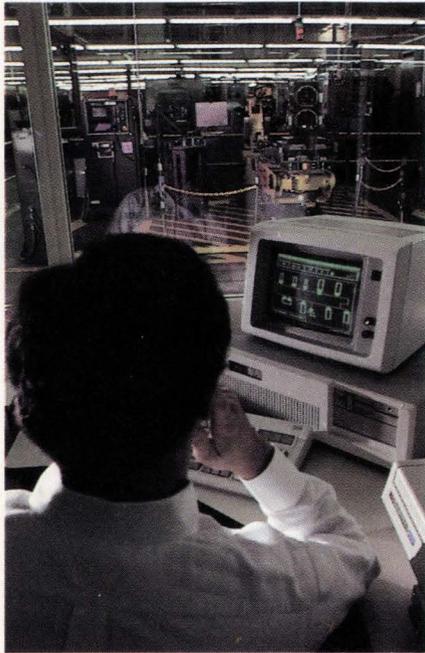
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SOFTWARE MANUFACTURING



TEXAS INSTRUMENTS' LOTT: The flexible manufacturing system that runs TI's factory floor, seen at left, was developed from scratch.

notable exception.) According to Plant-Wide Research Corp., a North Billerica, Mass.-based market research firm, MRP II penetration rates last year reached 58% among aerospace and defense contractors; 47% among automotive and related parts makers; and 38% among electronics and instruments firms (see "Which U.S. Manufacturers Use MRP II").

It's primarily when users endeavor to move beyond MRP II that they discover the gap between CIM talk and reality. Texas Instruments' Trinity Mills facility in Texas ended up developing its entire Flexible Manufacturing System (FMS) from scratch because of the dearth of off-the-shelf software.

Trinity Mills, a metal fabrication plant, is one of 14 facilities that comprise the company's Defense Systems and Electronics Group. According to the plant's automation manager, Vernon Lott, "third-party software absolutely wasn't available in the case of FMS" when TI first became interested in the concept three years ago. The job was expected to be especially complex because the facility employed factory-floor devices manufactured by so many different vendors that "it was more of a systems integration effort" than a pure software development one, Lott says.

TI already had spent more than five years developing its proprietary corporate-wide MRP II system. A 12-person development team spent a year planning and another year implementing its FMS system.

Brought on-line in March 1987, it includes a scheduling system for production control, a cell-control system for coordination, and links between its computer-aided design (CAD) and machine-tool facilities, to name just a few of the modules.

Design time for the FMS was relatively short, thanks to the engineers' use of TI's artificial intelligence programming tools and Explorer Lisp machine in developing the scheduler portions of the system, Lott explains. In addition, he says, quite a bit of the cell-controller technology that TI had perfected at its neighboring Sherman defense facility was transferrable to Trinity Mills. Yet little, if any, of Trinity Mills' FMS is transferrable to other TI plants, since no two TI manufacturing facilities use all the same parts. In fact, another TI plant is running a third-party-developed FMS system, Lott notes.

Packages Gaining Ground

Few users are as thoroughly automated and integrated as TI. Rather, those discrete manufacturers looking to take the next CIM step are likely to add single modules, such as cell control, quality control, scheduling, simulation, process planning, and maintenance, one step at a time.

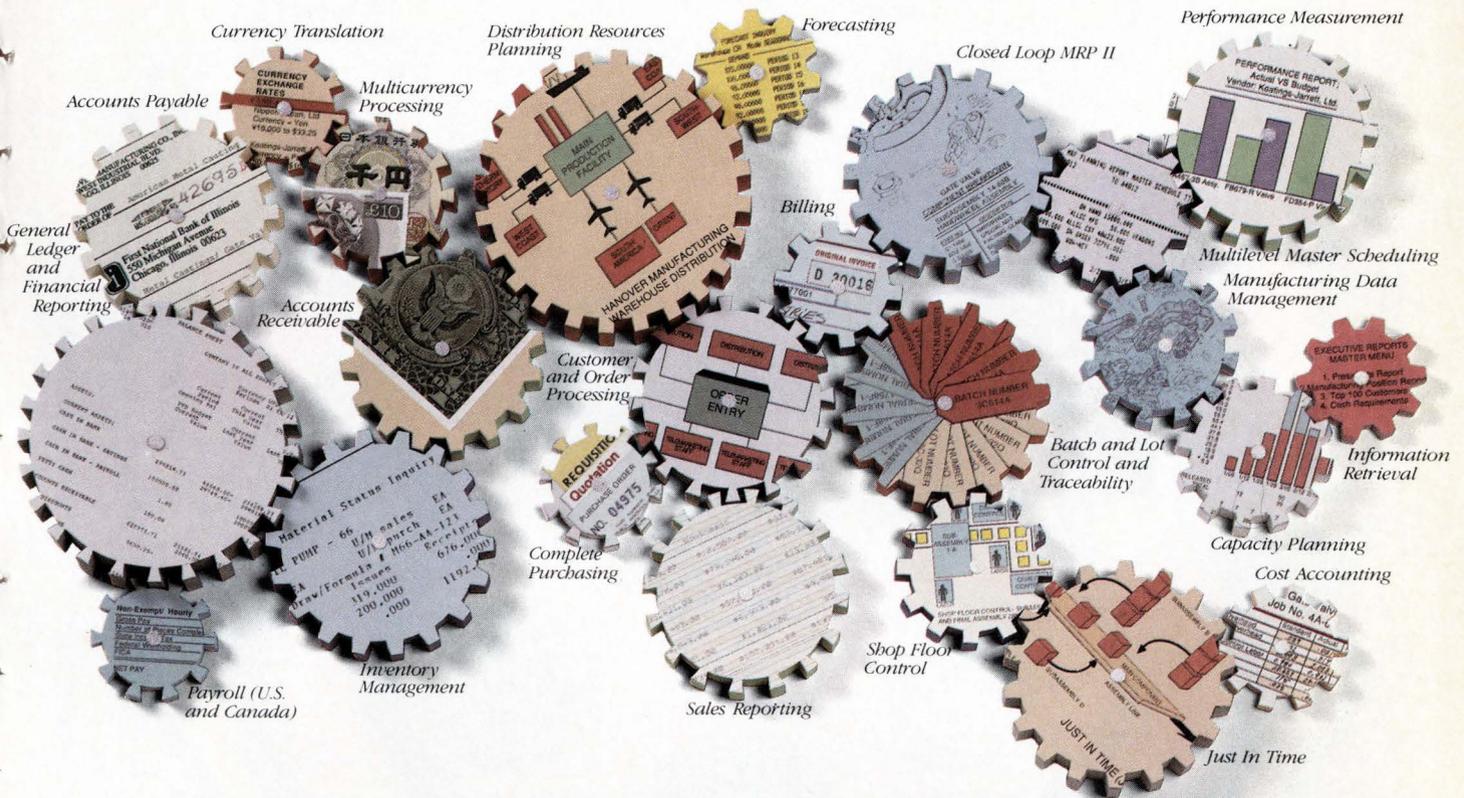
No two customers seem to agree which of these modules should be brought on-line first, but whatever module they choose, like TI, most are doing a lot of customization work themselves. According to market research firm Automation Re-

search Corp., Medfield, Mass., two thirds of the money that users spend on manufacturing software (including MRP II) is still going for in-house development and/or custom-built software. Among process industries, the amount that users spend on custom software is nearly 80% of their total CIM software expenditures.

Packaged modules other than MRP II have a low level of penetration in manufacturing markets primarily because "the number of commercial packages available is really low," says Alice Greene, president of Plant-Wide Research. "Companies are ending up having to modify them greatly," she adds. In some cases, such as the factory-floor maintenance market, "vendors are pushing the market more than the users." Consequently, maintenance packages are written to reflect a utopia where production and maintenance people work together, although Greene points out that this isn't usually the case within most factories.

It is also because few users have the massive muscle and know-how of a TI that they increasingly are looking at third-party services and products. For instance, when power-supply manufacturer Zytec Corp., Eden Prairie, Minn., called in a consultant for advice on choosing an MRP II system in 1984, the Control Data Corp. spin-off ended up opting for a Xerox Corp. system running on an IBM 4361 mainframe. "The system is doing a half-decent job, but it is limited in terms of tying it into our information system," says

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Zytec's systems engineering manager, Damon Whitmore.

When it came time to select other CIM components and processes, Zytec evaluated whether it should go the one vendor route or work with multiple systems integrators. "Even though we knew we would have to do a lot of work in between [linking various vendors' offerings], we decided to contract with several different vendors to create our CIM plan [known in-house as ZYCIM]," says Whitmore, chief architect of ZYCIM. Mainly, this was due to the fact that "there isn't a single vendor that currently can do everything from IS to factory floor, on PCs through mainframes," Whitmore says.

Whitmore is gathering bids from various third-party vendors for the next step in implementing ZYCIM: the development of an electronic link from the company's Cadnetix CAD system to its Hewlett-Packard Co. in-circuit tester. (So far, it has re-

Manufacturing Users' Wish List

Cell control, simulation, and scheduling top expected software buys.

Application Type*	1987 User Expenditures (\$ Millions)	1992 User Expenditures (\$ Millions)	AAGR** %
Cell control	16.4	82.2	38.1
Quality control	20.0	33.7	9.9
Scheduling	34.5	117.3	27.8
Simulation	25.6	90.7	28.7
Process planning	18.7	34.8	25.6
Maintenance	352.6	447.6	13.3

*Data is for packaged systems employed by discrete manufacturing companies only.
**AAGR—Average Annual Growth Rate
Source: Automation Research Corp.

ceived quotes from Cadnetix and HP.) After Zytec puts its link in place, Whitmore says, it will focus on acquiring an analog-design simulation package for its design engineers. "We're not going to sit here and do any major software development," Whitmore notes. "All of the tools and knowledge already are available to carry us into the 1990s."

Along with Zytec, computer maker Digital Equipment Corp., one of the foremost U.S. manufacturing experts, seemingly shares the view that many existing CIM tools and applications are sophisticated enough to meet users' needs. At its Chelmsford, Mass.-based Corporate Center for Excellence for Simulation and Modeling, DEC operates a simulation lab for training and development work. The lab runs "most of the [process simulation] software on the market," claims Chris Kuhner, manager of manufacturing expert

systems.

"Simulation tools that were available not too long ago required a mathematician to build models," Kuhner continues. "The user interfaces, especially, were extremely unfriendly." As of 1982, DEC had trained only six in-house users in process simulation techniques. "We basically did nothing in the way of simulation. Instead, we used to go out and build plants, and make mistakes." Today, however, "simulation is used in every one of the more than 40 [DEC] manufacturing sites by more than 300 users companywide," he boasts.

DEC relies on simulation tools that were developed by the West Lafayette, Ind.-based Pritsker & Associates, but customized to DEC's specifications. Six years ago DEC linked up with Pritsker to help develop user interfaces that were more applicable to discrete manufacturing operations. Developing these types of fine-tuned, complex software applications is extremely expensive, even for a company the size of DEC, Kuhner says. "We know we can't be all things to all people. To beat this limitation, we partner with third-party developers."

Despite a successful development effort, neither Pritsker's simulation tools nor other off-the-shelf simulation tools offer links between simulation and CAD, Kuhner says. Most such tools also would benefit from improved analytic (especially financial analysis) capabilities, he adds.

"Today, we're seeing great shortening of product life cycles and tighter cost ranges. Product is well controlled," with software like MRP II, "but process [manufacturing] isn't," since companies aren't fully utilizing other manufacturing software, Kuhner asserts.

Mary Jo Foley is a freelance business and technology writer based in Washington, D.C.

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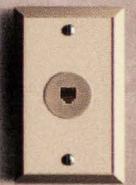
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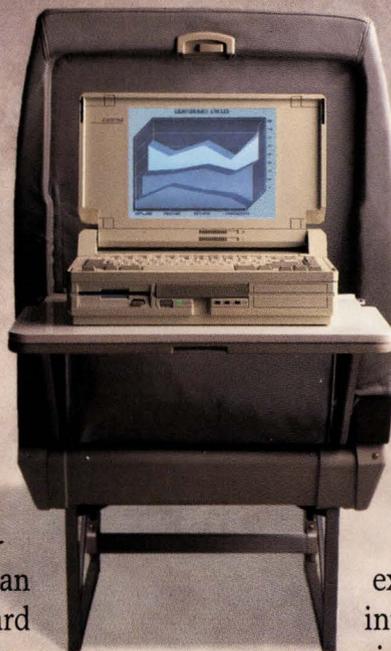


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Its footprint is small enough to fit on an airline tray table, with room to spare.

erals. You can even add a 12-MHz 80C287 coprocessor as an option to speed number crunching.

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Software creation: is it, as some believe, the worst managed and worst measured activity in business today, more free-form art than disciplined science? The evidence for this view is growing. One of the industry's foremost experts on software productivity claims that 25% of all large real-time and telecommunications-based software projects are never completed. Just as disturbing is his claim that a similar percentage of those applications that are actually completed and delivered are never put to work.

"Big projects fail more frequently than small," notes Capers Jones, founder and head of Software Productivity Research, Cambridge, Mass., and adviser to government and big business. He adds that 10% of all projects begun at commercial IS shops are aborted.

Horror stories from other experts abound. Take the case of one of the nation's leading aerospace manufacturers. This company started 260 applications software projects in 1987; 40% of them, one consultant claims, never got finished. "A lot didn't even make it back to the department that funded them," says Greg Boone, president of Bellevue, Wash.-based CASE Research Corp., of his client's distress. "Unfortunately, such waste is becoming commonplace."

Software projects are canceled for numerous reasons. Some of the more obvious include volatile business conditions, poor quarterly performance, mergers, and acquisitions. Typical, says Jones, is the company that embarked on a four-year program to develop a new PBX, only to find halfway through the process that a competitor had reached the market with a more sophisticated and salable product. Less obvious are the technical limitations that can bring software projects to their knees: primitive hardware access methods and arcane data structures that endlessly frustrate competent programmers. Even such tried and tested tools as programming languages and DBMSs aren't the trusty servants they appear to be. "A great deal of the function in such complex and rich languages as PL/I and Ada isn't used or understood by programmers," says Jones.

George Tamke, former president of IBM's longtime DBMS nemesis, Cullinet Software, has his own alarming statistic. "Only 50% of the function in our DBMS software is being used by customers," he says. According to CASE Research's Boone, this number holds for customers of IBM DBMSs as well. Tamke says that in essence some of his customers are using the DBMS as if it were a prior generation

Where Methodology Falls Short

The biggest problem in software development is faulty methodologies for moving from one generation of technology to another. Lacking solutions from the vendor community, some large users go it alone.

BY RALPH EMMETT CARLYLE

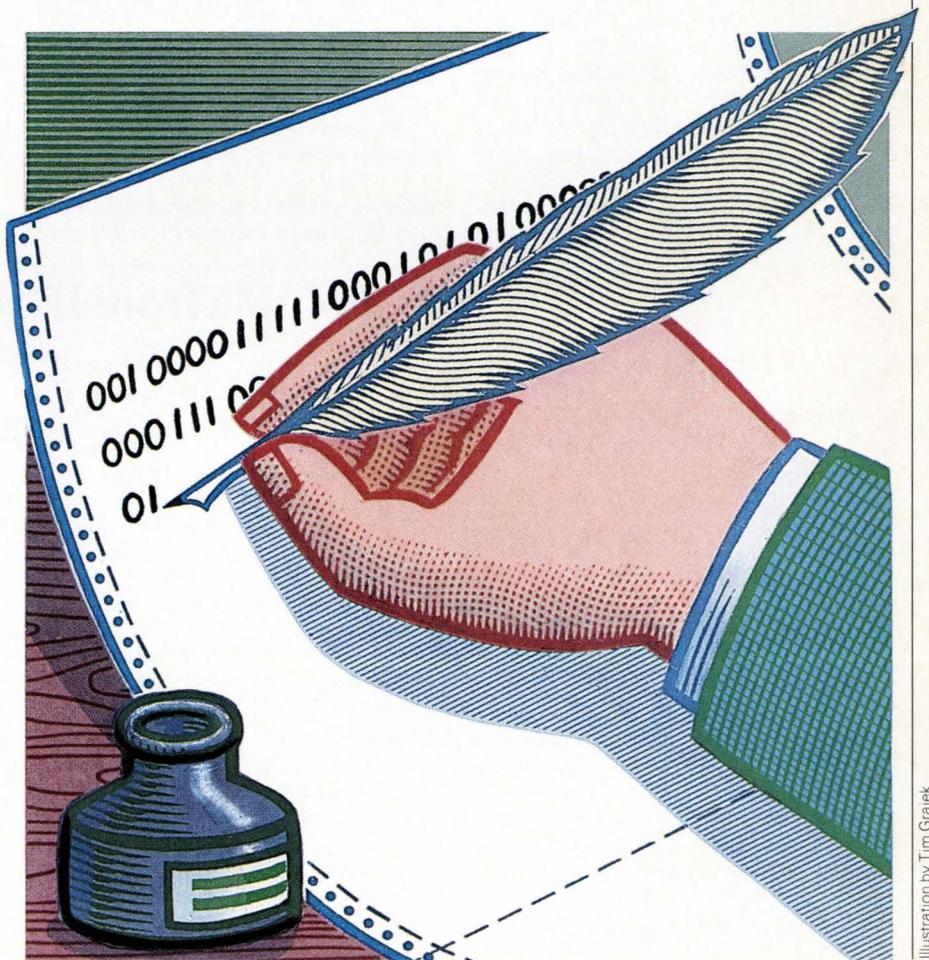


Illustration by Tim Grajek

flat file technology.

Software debacles have been blamed on a potpourri of business and technical factors that vary from company to company, but experts and a growing number of these companies have also managed to isolate one persistent offender common to all cases—the management process.

Putting Data in Order

"It's tempting to blame programmers for all our ills," says Dale Hull, manager of Systems Programming Support for Amoco in Chicago. "But the truth, as we and other shops have discovered, is that we've been slow to put our data houses in order and come up with the kind of methodologies that allow us to manage the applications development process from the top down."

The nation's utilities are a good case in point. Many have discovered that their data isn't, in the industry vernacular, "normalized." In simple language: their data hasn't been defined in such a way that it means the same thing to all their users. One computer could be forced to ask another: "What do you mean by 'invoice'?" Or, "What's an 'employee'?" Having put themselves under the microscope, utilities such as Wisconsin Public Service Corp. in Green Bay discovered that each application created by their programmers had ended up with its own database, to the point that data was stored willy-nilly throughout the system and was difficult to extract for uses other than those originally



WISCONSIN PUBLIC'S JOHNSON: IMS was starting to look like it was held together by Band-Aids.

intended. In the words of manager of information services Randy Johnson, WSPC's IMS database management system had started "to look like it was held together by Band-Aids."

Reporting to state and federal regulators had become an exercise in frustration. Data had to be pulled from several applications—each bit bearing the programmer's individual mark—and then it took several days of manual effort to reconcile the numbers and facts from various sources. "Inconsistencies could easily

lead to rate increases or adjustments to the utilities' operating budget," says Johnson.

One inevitable consequence of programming as an "art form," says WSPC, was a mountainous maintenance burden. Other consequences were the uncontrolled replication of data and brittle data structures that didn't lend themselves to new uses.

WSPC, which is now being emulated by other utilities, claims there is only one way to fight this menace. First, you must track down commonly used clusters of data. These must then be isolated into what are termed "information areas," although some prefer the term "subject" databases. WSPC found seven in all, and implemented each as a shared corporate database. The first of these to utilize IBM's relational model, DB2—a 60-gigabyte

customer accounts database—is scheduled to go live in the spring of 1989. Johnson reveals. Deregulation has ensured that other utilities can't mask programming inconsistencies with rate increases, so many of them are now following WSPC's lead by putting their data houses in order. Some 30 or so utilities have banded together into a task force to pool their know-how. One executive at Baltimore Gas & Electric says that 12 of these have already begun a migration to DB2.

The utilities have learned that the need

An Apologia from IBM

We realize our customers have grown impatient and we apologize," says Donna Van Fleet, director of data systems products at IBM's Santa Teresa, Calif., facility. She stresses that IBM "accepts their requirement" for an integrated CASE solution and methodology, but that it "takes time" to come up with something that will be of benefit to the whole industry.

Van Fleet is referring to IBM's now fabled DB2-based Repository (code named Annandale), the subject of a lengthy wait by its customers since its existence was first publicly revealed by DATAMATION over three years ago (see "Calling All Data," Oct. 15, 1985, p. 40). Like Hartford's Electronic Projects File, but on a much greater scale, the repository allows DB2 customers to store details of the relations between programs and related data across a whole applications life cycle, from start to finish.

Also stored in the Repository is data on all hardware, operating systems, DBMSS, TP monitors, communications software, and the like, that is used by each application in progress. Included with the Repository will be a data dictionary that controls the naming and formatting of all data.

Other large multinationals, which like IBM have been forced into large-scale reorganization of their data and into the creation of their own solutions, shouldn't be hurt by the IBM move. IBM's

Van Fleet says that for these IBM customers the cutting edge of CASE has become the "bleeding edge," in part because IBM had nothing to offer the market. However, she adds, "We'll make sure they don't suffer loss of investment."

IBM's plan seems to be to work with independent software vendors to ensure that their software and tools can interface with the Repository. In addition, the computer giant is using third-party software companies to help flesh out its CASE offering, ADE (Applications Development Environment), and make it more palatable for users.

IBM seems to be preparing for a January announcement of its Repository, and a gradual unrolling of its related products over the next two years. The announcement couldn't come soon enough for Texas Instruments and Arthur Andersen Consulting. Andersen's Mel Bergstein says his company has talked to IBM about the dangers of the two "reinventing the same product" and would prefer to be released from the burden of its own repository. He did not indicate what the results of the talks were.

"Developing our own repository has been a big drain on our funds," adds Michael J. Watters, the TI manager responsible for IEF at the company's Information Systems and Services Division in Dallas.



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for diligence and discipline from programmers doesn't end with the move to shared or subject databases and DB2—it becomes more acute. Programmers occasionally feel too rushed to do a thorough job with the logical data models and begin to backslide into old ways. Serious problems with further development and maintenance invariably follow, and precious time is consumed revising the model and adjusting the database and other programs that are affected.

WPSA and others now believe that to prevent such "polluting" of shared databases, companies must move to much higher levels of automation. They argue that the whole software creation process—from initial planning through design and code generation to maintenance—must be automated. In essence, new programmer workbenches become part of a "policing" mechanism that automatically enforces the rules and procedures surrounding the database each time a programmer works on a new application or maintains an old one.

The consulting arm of the Big Eight's Arthur Andersen is one of the few con-

cerns to have developed such integrated CASE technology and offered it to the marketplace. Says Mel Bergstein, managing partner of technical competency, "If there are gaps in the applications development process that require manual intervention, the consistency of the data can't be guaranteed. It's vital that all the links in the chain are automated."

The Methodology Gap

What Chicago-based Andersen discovered is that the biggest gap or "void" of all is at the top of the process—at precisely the point where management input and planning should be. Amoco's Hull refers to it as "the methodology gap," and he says that this, if anything, is the prime cause of so much software cancellation. "Companies lack a review structure that allows them to monitor the progress of an application and input changing plans and strategies," he says. "Having locked into a project, they discover that the problem has changed, the business world has changed."

A hardy few have attacked the problem head on, coming up with both top-down

methodologies and supporting technologies. Like many pioneers, they've received more than their share of arrows in the back. The Hartford Insurance Group created what it calls the Electronic Projects File, a data repository used to store, deposit, coordinate, retrieve, and review all products that are part of the life cycle of an application. HIG offered its technology to other corporations from late 1985 to early 1987, but the venture floundered.

Du Pont's multibillion textiles division in Wilmington, Del., mounted a massive cleanup of its data with the aid of its own repository, the so-called Data Encyclopedia, or Datapedia. The product was mounted on Digital's VAX, but unfortunately it remained an off-line phenomenon because its creators couldn't link it up with head-office IMS-based software running on IBM mainframes.

More recently, Bell Atlantic has come up with its own DB2-based data dictionary and central repository, and in conjunction with the consulting firm Computer Horizons it has even developed a methodology for migrating flat file data to a relational environment.

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An integrated network management

The two front-runners in the integrated CASE sweepstakes—management consulting giant Arthur Andersen and semiconductor leader Texas Instruments—have also developed repositories, based like IBM's on DB2, but on a much smaller scale. Both companies have helped pioneer the market for "total" solutions—that is, automation of the whole applications cycle, from business planning at one end to maintenance at the other. Both companies are pouring millions of dollars into their software; both integrated suites, IT's IEF and Andersen's Foundation, have cost around \$100 million to develop so far for the newly emerging market.

These pioneers all have one thing in common. They all grew tired of waiting for their principal vendor, IBM, to come up with a methodology, repository, and CASE tools. "Arthur Andersen is handling our migration to DB2," says Baltimore Gas & Electric's manager of information services, Joseph Hunter, "because they have a proven methodology and tools to offer us. IBM hasn't—and we grew impatient."

Such impatience has built up noticeably over the past year. One measure is the fact

that Texas Instruments has grown a \$50 million worldwide market for IEF since March—130 DB2 customers, according to insiders. Andersen Consulting has major beta sites for its product in such sectors as utilities, insurance, and local government. The other measure is IBM itself, and Big Blue's work on its Repository, an all-encompassing database.

Industry observers see the Repository and related tools as the first real commitment by IBM to the fledgling CASE marketplace. "Maybe now companies will start to get serious about CASE and stop dabbling," says CASE Research chairman Vaughan Merlyn. "So far only 7% or 8% of all programmers and analysts across the nation have been exposed to CASE."

Amoco's Hull calls the IBM initiative a start, but warns that software projects will continue to be derailed for a long time to come. "A rigorous methodology is simply too committal for the majority of companies at present," he says, adding that many feel that CASE is too new, too expensive, and too risky. Many of Hull's peers are tinkering with so-called front-end CASE tools for analysis and design and back-end

equivalents for code generation—what the Amoco programming manager refers to as "placebo CASE." These managers are not betting their jobs on such novelties or rocking the boat in any profound way, since they stop well short of fully integrated (and hence "committal") solutions. Amoco, it should be noted, is a rare exception.

SPR's Jones says this attitude is dangerous and warns that it is not shared by corporations in Japan, Europe, and Australia, which he says are getting serious about CASE. In the war for world supremacy in software, Jones, who is partial to military analogues, portrays U.S. multinationals as a cavalry on horseback fighting against armored cars from overseas. "There is a very real danger that the bulk of software creation will move overseas during the next decade," warns Jones, "and that would be a tragedy for this country."

If, as it seems, we're experiencing one of those major shifts in technology that pits the equivalent of a Gatling gun against bow and arrows, Arthur Andersen wants to make sure it's not the one that's holding the quiver.

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DATA CENTER DEPOPULATION

In the quest for productivity and profits, the trend toward unattended operations is growing. But the change doesn't happen overnight, and it requires stringent control and a reallocation of responsibility.

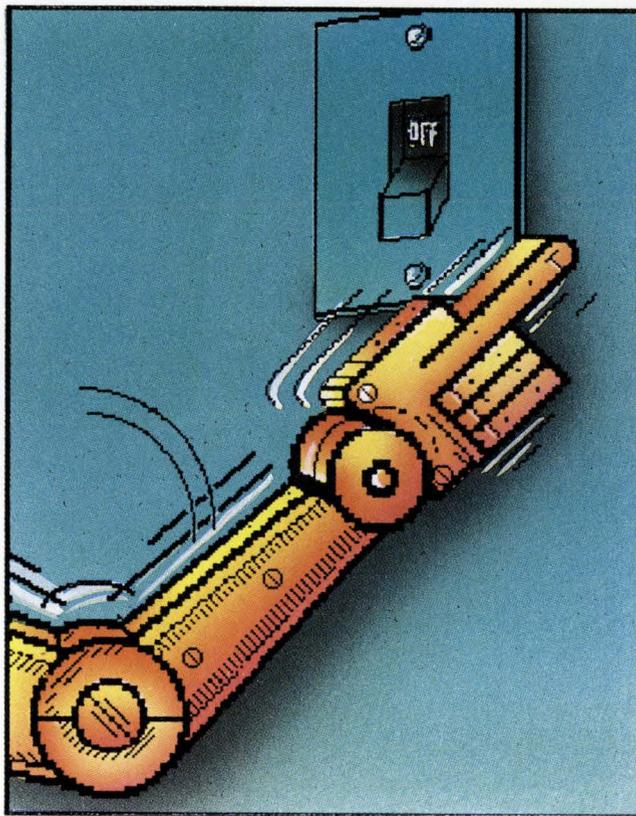
BY ROBERT O. PETERSON

Your fifth test of the payroll tape creation has bombed due to a simple JCL failure—one that could easily have been corrected by a halfway decent operator. Granted, you shouldn't have made the error in the first place, but all the operators do is sit around all night anyway, and you'd think they'd at least be able to fix things like that. In the three months you've been here, you've never actually laid eyes on a real, live operator. But you've been told the computer room is downstairs, and, angrily, you sally forth.

At the data center, a grinning supervisor offers to take you to where you can summon the operators. Finally, you find yourself staring through heavy glass into the computer room. Lights from disk drives, mass storage units, and processors blink softly through a swirling blue mist of humidity, static, and fire retardant gas. The supervisor says, "That's as close as you'll come to an operator, my friend. Go ahead and yell. You'll have to do it from out here though—there's no door."

If this computer room sounds like the engineering deck of the *Starship Enterprise*, think again. The fantasy of a sealed computer room is not that far from the reality that many data centers are moving toward today. The concept of "unattended operations" is coming of age.

The theory behind unattended operations is certainly not new. For years, manufacturing companies have been moving



□ THE CONCEPT OF 'UNATTENDED OPERATIONS' IS COMING OF AGE.

toward the lights-out factory, with its robots happily buzzing away. The application of this concept is not dramatically different for the data center.

The fundamental characteristic of unattended operations is that the computer room itself is closed and devoid of human

inhabitants. The room houses relatively light access devices such as processors, disk drives, power distribution boxes, etc. In most cases, these devices are touched only by service technicians, or in response to unpredictable events such as power failures.

With the room closed, control of the hardware and operational jobs moves outward to a control center, which is the monitoring point for hardware performance, fault situations, resource balancing, and application performance review. All monitors, command consoles, and entry facilities exist in the center, and equipment tends to be specialized specifically for this type of environment.

The consoles and input devices are not the only things removed from the computer room. Tape drives and mass printers are housed in separate areas, generally manned by clerical personnel. As the environment matures, the use of these external devices is reduced.

Instead of printed output, information is routed electronically to the requesting user's station, inquiry displays replace the need for hard copy, and cheap mass storage with off-site backup replaces the conventional use of magnetic tape.

The transition from a conventional data center to unattended operations can be handled in a variety of ways. From installation to installation, the most appropriate, simplest, or most cost-effective first step will vary. Seen as a long-term goal, unattended operations entail a number of

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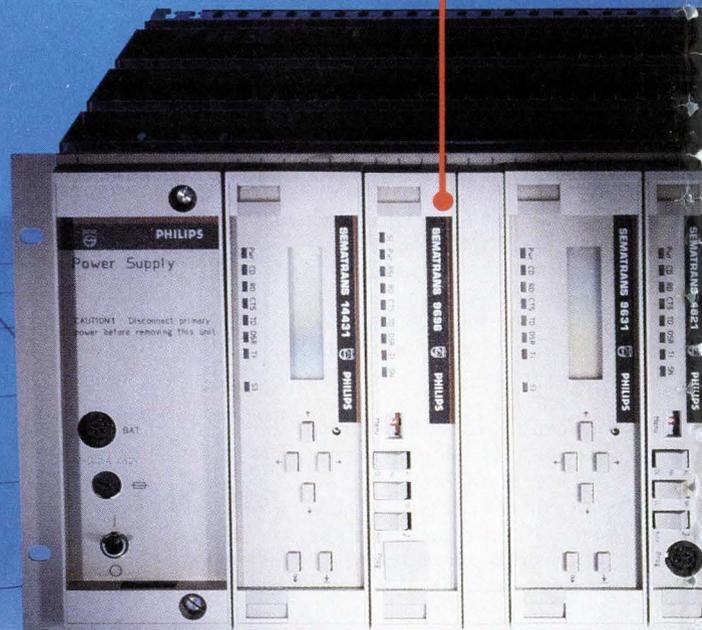
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costly activities, not the least of which is the eventual building or restructuring of the computer center itself. Benefits to justify the expense are only quantifiable endemically, but tend to follow some predictable lines. Regardless of how it is undertaken, however, somewhere along the line a number of issues must be addressed.

The automation of any department or function inevitably requires the implementation of software systems to support previously manual processes. In the case of unattended operations, this software tends to be oriented toward operating systems.

With few operators in attendance, especially during the night batch processing, sophisticated monitoring software is needed to ensure that the system remains in control. Control-type software, such as AF Operator from Candle Corp. (Los Angeles) or AutoMate/MVS from Duquesne Systems (Pittsburgh) permits substantial suppression of console interaction. In a truly unattended environment, there is no operator to respond, so reducing or eliminating console activities is critical. If an in-

teraction is required, a crucial application can be sitting in a wait state—or canceled—overnight. Automated operations facilities, in combination with standard control languages (IBM's CLIST, for example), allow hands-off control of application operation.

No less important is the management of the hardware and software mixing. With application control preplanned through software, the responsibility of console operators shifts to the balancing of the environment. Communications networks can be actively monitored, system software priorities altered and balanced, and bottlenecks massaged away. This activity is also facilitated by software and, often, hardware products.

The change to unattended operations does not lie solely with the operations staff. To assure a reasonably smooth transition and an effective environment, the manner in which users deal with applications becomes critical.

No longer is it reasonable to allow IS to be solely responsible for the running of application systems. Without a cadre of operations personnel available to collect

and arrange input, determine nightly or weekly needs, wait on slow input streams, and distribute output, the responsibility must shift to the end user.

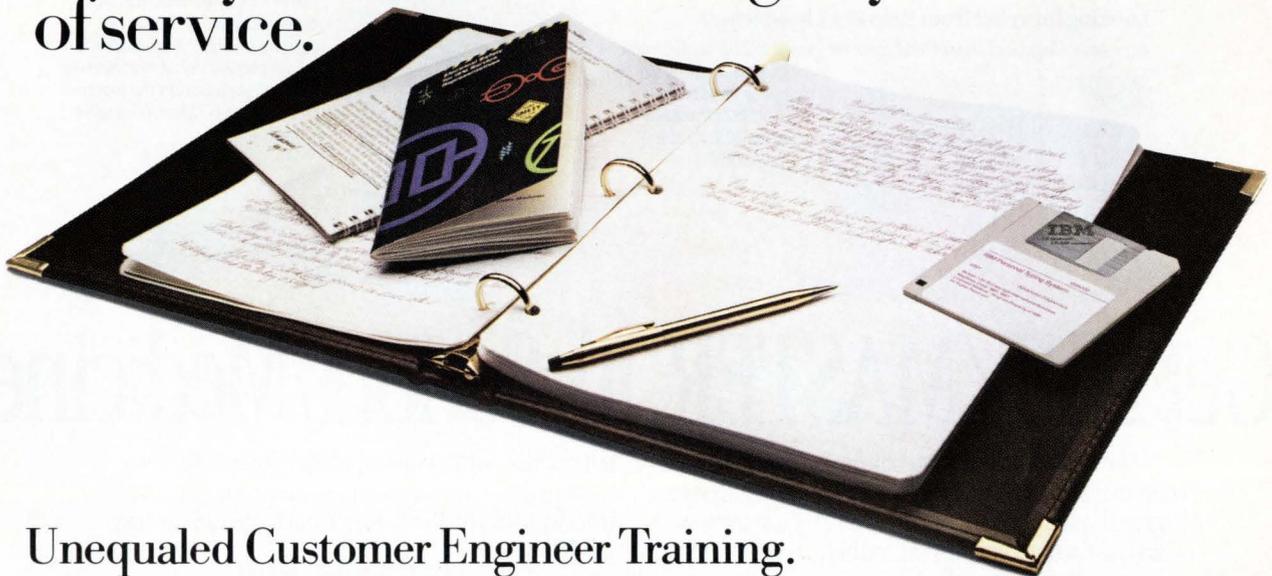
Users must choose what will take place in the day an application runs, determine what additional steps are needed, and queue those jobs for execution. After the jobs are run, it is the user who must verify the results and distribute the output. Although pre-established job sets can eliminate the need for actual JCL preparation, the user must select which runs are to be made.

Involving Operations in Design

Not only must the user deal with operations differently, but the developer must construct systems that both simplify the user's control and obviate the need for operator interaction with the system. The most effective means to assure this is to involve operations in systems design. This implies not only a role for the operators during the transition but in the normal process of developing systems.

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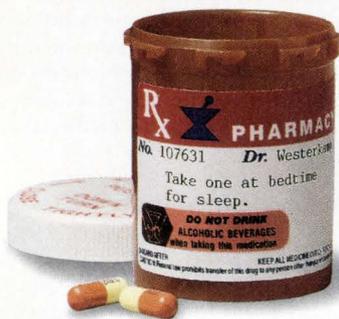


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Benefits Attending Unattended Operations

In unattended operations, certain benefits are obvious and direct. Temperature and humidity conditions no longer need be as sensitive to human needs; they are optimized for the hardware itself. The danger of damage due to contaminants such as dust and lint can be substantially reduced. Security is simplified when ready access is not a significant issue.

But the biggest benefits are in the personnel and performance areas. Bill Carico, president of training firm Acts Corp., Marble Falls, Texas, conducts seminars on automated operations across the country. Says Carico, "The first benefit—and unfortunately this is as far as many people look—is the obvious reduction of staff requirements." But he warns that "the elimination of tape, print, and other manual activities does not necessarily imply the absolute elimination of jobs. It allows the upgrading of data center responsibilities to provide greater payback."

Since the transition to an unattended environment occurs in gradual steps, the reduction in operators takes place over a

relatively extended period of time. The people become absorbed or refocused and, since so much time elapses, it is difficult to determine whether this causes the head count to decline. However, the elimination, or significant reduction, of printing, bursting, decollating, report distribution, magnetic tape activities, and input preparation does reduce head count. As the responsibility for many of those activities shifts into the user area, the burden is spread and an overall reduction takes place. Usually that overall head count reduction is significant.

The most important benefits extend beyond personnel reduction, however. "One of the immediate benefits lies with what is referred to as 'automated console operations,'" says Carico, which "involves having system products, rather than console operators, respond to operating system and application messages." With automated console operations, he says, what were previously human functions are now executed "at machine speeds, increasing machine availability and efficiency."

their systems, there will still remain a core of applications that must be controlled centrally—through the data center. Basic business applications that cross functional lines, systems whose operation is governed by regulatory umbrellas, and applications whose proper processing is so critical that failure implies a business crisis—all must be controlled through a single area where responsibility is absolute. This means there must be an operational control entity, and that entity must be involved in the design of the system.

Are these individuals the same operators put out of work by automation? They may be the same human beings, but their mission and training will be dramatically different. According to Gene Bailey, a Raleigh, N.C.-based consultant specializing in data center design and management, "the computer operator of tomorrow will bear little resemblance to what we've seen in the past. They will, and in some cases now [do], control a multimillion dollar business activity upon which most companies rely for their existence. You don't take someone in off the street and hand them that level of responsibility."

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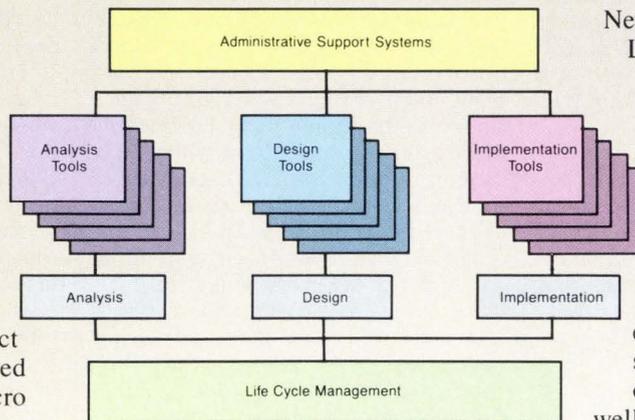
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Working in the command center of an unattended computer installation will be a demanding, pressure-intensive career. As the sophistication of computer systems grows and the reliance of the corporate health on information processing heightens, the computer operator will become far more critical than the typical developer of today. That means changes in the emphases of curricula at universities, career planning changes in most corporations, and some change in direction for hardware and software vendors.

Unattended operations bring change control to its zenith of importance—due to the discrete separation of application responsibility. In the past, operations shared that responsibility with development. The data center simply ran what the developers gave it to run. In an unattended mode, the responsibility is shared between the user and operations, which requires substantially more stringent control to assure a stable environment.

Assurance testing, protection of production libraries, security of key datasets, and the audit point validity of a system must be absolutely assured. This is ac-

complished through rigorous change control, magnifying the importance of that role for operational personnel.

This, of course, means that operations must become the co-owner of the application itself, with a voice in its future development path. This role is significant and affects the entire fabric of the application

□ RESPONSIBILITY IS SHARED BETWEEN USER AND OPERATIONS, IN AN UNATTENDED MODE.

life cycle. In many cases, this type of role is representative of operations' emerging position in the IS mission. The personnel lost to automation become the control specialists, the hardware specialists, the design liaisons, and a myriad of other functions hitherto scattered throughout the IS organization.

In today's vernacular, unattended operations can mean anything from "principally unattended" to "marginally unattended." In most cases, the term usually refers to minimizing human support of

the data center during off-shift hours, which at least serves to limit the cost of operations at night and on weekends.

It is also a reasonable first step in the transition to unattended operations. Off-shift changes tend to limit the level of responses the data center must make to questions from the user community—things that require a human being in attendance. Batch processes tend to be repetitive and predictable so that CLIST and other execution monitoring facilities can easily be brought to bear. Critical performance points can be monitored before the operators are removed to validate how well the applications will run on their own. Once all the bases have been covered, the computer room can be closed at night.

Limit Off-shift Chores

The final objective, however, should be to limit off-shift work as much as possible. Report preparation, backups, and system productivity adjustments may always be done at night, but the critical processing steps should be moved to the day shift whenever possible. This assures adequate support and negates the need for exces-

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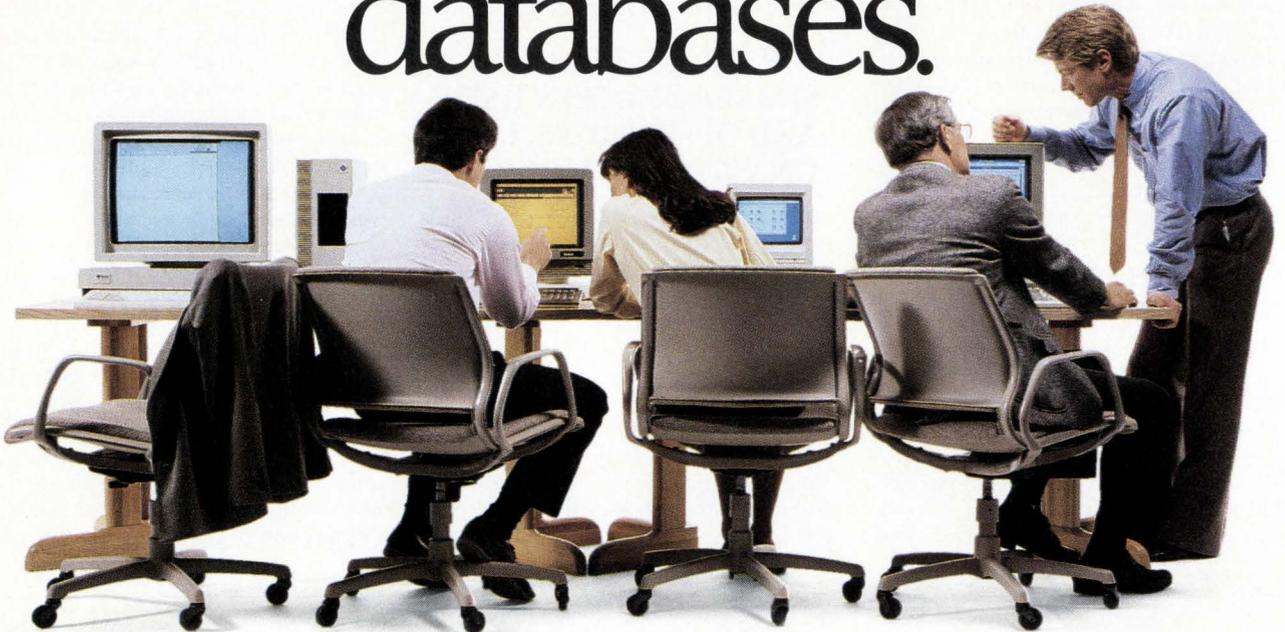
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sive reliance on overnight activities. In today's human process-oriented, interactive environment, limiting heavy nightly runs should not be an overwhelming challenge.

The first of two areas that generally gain the most attention in a transition to unattended operations lies in magnetic tape activities. At least for the foreseeable future, there will remain a need to place crucial data on transportable media for archival storage or cyclic backup. There is also a need to house extremely large, minimally accessed data files on off-line media. These two requirements are being addressed today in slightly different ways.

Backups and archival retention are being addressed by either partially or fully mechanical systems such as the tape cartridge systems offered by Storage Technology Corp., Louisville, Colo. With this type of product, the tape library is managed by the system, and cartridges are moved in and out of protective slots by the hardware. Independently housed cartridges can be stored and presented to the system on an as-needed basis.

Large data files can either be handled

with cartridge systems or through the mass on-line storage units beginning to find a market. With mass storage, not only can the end user find more rapid, dependable access to historical data, but the data center is provided with interim storage media for its backup needs as well. Data can be stored cyclically on mass storage media and transferred to tape only when it is certain that it will be truly archival, with only exceptional access.

The migration of printing to the end user yields benefits well beyond the obvious. The first is simply that raw print activity will be reduced when the user must physically do the printing. The effort and time required, not to mention the borne cost of ribbons, toner, and other print supplies, will cause users to reexamine the need for many of the reports they receive. No longer will the analysis report that nearly always goes straight to the trash be deemed so essential.

The second benefit involves the use of automated print facility products such as IBM's Report Distribution Management System, which allows review of spooled print files rather than hard copy. With

RDMS, and other equally viable products, printed reports can be routed, secured, and printed when needed. The obvious benefit lies in the absolute savings in printing and associated costs, but the most significant is the quality of review that pseudo-printed documents receive. The ability to perform string searches for data or to easily highlight exceptional conditions means that little will be missed in a given report. Therefore, not only is the print quantity decreased, its quality is increased.

The concept of unattended operations is not new, nor is it dramatically revolutionary. It does require a fresh and open look at the data center function and what that means to the future of any corporation. The vehicles now exist to make the transition from concept to reality. With information and its use occupying a salient position in strategic plans, the speed of transition to an unattended mode of computer operations is likely to rapidly gain momentum.

Robert Peterson is a consultant based in Cary, N.C.

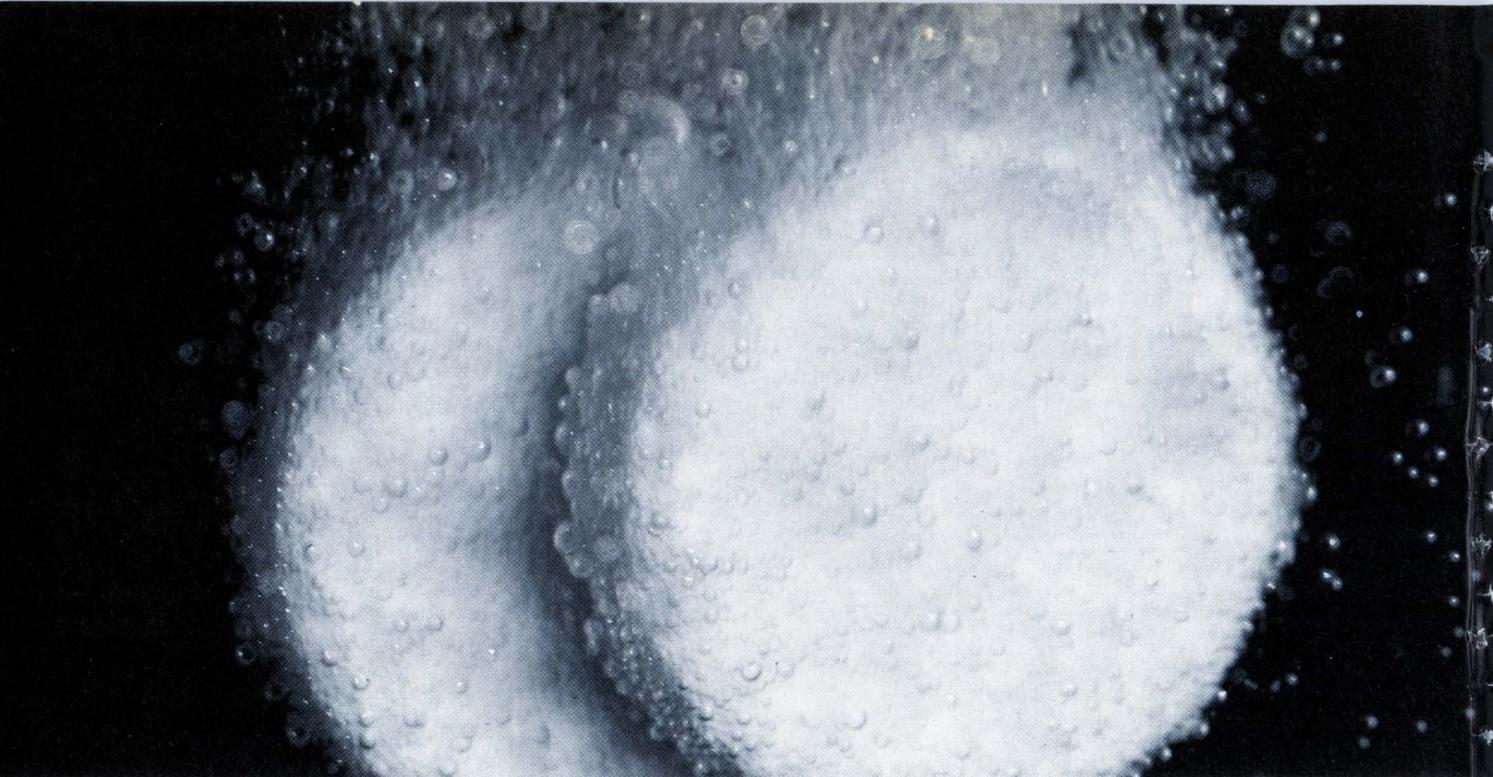
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With High Speed, New Applications

Research has pushed the throughput of high-speed, voiceband modems to a swift 28Kbps, without compression, making applications that were mere dreams a few years ago into realities.

BY MARVIN BRYAN

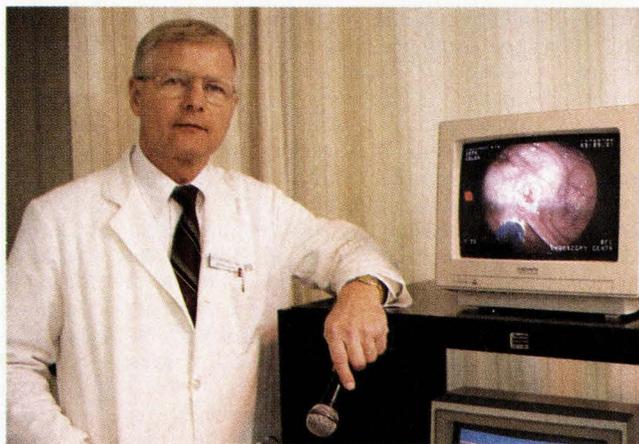
A fashion designer in Los Angeles has a conference with the president of her manufacturing facility. The two compare proposed drawings for a garment, make changes on the spot to each other's artwork, and finally agree on the exact characteristics of the product.

The exciting aspect of this seemingly mundane conference is that, although the designer was in Los Angeles, the president of the manufacturing plant participated in the meeting from Hong Kong. The "get-together" was made possible by high-speed modem technology.

Other applications in use today that would not be practical without high-speed data transmission capabilities include the transfer of medical images for diagnosis, the exchange of CADAM drawings between work groups designing aircraft of the future, and a sophisticated system used by a major bank to handle residential real estate loans.

Not long ago, a speed of 9.6Kbps was considered state of the art for voiceband modems. Now, 14.4Kbps and 19.2Kbps models are installed in many organizations, and various compression techniques can be used to boost the effective throughput by two or three times those rated speeds.

Although a number of companies are marketing 19.2Kbps modems, most achieve that speed using data compression



THOMPSON'S OVERHOLT: Sends medical images for diagnoses.

techniques. An exception to that practice is Telebit Corp., Mountain View, Calif., which manufactures dial-up modems that achieve 19.2Kbps throughput without compression. In fact, since its modems in this category adapt automatically to available bandwidth, on good lines they can often deliver transfer rates of up to 22.5Kbps.

Telebit modems can be bundled with HyperACCESS communications software from Hilgraeve Inc., Monroe, Mich., which includes a proprietary data compression algorithm. Coupled with Telebit's throughput of 19.2Kbps or better (without compression), the result is effective, error-free transmission rates as high as 49.7Kbps.

The 19.2Kbps modems from other manufacturers can all accept data at that rate from a host computer. Some, how-

ever, store the input in a buffer, so that the data can be spooled out at a lower speed that the modems can handle. When the buffer fills up, the host is signaled to suspend transmission momentarily until the buffer is cleared.

The remaining 19.2Kbps modems employ compression to attain 19.2Kbps throughput. This means that additional data compression hardware or software will not be of much help in boosting transmission rates above that level. Nevertheless, this transfer speed has already made possible operations only fantasized about a couple of years ago.

Of course, leased-line modems can operate at much higher rates than their voiceband counterparts, using wide-band lines that have greater information capacity. T1, at a throughput of 1.544Mbps, is considered a modest speed achievement in the wide-band category.

Greater speeds for voiceband modems are in the works, however. The Consultative Committee for International Telegraphy and Telephony (CCITT) met in April at their Geneva headquarters for the purpose of developing a new high-speed asymmetrical modem standard, known as V.34 (see "The Modem Standards Race"). At the meeting, Telebit demonstrated a modem that transferred non-compressed data without error over an Electronics Industries Association representative voice line at a rate of 28Kbps.

This means that, with compression, dial-up rates of 60Kbps to 70Kbps soon might be realized.

The high-speed transmission technology used by the Los Angeles fashion designer dealing with Hong Kong was provided by Xenaf Communications Corp., Cincinnati. Xenaf has developed the Send It software system, which includes proprietary image transmission software and a bundled 19.2Kbps Telebit modem. This technology is being used to transfer images between distant locations by other professional groups, such as advertising agencies, architects, and photographers.

The system sells for \$1,795, including the modem. According to Greg Peck, Xenaf president, "The throughput can be increased with a board we offer at a cost of \$1,500. This adds data compression, but at the present time does cause some degradation of the image."

In Knoxville, Tenn., Dr. Gene Overholt, MD, uses a digital imaging system developed by Digital AV Inc. of Knoxville for the display and transfer of medical images for diagnostic and consultative purposes. Overholt invented the flexible fiber-optic sigmoidoscope and colonoscope, both of which are used for the internal examination of the human colon, a major component of the digestive tract. He is director of the Laser/Hyperthermia Div. of the Thompson Cancer Survival Center in Knoxville, where real-time images captured from within the body are routinely transmitted by modem for processing and analysis.

"It's exciting technology," Overholt says. "I can look at an image on a screen in my office and share it with colleagues anywhere in the country. And when a third-party peer review is requested, it's not necessary for the patient to go through the entire diagnostic procedure a second time."

Since a single image can create a file as large as 200MB, the speed of transmission is critical to the success of the practice. Telebit's 19.2Kbps modems are used, along with a proprietary compression routine that, in the words of Digital AV president Tom Sudman, "transmits the image in minutes instead of hours."

"The process is completely nondegrading," he asserts. "We can't be [just] almost accurate. If we lost only one level of gray in transmission, we could eliminate the information that would differentiate diseased tissue from healthy tissue." He adds, "We can transmit images in 16 million different colors, with a resolution of 8,000 by 8,000 pixels and, since the im-

The Modem Standards Race

It is expected that it will be November of next year before CCITT adopts its new dial-up modem standard, referred to as V.34. Among the issues being debated by manufacturers on that standard is whether single- or multi-carrier technology should be used.

James McGill, vice president of product development at Telebit Corp., Mountain View, Calif., tells DATAMATION, "Multi-carrier technology is the only way to get above 14.4Kbps." On the other hand, according to Dale Walsh, vice president of engineering at U.S. Robotics, Skokie, Ill., "We believe single-carrier [technology] can come closer to the theoretical speed."

In any event, the process should run smoother than was the case for V.32, the CCITT standard that 9.6Kbps dial-up modems support. V.32 was approved on paper in 1984, since no modems had been built to that standard before it was adopted. Compliance with all of the V.32 specifications proved difficult, expensive, and time-consuming. Some modem makers chose simply to offer models that would operate at 9.6Kbps, but did not support all of the V.32 features.

Several manufacturers already are using or testing advanced features on modems in the real world, which they hope will be incorporated into V.34.

In the attempt to push throughput higher, engineers continually wrestle with the problem of error correction. Error-correction protocols verify that a transmission has been received correctly by querying the source. This usually slows the effective transmission rate.

Error-correction protocols have been dealt with by CCITT in a separate "Recommendation V.42," adopted by its Plenary Modem Study Group XVII in April of this year.

Ken Miller, chairman and chief technology officer of Concord Data Systems, Marlborough, Mass., participated in the V.42 standard-formulation process and says that "the error-correction procedure supported in the body of the text is LAP-M, and future enhancements to the standard will be built upon this protocol." LAP-M stands for Link Access Procedure—Modems, and is based on an earlier protocol known as HDLC that was intended to provide "error-free transmission."

To maintain downward compatibility with existing modem standards, the first four classes of Microcom Networking Protocol (MNP) have been included in a section of the recommendation called Annex. MNP has been developed over a number of years by Microcom Inc., Nor-

wood, Mass. Microcom has introduced a total of nine MNP levels; the higher levels deal with data compression as well, but CCITT support will be frozen at Class 4 indefinitely.

Until recently, the so-called Shannon limit was accepted by most modem manufacturers. It provides a theoretical maximum speed at which it is possible to transmit data. Invoking this theory, some engineers say that voiceband throughput greater than 25Kbps "is not possible." Telebit's demonstration in Geneva has already proven that this belief is incorrect.

Obviously, however, there is a limit. In order to push the effective throughput higher, developers must rely on fine-tuning hardware- and software-based data compression techniques. Regardless of the compression algorithm used, actual increased throughput will depend upon the compressibility of the file being transmitted.

The most common data compression technique is Huffman encoding, based on a theory more than 20 years old. This technique consists of decreasing the length of the most commonly sent characters, therefore decreasing the average word length being transmitted. Huffman uses fixed translation tables, however, which do not adapt to the differing structures of files; the result can be little or no compression if the file differs greatly from the model tables.

Some vendors have added run-length encoding to the Huffman algorithm; this technique provides further compression of data with multiple repeated characters. Nevertheless, Huffman encoding is based on the assumption that each character is statistically independent—not true in the real world, where, for instance, u often follows q.

MNP Class 5 was based on Huffman principles. More recent developments, such as the HyperACCESS communications software from Hilgraeve Inc., Monroe, Mich., have improved on this technology. Another example is CommPressor, a multicharacter, adaptive data compression technique created by Adaptive Computer Technologies and supported by three major modem vendors: Concord Data Systems, Racal-Vadic, and Universal Data Systems. These companies are pressing for its inclusion in V.42 as a compression standard for LAP-M. According to its proponents, CommPressor can deliver a 3:1 compression ratio in some situations where only 2:1 could be realized using modems that employed Huffman techniques.

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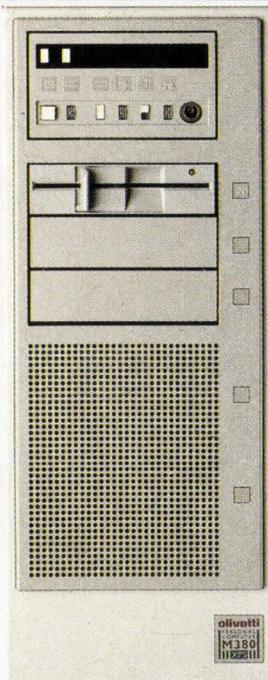
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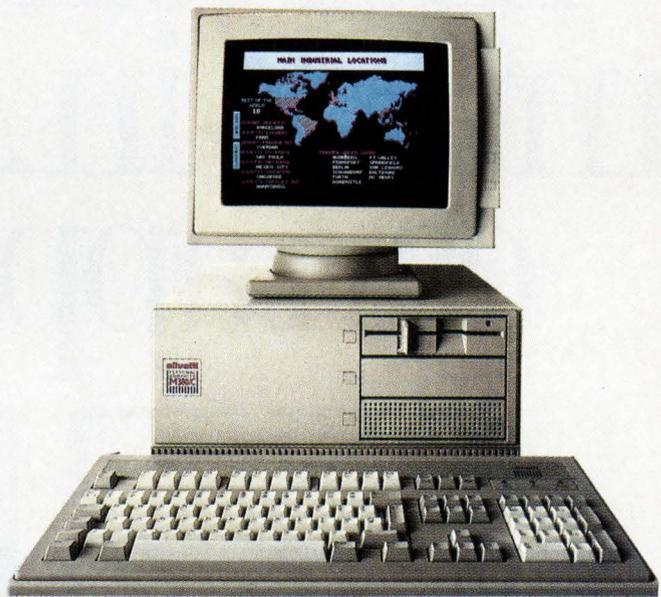
M380/XP1

model to maximise expansion capacity, it has 4 MB of RAM expandable up to 64 MB. It can house five integrated magnetic peripherals, has ten expansion slots and an HDU capacity up to 600 MB.

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M380/C

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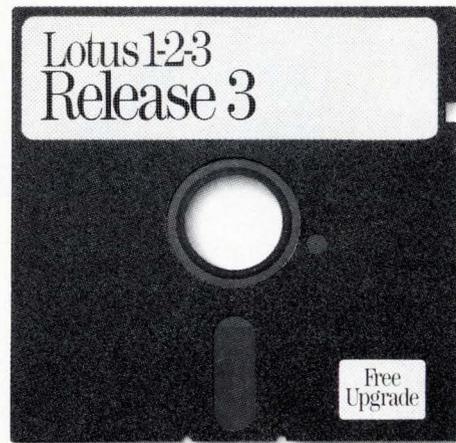
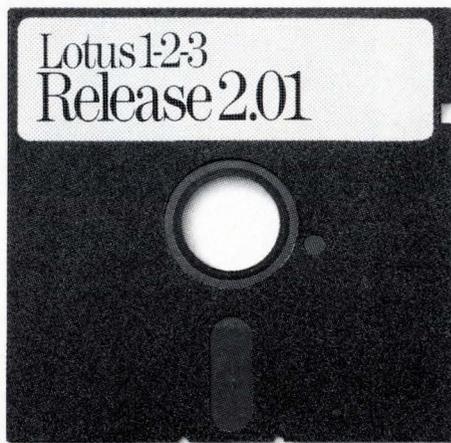
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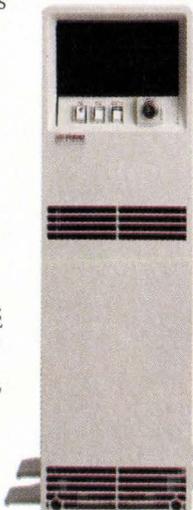
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COMMUNICATIONS

MODEMS

ages are digital, reproduce them without generation decay."

At Boeing Co. in Seattle, the modems in use include both dial-up and leased-line varieties, from, among others, Fairchild Data Corp., Scottsdale, Ariz.; Chipcom Corp., Waltham, Mass.; and Concord Data Systems, Marlborough, Mass. Boeing has thousands of CADAM workstations engaged in the design of the next generation of aircraft. A typical drawing is passed along electronically through several phases: the original design process, revisions, manufacturing records, pro-

duction, changes and enhancements, and final testing.

Ron Holtmyer, Boeing network design engineer, explains, "The screen-refresh rate must be fast. We're running applications now on a broadband network at speeds from T1 [1.544Mbps] up as high as 10Mbps. And we're working very closely with manufacturers to achieve a rate of 100Mbps in the near future."

How did they handle the exchange of design information before they acquired this technology? "We had to hand-carry the drawings from station to station,"

Holtmyer says. One wonders how the Boeing 707 ever became a reality.

In installations where dial-up modems are used only occasionally, state-of-the-art transmission speeds prove too costly. For a complex terminal system that processes residential real estate loans, for example, Security Pacific Bank chose 14.4Kbps modems over 19.2Kbps dial-up modems precisely for that reason. The system, headquartered in Brea, Calif., serves dozens of locations both within and without the state and incorporates both leased-line modems from Emulex Corp.,

The Speedy Contenders

Some major vendors of modems with throughput of 14.4Kbps and above

Anderson Jacobson Inc.
521 Charcot Ave.
San Jose, CA 95131
(408) 435-8520
Circle 180

ARK Electronic Products Inc.
1500 W. NASA Blvd.
Melbourne, FL 32901
(305) 724-5260
Circle 181

AT&T Information Systems
100 Southgate Pkwy.
Morristown, NJ 07960
(201) 898-8000
Circle 182

Avanti Communications Corp.
Aquidneck Industrial Park
Newport, RI 02840
(401) 849-4660
Circle 183

BCH Equipment Corp.
6950 Bryan Dairy Rd.
Largo, FL 34647
(813) 541-6404
Circle 184

Case Communications Inc.
7200 Riverwood Dr.
Columbia, MD 21046
(301) 290-7613
Circle 185

Codex Corp.
7 Blue Hill River Rd.
Canton, MA 02021
(617) 364-2000
Circle 186

Concord Data Systems Inc.
45 Bartlett St.
Marlborough, MA 01752
(617) 460-0808
Circle 187

CTS Fabri-Tek Inc.
Datacomm Products Div.

6900 Shady Oak Rd.
Eden Prairie, MN 55344
(612) 941-9100
Circle 188

Datagram
11 Main St.
East Greenwich, RI 02818
(401) 885-4840
Circle 189

DCB Inc.
807 Pioneer
Champaign, IL 61820
(217) 352-3207
Circle 190

Emulex Corp.
3545 Harbor Blvd.
Costa Mesa, CA 92626
(714) 662-5600
Circle 191

Fairchild Data Corp.
350 N. Hayden Rd.
Scottsdale, AZ 85257-4692
(602) 949-1155
Circle 192

Fastcomm Communications Corp.
12347 E. Sunrise Valley Dr.
Reston, VA 22091
(703) 620-3900
Circle 193

Fujitsu America Inc.
3055 Orchard Dr.
San Jose, CA 95134-2017
(408) 432-1300
Circle 194

Gandalf Data Inc.
1020 S. Noel Ave.
Wheeling, IL 60090
(312) 541-6060
Circle 195

General Datacomm Industries Inc.
Route 63
Middlebury, CT 06762-1299

(203) 574-1118
Circle 196

Hayes Microcomputer Products Inc.
P.O. Box 105203
Atlanta, GA 30348
(404) 449-8791
Circle 197

Incomm Data Systems Inc.
652 S. Wheeling Rd.
Wheeling, IL 60090
(312) 459-8881
Circle 198

Infinet Inc.
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North Andover, MA 01845
(617) 681-0600
Circle 199

Infotron Systems Corp.
9 N. Olney Ave.
Cherry Hill Industrial Center
Cherry Hill, NJ 08003-1866
(609) 424-9400
Circle 256

Microcom Inc.
1400A Providence Hwy.
Norwood, MA 02062
(617) 762-9310
Circle 257

NEC America Inc.
8 Old Sod Farm Rd.
Melville, NY 11747
(516) 753-7000
Circle 258

Paradyne Corp.
8550 Ulmertown Rd.
Largo, FL 34294-2826
(813) 530-2000
Circle 259

Penril Datacomm
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Gaithersburg, MD 20877-2197
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Racal-Milgo
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Fort Lauderdale, FL 33340-7044
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Telebit Corp.
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Mountain View, CA 94043-1329
(800) TELEBIT
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Telenetics Corp.
5109 E. La Palma Ave.
Anaheim, CA 92807
(800) TC-MODEM
Circle 266

Universal Data Systems
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Huntsville, AL 35805
(205) 721-8000
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Skokie, IL 60076
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XEROX

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Low data center productivity. It still persists despite billions spent on data processing technology. Could the problem be smart computers lashed to not-so-smart printers?

The solution is intelligent printing systems from Xerox, leader in document processing. Unlike other printers, they have the power, the capability and the intelligence to produce complex documents from computer data without tying up your host computer in the printing process.

Xerox Intelligent Printing Systems merge text with graphics, and forms with data, to give your documents publishing house quality. Documents can be printed on multiple paper weights, colors and sizes. And Xerox Intelligent Printing Systems' recent announcement of 50 ppm 600 x 600 spi resolution means a new benchmark in electronic printing. Selected applications can now feature half tones and the smallest of type sizes as a part of day-by-day data center operation.

While your document quality can be far higher, your costs can actually be far lower. Because Xerox Intelligent Printing Systems can think and work on their own, expensive CPU resources aren't tied up in the printing process. Your organization's forms, logos and signatures are stored on the printer, eliminating preprinted stocks. Outside printing costs can be drastically reduced because Xerox Intelligent Printing Systems' document quality allows you to bring complex jobs in house.



XEROX

as smart as your information system.

Xerox Intelligent Printing Systems, like your computer, can be programmed to deliver with leading-edge efficiency. They load while running for continuous operation. Using another Xerox exclusive, magnetic ink character recognition (MICR), negotiable document production can be cut from seven steps to one.

Xerox Intelligent Printing Systems include the premium quality, high-volume 9790 and 8790 systems; solid, productive mid-volume systems

like the 4050, the 4075 and the 3700 for data centers and distributed locations; and the versatile low-volume 4045 for office and terminal-network environments. There's also the newly introduced 92 ppm 4090 for the ultimate in mid-volume productivity and the 4650 with 600 x 600 spi resolution. Team Xerox professionals have already converted thousands of data centers to electronic printing—Xerox Intelligent Printing Systems are compatible with virtually every mainframe—and as a result have specific applications

developed, proven and ready to put in place for you today. By installing a printer as smart as your computer, you'll not only increase printing quality, but gain a quantifiable competitive edge through superior applications documents.

Xerox Intelligent Printing Systems are a vital part of Xerox leadership in document processing. Whether creating, copying, distributing or filing, we turn ideas and information into electronic and print documents that are superior in look *and* content.



Smart printers, smarter applications.

It's one thing to improve printing quality, another to dramatically improve your printing applications. This is what intelligence in printing is all about.

Take insurance, for example. Xerox Intelligent Printing Systems allow forms and page formatting instructions to be stored at the printer. As a result, policies can be printed without the need for preprinted forms and without costly hand assembly. With Xerox MICR printing techniques, payment checks can be printed on the claim settlement document itself at the same time! Xerox

Supplies Division supplies safety papers, perforated and die-cut stocks, labels and transparencies in addition to cut sheet paper that sets industry standards for paper quality. This level of applications productivity improvements also applies to banking, manufacturing, retailing and finance. As of today, 85% of the *Fortune 500* companies are using Xerox Intelligent Printing Systems to give their applications documents a competitive edge.

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To have a Xerox electronic printing systems specialist show you how intelligent printing can lead to smarter applications, call us at 1-800-TEAM-XXR (1-800-832-6979), ext. 117E or send the coupon below. Xerox Corporation, P.O. Box 24, Rochester, NY 14692

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■ MORE EFFECTIVE

By duplicating the motion of cross country skiing, the world's best exercise, NordicTrack provides the ideal aerobic workout. Your total body is exercised simultaneously.

■ MORE COMPLETE

Unlike bikes and other sitdown exercisers, NordicTrack exercises major muscles in the buttocks and legs more uniformly, as well as exercising the arms, shoulders, and back. You get a total body workout.

■ MORE CALORIES BURNED

In tests at a major university, NordicTrack burned more calories and provided a greater aerobic workout than an exercise bike and a rowing machine.*

■ MORE UNIFORM

Unlike a rowing machine, you can independently adjust NordicTrack's resistance for upper and lower body muscles for a more thorough, balanced workout. Major muscles are neither overstressed nor underworked. Plus NordicTrack's patented flywheel system provides a smooth, rhythmic motion that makes exercising more pleasant.

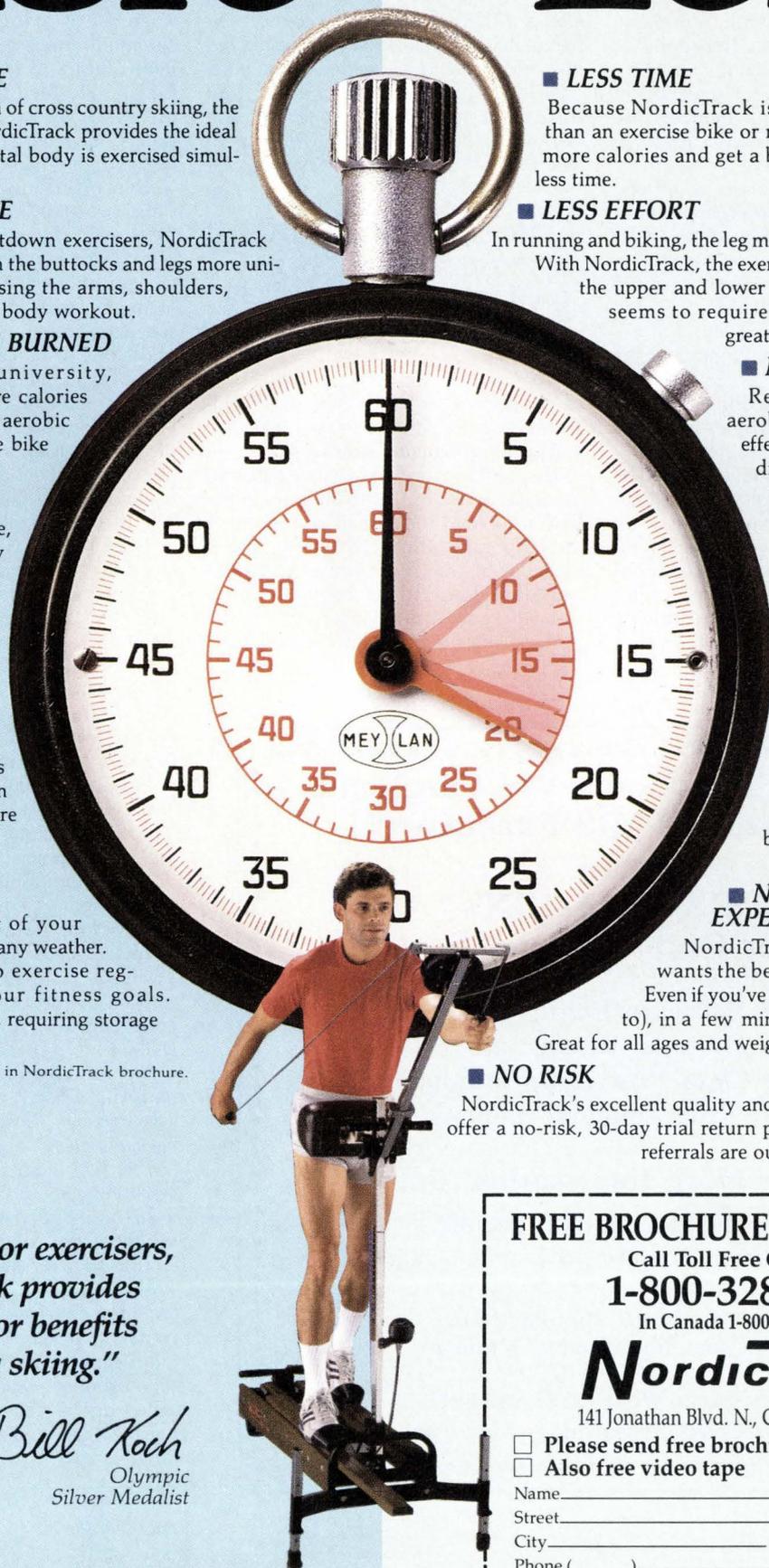
■ MORE CONVENIENT

Exercise in the comfort of your home, any time of day, in any weather. You'll be more likely to exercise regularly and achieve your fitness goals. NordicTrack folds easily, requiring storage space of only 17" x 23".

*Scientific test results included in NordicTrack brochure.

"Of all the indoor exercisers, only NordicTrack provides the same superior benefits as cross country skiing."

Bill Koch
Olympic
Silver Medalist



■ LESS TIME

Because NordicTrack is so much more efficient than an exercise bike or rowing machine, you burn more calories and get a better aerobic workout in less time.

■ LESS EFFORT

In running and biking, the leg muscles do most of the work. With NordicTrack, the exercise workload is shared by the upper and lower body muscles, so exercise seems to require less effort and provides greater cardiovascular benefits.

■ NO DIETING

Recent studies show that aerobic exercise is much more effective for losing weight than dieting. And no other exercise machine burns more calories than NordicTrack... So you can lose weight faster without dieting.

■ NO IMPACT

Running and some aerobic workouts can cause painful and harmful jarring to the body, resulting in knee, shin, back and other injuries. NordicTrack gives you a vigorous aerobic workout that is completely jarless.

■ NO SKIING EXPERIENCE REQUIRED

NordicTrack is for everyone who wants the benefits of regular exercise. Even if you've never skied (and never plan to), in a few minutes you'll be "tracking." Great for all ages and weights.

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NordicTrack's excellent quality and performance allows us to offer a no-risk, 30-day trial return privilege. In fact, customer referrals are our largest source of orders.

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Costa Mesa, Calif., and voiceband modems from BT Datacom, Herndon, Va. Offices are moved frequently, as geographical areas increase or decrease in loan activity. The dial-up modems are used in new offices only until leased-line facilities can be established.

Henry Jones, data processing officer, says of his setup, "We've bought products rated at 14.4Kbps from both modem vendors. The 19.2Kbps units on the market we investigated cost as much as three times more. We simply couldn't see that extra speed as cost-efficient."

He uses compression equipment by Simplex of Portsmouth, N.H., to boost throughput on his leased-line installations and says that this "triples the effective bandwidth."

Working for Atlas Powder Co. could be termed "a blast." This Dallas-based company manufactures explosives used in rocket fuels, mining and quarrying operations, building demolition, and road construction. Joe Kopecky, data center manager, describes its modem installation: "We use AT&T analog lines and

Codex 19.2Kbps modems to connect our manufacturing plants in Pennsylvania and Missouri with our headquarters here. Each plant has about 30 devices, 10 of them printers. They're connecting to a Digital [Equipment Corp.] 8700 and an IBM 4341. We also have some VAX ma-

□ SUCCESSFUL HIGH-SPEED TRANSMISSION CAN DEPEND ON THE CHARACTER OF THE LINE.

chines using a DECnet. We use these communications facilities to transfer financial, marketing, and manufacturing data.

"In addition, we have Codex dial-up modems in use by 16 distributors in the field who send their financial reports to the corporate office. Fast throughput is essential because, without it, a network can slow down to unacceptable levels when there are a number of users."

Mark Ames is based in New York City,

where he is assistant vice president of communications and R&D for Equicor, a joint venture of the Equitable Insurance Co. and Hospital Corporation of America, which processes group insurance claims. A total of 17 claims offices using IBM 3270 terminals exchange information with an IBM mainframe in eastern Pennsylvania via 19.2Kbps modems from AT&T. "We were using 9.6Kbps models until recently," Ames said, "and we needed twice as many phone lines."

An important factor in successful high-speed transmission of data is the character of the line involved. Joe Cortese is manager of data communications equipment product marketing at AT&T. He cautions, "The point of conditioning is not to buy the highest level available, but rather to buy the type that best matches the modem manufacturer's published specifications. The three types of conditioning we provide are known as C-Type, D-Type, and Overseas Service, which is available only at overseas locations."

Cortese explains their characteristics: "Both C-Type and Overseas Service control attenuation distortion and envelope delay distortion. D-Type conditioning controls the signal to C-notched noise ratio and intermodulation distortion, and, for the level known as D-6, it also controls phase jitter, attenuation distortion, and envelope delay distortion. C-Type and D-Type conditioning can be combined on the same channel.

"D-6 conditioning will improve customers' ability to use AT&T's Voice Grade Private Line Service to transmit data at high speeds; in other words, up to 19.2Kbps. It provides technical transmission characteristics that are more stringent than those provided by the lowest D-Type level, D-1."

D-6 conditioning is available only on nonswitched, two-point services because switched and bridged multipoint services have increased noise levels.

AT&T and other carriers constantly are researching methods to improve the quality of the lines that they provide, especially in light of the demand for higher and higher throughput. Among the areas being worked on at AT&T, according to Cortese, are "new equalization techniques, timing recovery, quicker startup speeds, and the loop access between the central office and the customer. There's the possibility of achieving 1.5Mbps throughput by adapting analog modem techniques to the local loop."

Marvin Bryan is a freelance writer based in Palm Springs, Calif.

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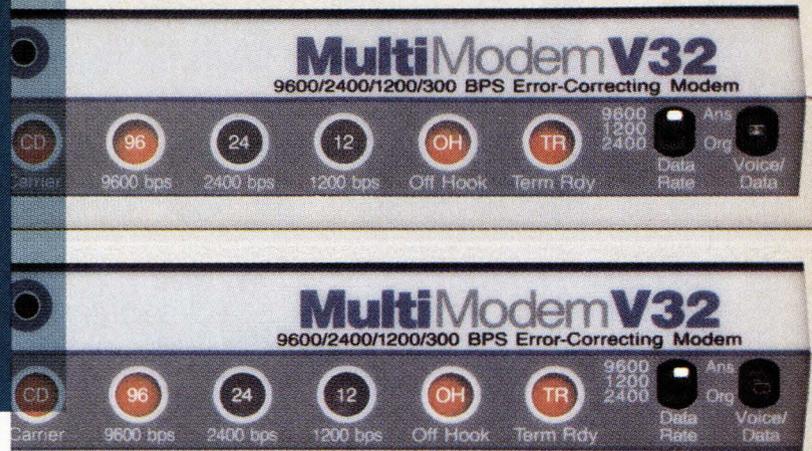
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The **MultiModem V32** incorporates MNP Class 3 & 4 Error Correction and Class 5 Data Compression with Speed Conversion. This gives you error-free communications, with throughputs well in excess of 9600 bps. Add to that a full "AT" command set, auto-dial/auto-answer, and a memory for phone numbers and option setting, and you get a modem with true upward and downward compatibility, that can satisfy most any application*, at a most affordable price.

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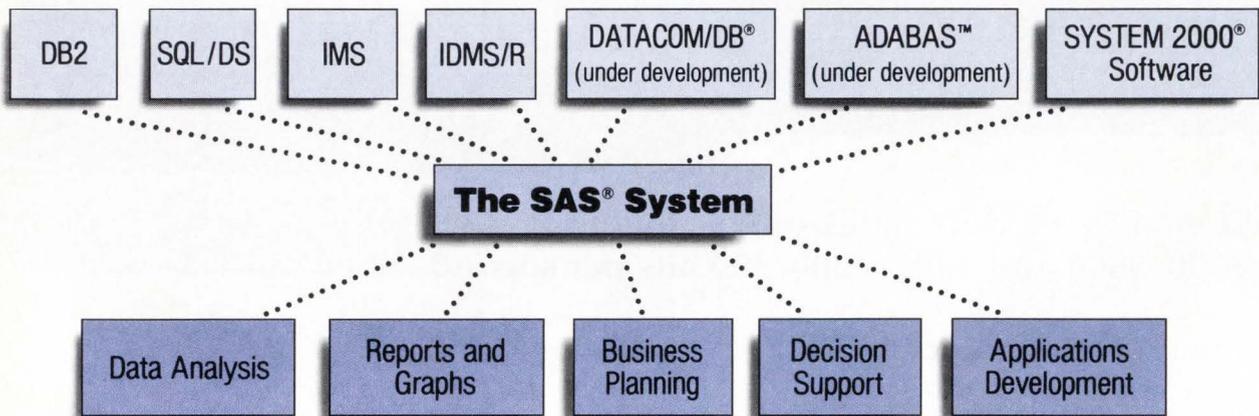
All things considered, the **MultiModem V32** is clearly the Right Answer.

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```

COMMAND====>
DB2 INTERFACE          TABLE NAME  DB2.PERSONNEL
DATA EXTRACTION PANEL SAS DATA SET  PERS.SUBSET

FUNC  COLUMN NAME      SAS NAME      FORMAT
-----
1 *** TABLE PERSONNEL
2 LASTNAME              ..... $10.
3 FIRSTNAME             ..... $10.
4 ADDRESS                ..... $20.
5 CITY                   ..... $20.
6 STATE                  ..... $2.
7 ZIP                     ..... $10.
8 PHONE                  ..... $15.
9 SEX                     ..... $1.
10 HIREDATE              ..... $10.
11 DEPTCODE              ..... $2.
12 SUPERVISOR            ..... $10.
13 DIVISION              ..... $10.
14 TITLE                 ..... $15.

----- WHERE CLAUSE -----
city = baltimore_
    
```



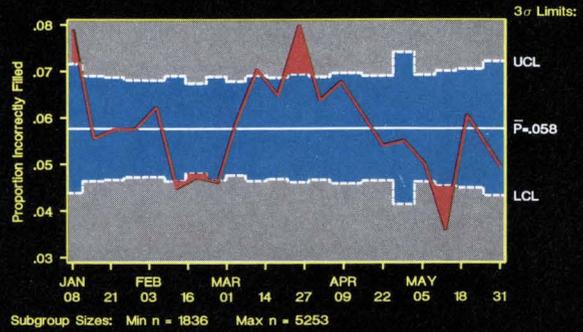
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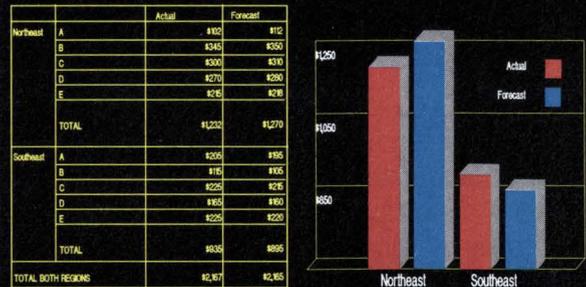
Morgan Cosmetics Inc. P Chart for Perfume Bottle Capacity



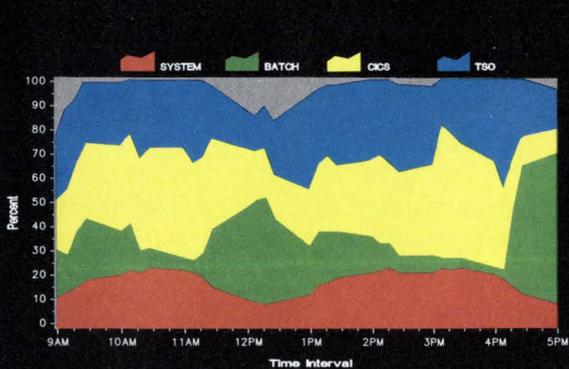
EMS Software International Countries with Products Installed As of January 1, 1987



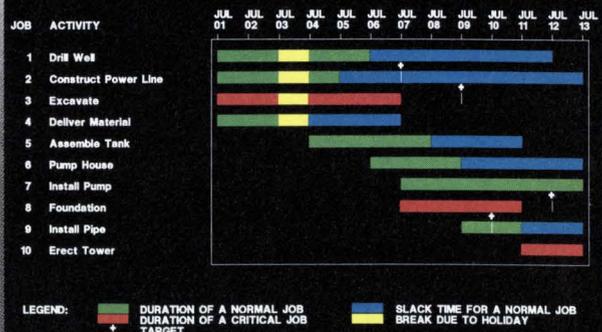
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“If that came out of our mainframe, I’ll eat it.”

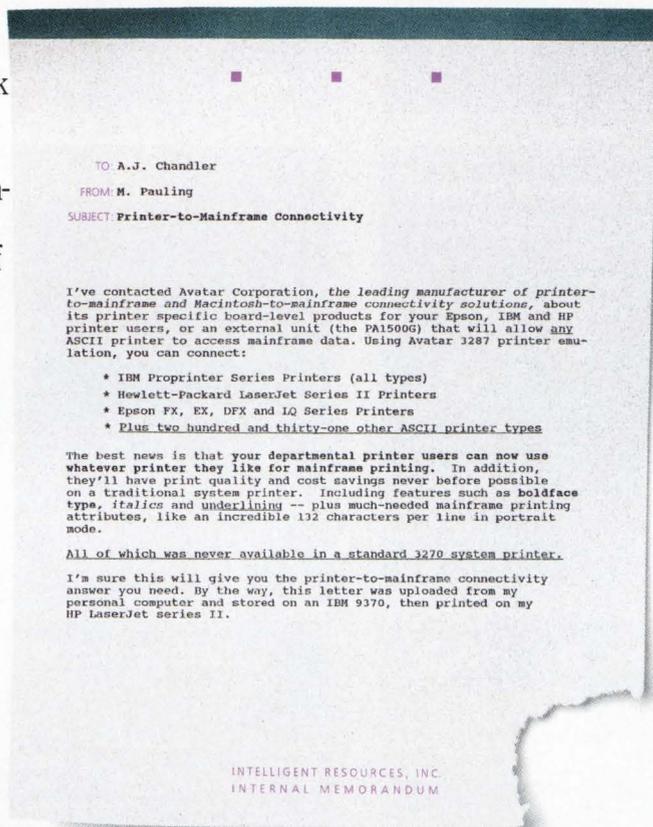
Once, the idea of getting printed mainframe information to look this good was just a little hard to swallow.

Understandable, considering the somewhat down-and-dirty nature of one of your average system printers.

A far cry, needless to say, from the advantages of ASCII printers. Whether it be the high quality, advanced capabilities and faster printing speeds of some. Or the significant cost savings of others.

Which is where Avatar's PA1500G, EP-Connect, PRO-Plus and Passport 3287 printer emulation products come in. Very simply, they make it possible for anyone in your organization who needs IBM mainframe information to get it quickly and easily using any ASCII printer. Everything from the IBM® Proprinters and the Epson series to the HP LaserJet II and everything in between.

They're easy to install, require very little training or MIS support and are fully compatible with



Now any printer can be used to print quality documents from mainframe data. Even laser printers like the one that produced this memo.

IBM 3174, 3274 and 3276 control units.

As you can imagine, the implications of all this are more than a little impressive. It means you can print mainframe data more cost efficiently than ever. It means you can print both local and mainframe applications on one printer.

But most of all, it means you can get more information into the hands of more people than you ever could before.

And because Avatar is the number one name in printer emulation technology, you can rely on getting the service, support and experience in IBM 3270 connectivity you expect.

For the name of your Avatar printer emulation distributor, call 1-800-289-2526, ext. 30. Or write Avatar Corporation, 99 South Street, Hopkinton, MA 01748.

We think you'll be impressed with what printer emulation can do for you. Once you get a taste of it.

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How To Survive Post-Implementation Aftershock

If you're designing a complex system for professionals, be prepared for post-implementation aftershock. Once these pros learn their way around the system, they will test its limits, setting off shock waves that could devastate an otherwise successful project.

BY JANET RUHL

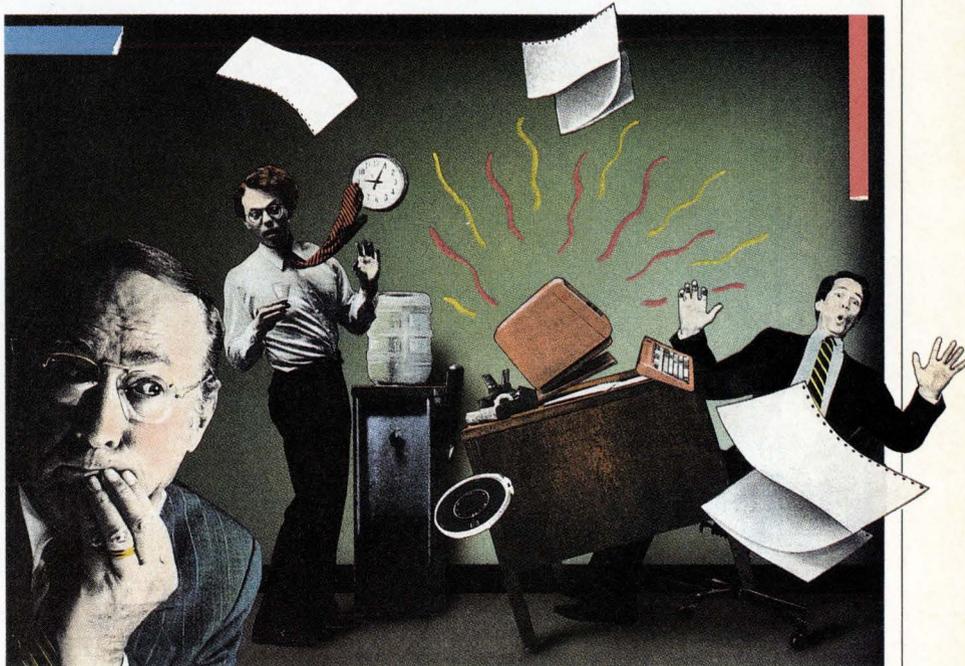
Six relatively quiet months have passed since you have implemented the complex system. You had insisted on extensive integration and acceptance testing, which you assume has flushed out programming errors and exercised the various pathways through the system. Suddenly, just at the time when programming support for the project has been cut to the bone, an explosion of bug reports has hit the maintenance team, along with a slew of frenzied requests for new function needed immediately. What went wrong?

What you are experiencing is post-implementation aftershock, a little-known phenomenon that typically occurs in well-designed systems used by professionals, particularly those that are deeply bound with the way professionals do their daily work. When it strikes, a dramatic increase in bugs and user service requests occurs—usually about six months to a year after the implementation of the system. Failure to prepare for it can give an otherwise model project a bad name and spell disaster for the careers of those associated with the project.

Post-implementation aftershock does not occur because of some failing in system testing, and even the best testing cannot prevent it. It occurs because of the unique learning curve that appears after the implementation of systems designed to aid the work of professionals. This learning curve is very different from that of systems used by clerical workers for routine tasks (the most common systems, with which most development managers are familiar). Post-implementation aftershock occurs because when management budgets for a new system, it usually looks to past experience to see what to expect. Often, as a result of these previous experiences, management expects to have to lav-

ish resources on a newly installed system during its first few weeks and months, but, in return for this attention, it expects this maintenance activity to drop off sharply after the system's first few months, when the system finally enters a stable "mainte-

Post-implementation aftershock occurs only after the system's users have had a chance to get comfortable with the system—and this often takes many months. Early in a system's life, professional users resist using it for their important work. Af-



❑ FAILURE TO PREPARE FOR AFTERSHOCK CAN ROCK AN OTHERWISE SOUND PROJECT.

nance" mode. Ironically, in a well-designed system that has been developed using good methodology and an extensive test phase, these first few months are when big problems are *least* likely to emerge.

ter all, they already have their own comfortable ways of getting their work done. A complex computer system may appear threatening and intrusive. Many professionals (at all levels of seniority) secretly harbor a fear of appearing stupid by failing to master such a tool.

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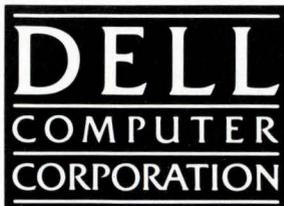
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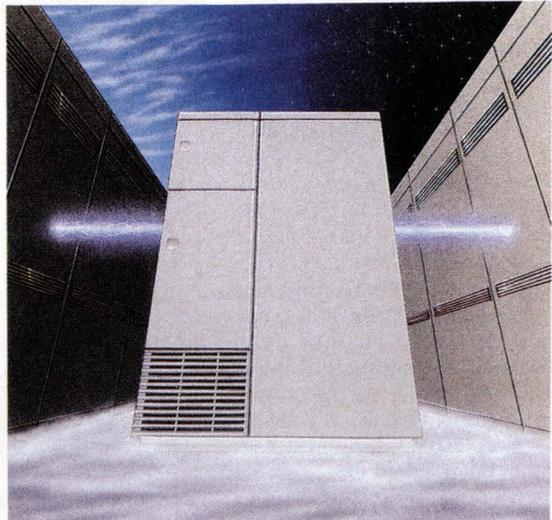
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just enough to demonstrate to management that they are giving it a try. They will usually use those features of the system that require the least effort to learn and that pose the least risk of things going wrong. You can see these patterns if you include in your system a monitoring function that reports statistically on which functions of the system are being used, how often, and by whom (see "Monitoring Aftershock").

When I was working as a programmer at IBM's Burlington, Vt., plant in 1981, I designed such a system to monitor the implementation of an early version of PROFS. We found that shier users were only using the system to receive mail from others and to look at calendars created by their secretaries, but were not using the document creation routines themselves or storing things in the document database. In a very different kind of system, during the first months of Philadelphia-based CIGNA Corp.'s DCIS (Defined Contribution Information System) pension administration system's life, pension administrators often overrode sophisticated automatic processing and only used manual functions that gave them a greater feeling of control. They also preferred looking at reports to using on-line inquiry.

It takes a period of months for users to

begin to feel comfortable with their new tools. However, at some point in a system's life history, as users begin to see the advantages of the new system, they gingerly begin to explore its functions, gradually getting over their shyness as their efforts are greeted with success. After all, the system would not have been designed in the first place if it were not supposed to

**□ IT TAKES MONTHS FOR
USERS TO FEEL
COMFORTABLE WITH
THEIR NEW TOOLS.**

be a terrific aid. Finally, after some six months to a year, a critical mass of users emerges, users who are enthusiastic about the system and, most important, are beginning to understand—from a functional standpoint—how it operates.

System Usage Explodes

At this point an explosion takes place. Your monitoring programs, if you have them, will suddenly show a tremendous upsurge in the use of the system by all users. If the system includes communications features like electronic mail or work group computing, enough people in the user group are sufficiently comfortable

with such features to begin to use them instead of the telephone or paper documents. If the system tracks investments or accounts, the users may start relying on on-line inquiry in place of hardcopy reports, and use all the sophisticated transactions you have provided for them.

Finally, having mastered the system, the users begin to get creative with it. These are, after all, bright, educated professionals. Now they are likely to apply their functional understanding of how the system appears to operate and try to push it a step further than it was designed to go. They will start using the system to deal with (or attempt to deal with) situations that were not envisioned by the system's designers, no matter how hard the designers tried to imagine the system in operation.

It is at this point, when a critical mass of users is really using the system fully, bringing to it all their ingenuity and creativity, that post-implementation aftershock strikes and the bug reports start flooding the maintenance group. And the bugs they report are rarely trivial and are difficult to track down. Many of these bugs result from users doing tricky things with the system in hopes of "faking it out."

On DCIS, for example, some pension administrators understood the way that a parameter file controlled what they could and could not do with the system, and they began to alter parameters temporarily so they could slip in transactions that contained combinations of field values needed in a particular case not anticipated by the system's designers. Without such finagling, the transactions would not make it though a series of on-line edits, but with the finagling they would. Having made their changes, the users then politely changed the parameter file back to its earlier values. The records generated by these tricks caused problems in a batch subsystem that the administrators were not aware of. It took major detective work to determine the source of these illegal records.

At the same time that bugs like these occur, requests begin to pour in from these same users for more function. The functions requested are often complex, and user management may start wondering why such "obvious" function was not included in the original systems design.

But this slew of system requests is not a sign of bad design; rather, it is a sign of the system's success! It shows that the users have accepted the system and are putting it to use. It also demonstrates that the professional users are confident enough to go beyond a cookbook approach to using the system and are becoming creative and in-

Monitoring Aftershock

If the thought of post-implementation aftershock makes you quake, take heart. There is a way to prepare and protect your project from disaster by measuring stress on a system. The best way to track aftershock is to design a function into your new system that monitors system usage in terms of transactions or function used and how often, breaking that usage down by individuals. This information is usually available in the system already, but not presented in an accessible report format. This function should generate reports that go to project management on a weekly basis during the first months of the system's life, and it is often a good idea to have a version of this information go to user group management. These reports will give information that is helpful in several respects.

By identifying shy users, the system makes it possible to give extra help to those individuals who most need it, early in the system's life history, thus accelerating the learning curve for the group. Ideally, those responsible for training users can send someone to drop by users' desks

casually and give inconspicuous help to those who need it most without in any way singling them out as deficient.

Such monitoring may turn up the surprising news that whole sections of your new system are not being used, and alert you that these areas will be where you can expect a lot of aftershock activity. For example, if your new system is being phased in and only being used for new customer accounts until some older system is converted, you may find that a whole subset of transactions appropriate for older accounts is never being used. These transactions are the ones most likely to show up on bug reports a year down the line when the new accounts have matured. It is particularly important to track this because often the conversion of older systems, along with the implementation of enhancements, is scheduled for the period six months to a year after implementation, again because that is when the system is expected to be stable. By avoiding mixing conversions with aftershock, both phases of your project can be completed with a minimum of confusion.

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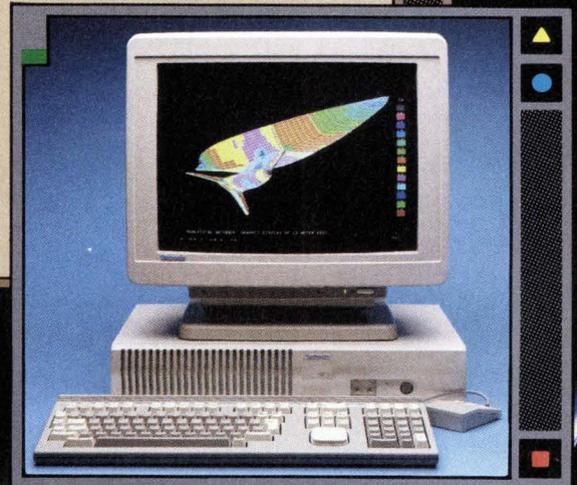
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novative partners in the system's design. Now, having digested the system that their representatives said they wanted, these sophisticated users want to push the system's limits further. It is highly unrealistic to expect representatives of systems groups or user groups to be able to design into the initial version of a complex professional system every feature that professional users would require—that is why commercial software is developed in a series of releases.

Why Aftershock Can Devastate

The complex and challenging requirements posed by the system's newly sophisticated users emerge just when there is no one left on the project with a good grasp of the project's existing design, and with the analysis and debugging skills needed to meet the users' very real new needs. Management, lulled by the system's initial months of quiet, and certain that excellent development methodology has finally paid off, tends to strip projects of capable programmers, sending them on to hot new development projects.

Thus, the users do not get the changes

they need at the time that they are most excited about using the system, or they may get the changes but either the changes don't work properly or they "break" other previously working parts of the system. This, unfortunately, can set the stage for an ongoing adversarial relationship between the users and the systems department. In the worst cases, managers involved in the system's development get blamed for producing a system that has become an embarrassment to the systems area.

How can you best prepare for post-implementation aftershock? There is no way to avoid aftershock in the project's development phase. It is a maintenance phase phenomenon and should be treated as such. The position that maintenance can be omitted or bypassed by "correct" development is not only unrealistic, it fails to give the maintenance phase of a project the respect it deserves.

Nor can aftershock be eliminated during the testing phase—unless the test phase is expanded to include the acquisition of a critical mass of experienced users. In the test phase, those doing the

testing are either those who developed the specifications for the system (who are too familiar with how the system is expected to operate to truly stress it in new and ingenious ways) or they are the "real users" who have not yet shifted gears from their current non-system-oriented methods to methods in which the system is an integral part of their jobs. Only the emergence of a critical mass of users creates the stress that can result in post-implementation aftershock. By monitoring system usage, you can determine when that critical mass has formed, and whether the system can withstand its pressure.

It is vital to expect aftershock to occur and to budget for it. Ideally, project management will consider this phase a part of final testing and budget for it accordingly. It is essential, too, to retain the services of the people who designed the system until this phase is complete, especially since it is at this stage that the users may request the most useful and, to them, necessary, enhancements to the system. If the project depends heavily on outside consultants for programming support, plan to use the heavy consultant support for this phase—

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not just, as is often the case, for the three months after implementation.

Prepare user management for the advent of this phase and make sure that they understand that its emergence is a sign of the system's success and proof that the users are really using it. Make sure that they save some of their development budget for the resources they will need to participate in this final fine-tuning of the system's design.

Don't abandon methodology just because development is over. Most development groups now operate under the influence of some kind of development methodology. Most require some kind of design review and usually demand that documentation be produced along with system design. Unfortunately, since the aftershock occurs when development is over and maintenance has begun, all too often methodology has become a thing of the past, replaced by a bug-oriented change control system that controls code fixes at a module inspection level.

This means that the system enhancements made as a result of post-implementation aftershock all too often are made

without the benefits of design methodology. These enhancements are often treated as independent code fixes rather than as a return to the system analysis and design phase. Usually, these enhancements are not made one at a time, but are proposed and added to the system at the same time as a whole constellation. Unless they are managed as a unit, using strict development methodology, disaster is assured. Since many of these user-originated new features are highly sophisticated and very important to the system's ongoing integrity, it is vital that they work. For this to happen they must be developed, coded, and tested with the same rigor as was the original system. Otherwise they will fail—spectacularly—in a manner that will give the entire system development team a black eye.

Finally, during the frenzy of system testing, many development managers tend to postpone adding the many small changes that the users' representatives come up with during the latter part of the development process. Rather than risk falling behind on tight development schedules by attempting to add them to the system dur-

ing testing, they postpone these design change requests for six to 12 months after implementation. Their thinking is that after six months the system will have become "stable" and these expected changes can be quietly slipped in.

Nothing could be further from the truth. It would be better to put expected changes in right after implementation during the "quiet period" that occurs before the users really take to the system, or else to wait until the aftershock has occurred. Otherwise, attempting to implement the new code required by these many small changes simultaneously with those for the enhancements to satisfy newly sophisticated users can quickly destabilize the most stable system. The many months of hectic debugging that ensue can give what may have been a good system a bad reputation from which it may never recover.

Janet Ruhl is a consultant based in Windsor, Conn. She is the author of The Programmer's Survival Guide: Career Strategies for Computer Professionals, recently published by Prentice Hall, Englewood Cliffs, N.J.

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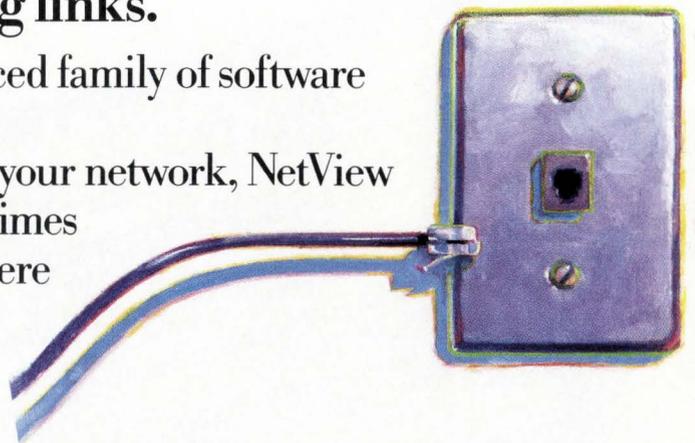
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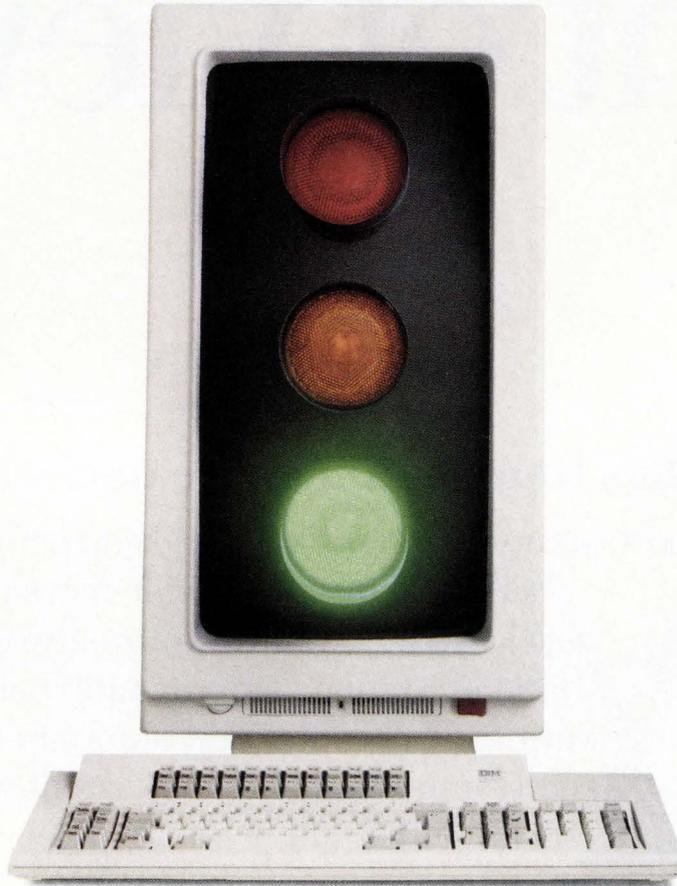
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2 LA Sales	Red	Yellow	Green
3 NY Purch	Green	Green	Green
4 DC Burch	Green	Green	Green
5 SF Sales	Green	Green	Green
6 HIS Test	Green	Green	Green
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Users Want WATTC To Limit Rules For Telecom Services

The world's telecom policymakers are thrashing out rules for who should control value-added network services. The world's major users want a fair say in the outcome.

BY RUSSELL PIPE

A clash of telecom titans is under way in Melbourne, Australia, where international telecom policymakers are attending the World Administrative Telephone and Telegraph Conference (WATTC) from Nov. 28 to Dec. 7. At stake is the regulation of the expanding business of value-added network services. The networking plans of providers like IBM, and those of many of the world's telecom users, may hang on the outcome.

One hundred or more countries will prepare legally binding rules covering telecom authorities and operators, and perhaps even intracorporate networks engaged in international telecom services. Hideo Yoshizaki, a senior Japanese Ministry of Posts and Telecommunications official, said: "The new regulations should be flexible enough so every country can accept them even though they have different telecom regimes and policies. This flexibility is also needed to promote technological development and user demand for new services."

WATTC is trying to regulate strategic competition between network-based providers, entrenched telephone companies wanting to provide end-to-end services to every customer, and computer-based providers of value-added network (VAN) services. Battle lines have been clearly drawn by IBM and other VAN services vendors. "Providers of value-added networks and services design customized interfaces and protocols for their own networks to meet significant user needs," IBM's vp for exter-

nal relations, Kenneth W. Dam, recently told the International Institute of Communications. Dam expressed concern that some national authorities are now considering mandatory use of standardized protocols. "The single network solution precludes solutions custom-tailored to the needs of different users. This limitation of choice [is] an undesirable prospect for users . . . that will ultimately limit user competitiveness in the global market."

User needs may be king at WATTC, but, except for a sprinkling of private sector executives in delegations from Europe, Australia, Canada, Japan, New Zealand, and the U.S., users will be sidelined, cast in the role of mute observers. This has angered Stephen C. Finch, chairman of the International Telecommunications Users Group (INTUG). Finch is pleading with his members to show their governments "how much the prosperity of business—and hence the national economy—increasingly depends on the effective application of information technology,

especially telecom." According to Finch, "business alone can decide on the services that best suit its needs," and he is urging members fully brief their national delegations so that they "support lighter and not tighter regulations."

WATTC has been a five-year process, beginning with a preparatory committee, which hammered out draft regulations that were judged unacceptable, at least to industrial countries where VAN services are in the widest use. The most controversial points involve the requirements that:

- countries regulate any organization that provides international telecom service;
- CCITT recommendations be applied to these organizations on a semimandatory basis; and
- the blanket definition of services offered to the public cover all private and public entities under the regulations.

The U.S. has made WATTC a cause célèbre because it wants the regulations to complement, not undercut domestic policy. FCC chairman Dennis R. Patrick stressed to an Anenberg Washington Program forum recently that "the question for WATTC in this technological environment is what kinds of new international regulations, if any, are appropriate to foster new international telecommunications services, while at the same time preserving national options to tailor domestic regulations to unique national contexts. The

only answer is flexible international regulations that are neutral regarding solutions."

Can such neutrality and insistence on national sovereignty also ensure the connectivity and interoperability of services? That's the real dilemma. A major effort to ensure a successful conference by reconciling several key points has been launched by Richard E. Butler, secretary-general of the International Telecommunications Union, which is backing the conference. Suggestions for revising the preparatory text were circulated to member states; it seems they have been widely embraced. According to Theodor Irmer, director of CCITT, "a minimum common framework for connectivity and interoperability is needed to provide for certain telecom services to the public on a global scale."

Russell Pipe, a DATAMATION adviser, is an international consultant on telecom issues. He is based in Washington, D.C.

INTERNATIONAL

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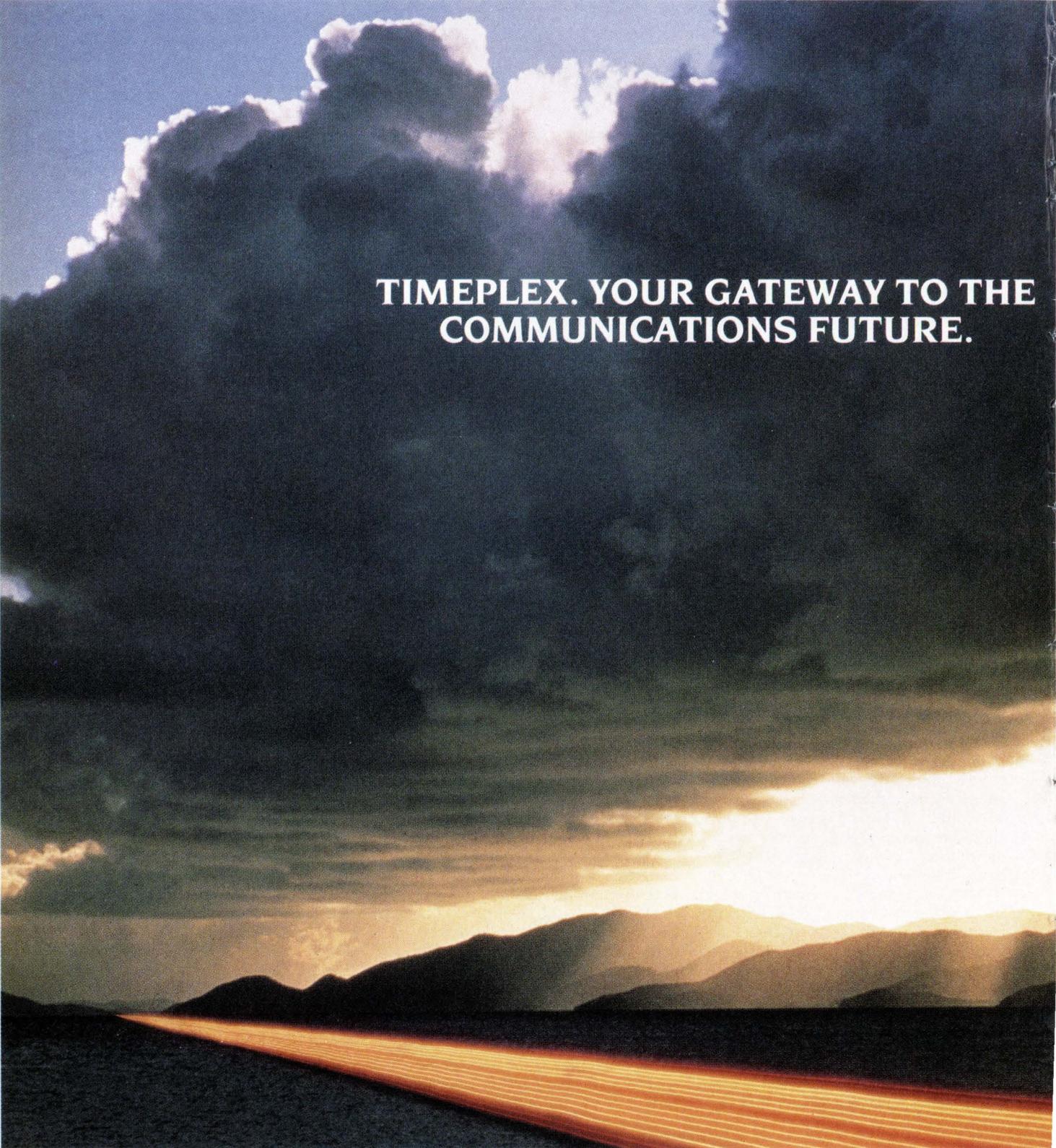
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Users Expect Fewer Vendors And Lower Costs

A DATAMATION/Price Waterhouse survey shows that while many European users don't expect the pan-European standardization of 1992 to affect their IS plans, many expect the European IS industry to change.

BY PAUL TATE

On Dec. 31, 1992, Europe will become a unified market, free of internal trade and tariff barriers, and linked together by an expanding web of electronic trading links. At least that's the plan of the European Commission in Brussels, which represents 12 of Europe's major countries.

With an estimated GNP of over \$4 trillion and a population of 320 million people, a single Europe would be one of the largest industrialized markets in the world, strongly supported by established economies and an infrastructure of internal trading links. Observers believe that many of the new trading links forged in preparation for 1992 will be electronic. Multinational network services, electronic data interchange (EDI) systems, and messaging, inquiry, and transaction networks will create a trading environment that will sustain the future European economy. This will be the foundation of a European "open system" for trade and commerce.

Yet some European IS managers, who are supposed to be key to creating this new Europe, are still approaching the 1992 deadline with skepticism and in a state of poor preparation.

A DATAMATION/Price Waterhouse pilot survey of 90 European IS managers in West Germany, the U.K., and France canvassed their attitudes on the 1992 transition, and found that three quarters of U.K. users and a third of French and German users expect 1992 to be a "nonevent" in IS terms for their companies.

Although some expect to make formal IS plans for 1992 in the next four years, a large number—half of U.K. and West German users—believe that such plans are

unnecessary. Over 80% of U.K. and West German users do not even expect the new rules to delay the development of their key systems.

They do feel, however, that the IS industry in Europe will change, and that that change will be to their benefit. IS executives in all three countries predict a reduction in the number of IS suppliers. Also, over 90% of users expect 1992 to be good for them because they expect prices to drop due to the economies of scale or reductions in tariffs. They also expect that standardization will help reduce the complexity of their choices.

In fact, the proposed European standards, covering a range of technical, trad-

choices to be influenced in all areas surveyed except database systems, and the vast majority have, or expect to make, formal IS plans geared to the 1992 deadline over the next few years. There is clear evidence that these plans will require considerable software changes for French users. Unlike U.K. and West German IS executives, most French users expect their choice of software packages to be strongly influenced by European standards.

These kinds of recent market shifts at both a national and European level, combined with the urge to benefit from pan-European economies of scale in manufacturing and distribution, are sending IS vendors in Europe into a frenzy of strategic mergers and acquisitions, as exemplified by Nokia's takeover of Ericsson Information Systems and the merger of U.K. services companies Systems Designers and Scicon. U.S. companies such as IBM and Digital Equipment Corp., meanwhile, are embarking on aggressive marketing drives to promote their systems integration products and services, as well as their willingness to work with other companies in major deals.

But perhaps the most ambitious 1992-inspired union thus far is between 22 European telephone authorities. Next month, in an unprecedented move, they will launch a new joint company called Managed Data Network Services (MDNS), which will provide a pan-European one-stop shop for managed network services. Based in the Netherlands, MDNS will develop and sell cross-border leased lines along with network management services. Based on X.25 protocols and linking each national packet switched network, the new service is expected to boost OSI stan-

The Influence of 1992 on IS Purchasing

French and German companies most expect their buying choices of key products to be influenced by emerging European standards in the next four years.

	Operating Systems	Packages	Database Systems	Software Dev. Tools	Suppliers
(by percent)	%	%	%	%	%
FRANCE	72	72	28	50	56
GERMANY	100	13	67	27	7
U.K.	29	32	19	20	24

Source: DATAMATION/Price Waterhouse.

ing, and legal issues in many industry sectors, are already influencing the purchasing plans of these IS executives. The results show a likely boost for Unix and the OSI networking standards, which reflects the need for Europeans to use standard interfaces to overcome both supplier and national network incompatibilities.

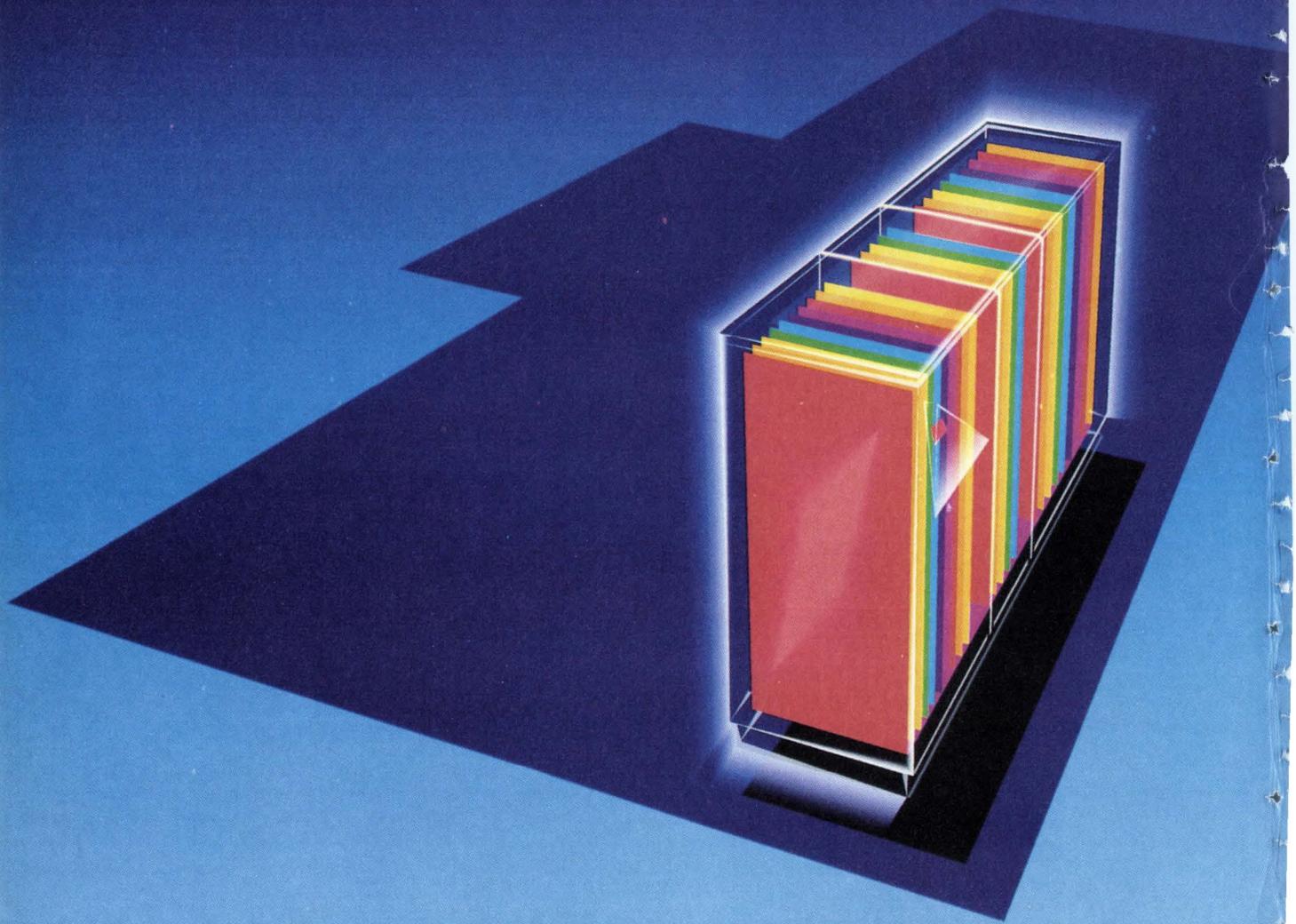
French users stand out in the survey as being particularly conscious of the significance of 1992, partly because of the French government's extensive awareness campaigns. Most expect their IS

standards in Europe.

In the meanwhile, network users, whether they are industrial firms or network providers such as GEISCO, should find that the costs of value-added services and some intra-European networking will be greatly reduced.

It would seem that in the key network services sector at least, the survey respondents may start reaping the benefits of 1992-induced price reductions somewhat earlier than they may have anticipated.

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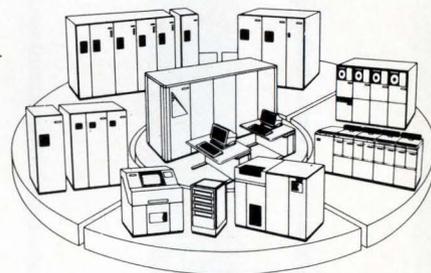
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International standards for information network design provide the foundation of Open System Architecture. They manifest themselves in the Olinet family of networking products, which incorporates all ISO/OSI standards for both Local and Wide Area Networking applications. And in Open System Architecture's commitment to the PC world of MS-DOS.

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Cassoni Shakes Olivetti: Reorganization On the Way

The major reorganization at Olivetti reveals poor profit figures, product line problems, and power shifts that have made Vittorio Cassoni heir apparent at the troubled Italian giant.

BY JANETTE MARTIN

Vittorio Cassoni, the 46-year-old former head of AT&T's Data Systems Division, has become the new heir apparent at troubled Italian company Olivetti.

Effective January 1, Olivetti will be reorganized to create a holding company run by Carlo De Benedetti and Cassoni as dual managing directors, and three new divisions based on product and service categories. Each division will become a full-fledged subsidiary by 1990.

Industry reaction ranges from "valid evolution" to "bad news." Some think the reorganization is a short-term financial solution to a long-term strategy problem. Olivetti suffered a 23.7% drop in pretax profits during the first half of 1988.

According to a technical resources manager at CARIPLO, a major Italian savings bank and Olivetti user, the bank is "not worried" and it hopes technical assistance will improve with the reorganization. Anthony Rodino Dandolo, MIS director at Fininvest in Milan, says, "The reorganization will be a good thing, but it's also a sign of problems. There's trouble everywhere—in deliveries, in assistance. OSA [Olivetti's Open Systems Architecture] is a good theory, but there's no delivery; the telecommunications plans are exciting, but there's nothing to sell. Olivetti has some tough years ahead."

The first of the three new divisions is Olivetti Office, covering consumer products such as typewriters, text processors, PCs, printers, copiers, and facsimile and



OLIVETTI'S CASSONI: A savior in Ivrea?

telex machines. It will be run by Franco Tato, now head of Olivetti's West German office equipment subsidiary, Triumph Adler, which will be incorporated into this organizational unit.

The Olivetti Systems and Networks division will cover distributed data processing with standards and open systems for personal and mini computers, LANs, terminals, workstations, telecom systems, mainframes, and software. Luigi Mercurio, CEO since 1984 of the U.S.-based David Systems Co., will head this unit.

Franco De Benedetti, brother of Carlo and former comanaging director of the

company, becomes head of Olivetti Information Services, which covers VANS, voice/data services, and electronic publishing. There is also a provision for a Technological Activities Group to manage Olivetti's investment in special technologies and software companies, to be headed by Ettore Morezzi.

According to Cassoni, earnings for the Office and Systems and Networks units will be 3 trillion lire initially (\$2.2 billion). Olivetti Information Services, which Cassoni predicts will be the European leader by 1992, expects to earn 400 billion lire (\$299 million). All of the companies will be eligible for a listing on the Italian stock market by 1994 if they have three consecutive years of profit.

Olivetti says the objectives of the reorganization are to increase control over product areas, adjust products to suit particular markets, and delineate company activities to allow a smoother way to joint ventures.

Rumors have abounded that De Benedetti has been looking for a buyer for Olivetti, but in September he said he expected to increase his own 19.4% equity stake in the company and will remain for at least another 10 years.

Cassoni, meanwhile, spent 13 years with IBM in and outside of Italy and has worked for Olivetti in the U.S. and Europe since 1980. His experience with AT&T while on loan from Olivetti was an excellent primer in reorganization, and gave him the opportunity to learn the fine points of the U.S. information systems market. He also learned to love Unix.

The reorganization is evidence of Cassoni's influence in the company since he was called back from AT&T last May. It also indicates a major shift in players in Olivetti's power structure. Although Elserino Piol keeps his position as head of strategy in the new holding firm, Cassoni is now head of that firm and his key task is to "formulate strategies." Former vice president of operations, Vittorio Levi, is vaguely described as being "at the disposal of the presidency for special missions."

Roberto Taranto, a senior analyst for Milan's Teknibank, says, "Olivetti's main problem is that it needs the U.S. market. The reorganization may be a way for Olivetti to pick up [another] partner and get in." Most observers agree that AT&T's accord with Sun Microsystems and flagging purchases of Olivetti PCs spell Olivetti's failure to keep its American partner interested.

Janette Martin is DATAMATION's Milan-based correspondent.

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COMPUTING FOR ART'S SAKE

Michelangelo's frescoes, Leonardo's "The Last Supper," and the ancient city of Pompeii now rely on computers for their preservation. The imaging technologies used are attracting interest among commercial corporations.

BY JANETTE MARTIN

Among the paints, brushes, and sponges on the scaffold that now spans the Sistine Chapel's frescoed ceiling in the Vatican is the latest addition to the art restorers' tool kit—an Apollo workstation.

On the screen appears an exact, scaled-down line drawing of part of Michelangelo's masterpiece, in sufficient detail to see clearly the creases in God's finger as it stretches out to the newly created Adam. Each crack, each chip, each discoloration of the fresco is recorded on the system.

By the end of 1993 when the 13-year restoration project is completed, the Vatican will have a unique computerized database of one of the world's greatest art treasures. All 1,200 square meters of the work will be stored on disk—including notes on Michelangelo's own work habits and details of previous restorations.

"We're encouraged and impressed with what we can do with the computer," explains a delighted Fabrizio Mancinelli, curator of the Sistine Chapel restoration project. "Although we've been using it [only] during the last year and a half of the project, we're discovering new applications all the time and we're experimenting with the computer in other areas of the Vatican. We don't experiment with Michelangelo's frescoes! The problem is that the Sistine Chapel ceiling is a tiny portion of the Vatican's artistic property, which includes square kilometers of frescoes, and is the first and thus far only restoration project in the Vatican in which the computer is [so closely] involved."

Mancinelli's workstation is a prime example of how high tech is finding favor among high-brow industry sectors. The process of implementing new technologies in such a specialized activity has payoffs for all sides. The art world gets new tools to use in its ambitious and complex task of restoring and protecting the world's artistic heritage, while the devel-



"THE LAST SUPPER": Computers will help this masterpiece survive.

opment groups of hardware and software suppliers have their art stretched by the restorers' new ideas and perfectionist demands for imaging systems, better software, and sophisticated graphics.

Many of those new ideas are surfacing in Italy, a country that UNESCO estimates is keeper of two thirds of the West's cultural heritage. Rome alone has the world's highest concentration of antiquity in its museums, monuments, and archaeological areas. As one astute Italian historian put it, "Italy is a huge natural encyclopedia in which the signs and symbols of the cultural language of the West are gathered and ordered."

This cultural heritage is now in serious danger. For example, 65% of the damage that the 2,000-year-old Marco Aurelio Column has suffered has occurred in the

last 20 years, mostly as a result of automobile exhaust fumes and other human-generated causes. Monuments throughout Italy that have been aging gracefully for thousands of years are suddenly being brutally disfigured and rapidly destroyed because of the excesses of modern industries and life-styles. Restorers and preservers are desperately trying to keep pace with this accelerating deterioration, and in recent years have started using computing technology as a weapon in the battle to protect the world's past.

High Tech's Contribution to Art

Many computer companies are rising to the occasion. Italy's Olivetti is sponsoring several projects, including work on Leonardo da Vinci's badly damaged "The Last Supper" in the Santa Maria del Gra-

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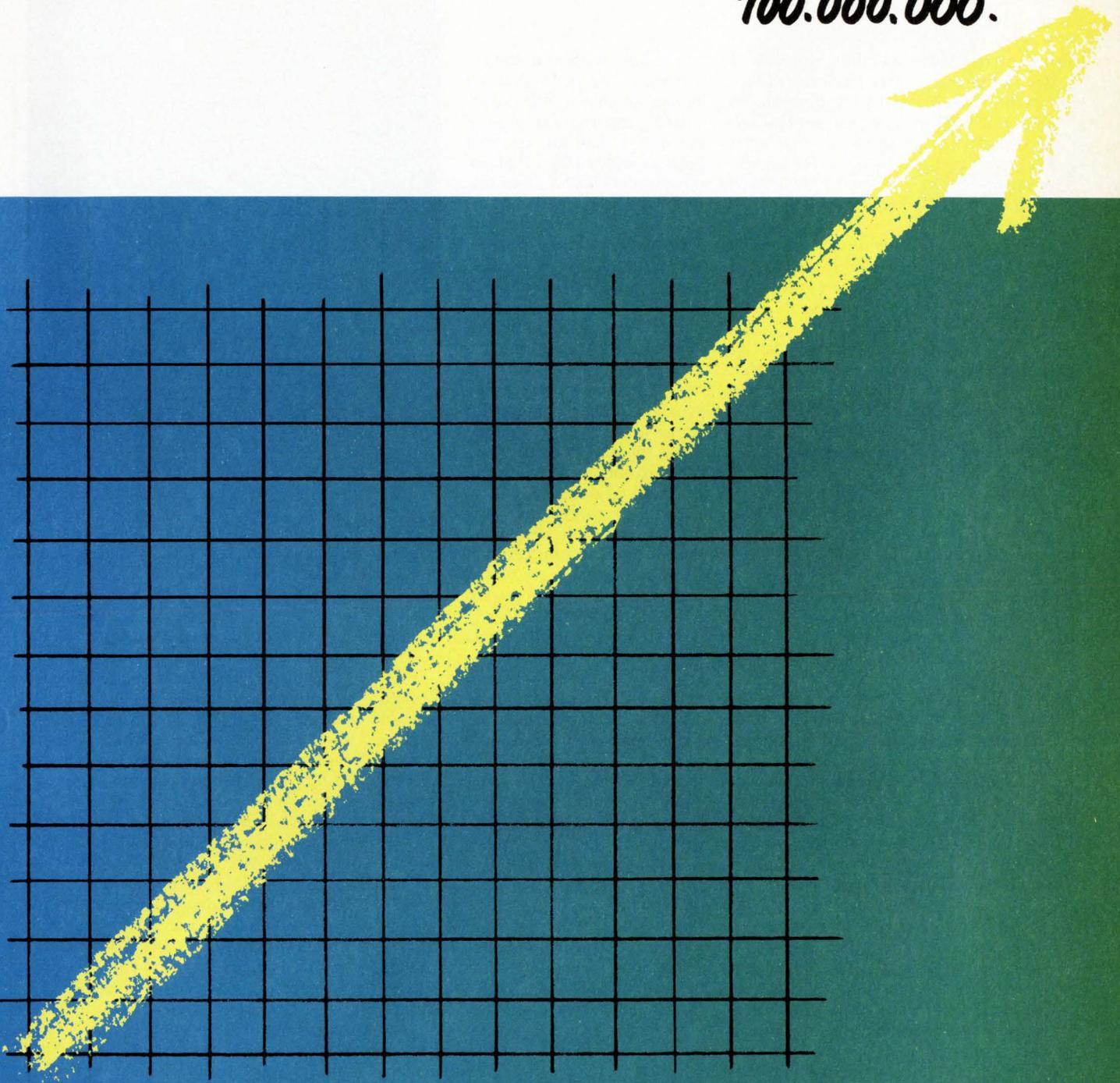
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INTERNATIONAL

ITALY

APPLICATIONS

zie church in Milan, and the restoration of important frescoes in the Brancacci chapel in the Santa Maria del Carmine church in Florence. Meanwhile, IBM and Fiat Engineering are working together on what may be the largest, most advanced preservation project in existence, "Neopolis," which includes work in the ancient city of Pompeii near Naples.

Speaking at a presentation at the end of the first year of the Neopolis project last June, Federico Zeri, the renowned and outspoken Italian art historian and critic, noted, "Neopolis is a great success in Italy's guardianship of its cultural goods. But Neopolis shouldn't be a singular project. The techniques here should be applied to other areas in Italy, like the Roman Forum, that are begging to be explored, catalogued, and preserved for all time."

The computer's role in various preservation and restoration projects in Italy ranges from simple cataloguing to complex image processing and CAD applications. At the Brancacci chapel, Ornella Casazza, who is overseeing the four-year fresco restoration program, says, "At this point in the restoration, the computer is a necessity. We use it to keep a diary of our work and to catalogue the characteristics of each square centimeter of the frescoes. Over time, we can compare the frescoes with the computer records to measure ulterior damage and surface or structural changes in the shape."

The Vatican's Mancinelli adds, "With the computer, we can ask for any measurement on any fraction of a figure of the frescoes that we've programmed into the computer. We're also studying the problem of microclimate control. We'll eventually have the computer monitor air conditions in the chapel so we can constantly protect the environment."

Restoration methods have changed greatly in the last decade or so, and the computer is helping with the new techniques. Restorers used to paint solid colors in missing areas of frescoes and paintings, deciding for themselves what colors had probably been used before. As a result, even with their good intentions, past restorers often ruined or changed an original work dramatically. Francesca Monfredini, a Milan-based restoration expert comments, "Up to a short time ago, restorers used poor tools, materials, and techniques. I'd say about 80% of works restored before the last 10 years have been restored poorly."

Now, restorers clean existing areas and fill missing portions of a painting or fresco with a neutral hue applied in fine streaks of variegated colors created from an aver-

age of hues present in the entire work. The idea is that you should be able to tell the restored parts from the original parts, but that the restored parts should still blend harmoniously and give an overall effect of the original.

Painting by Pixel

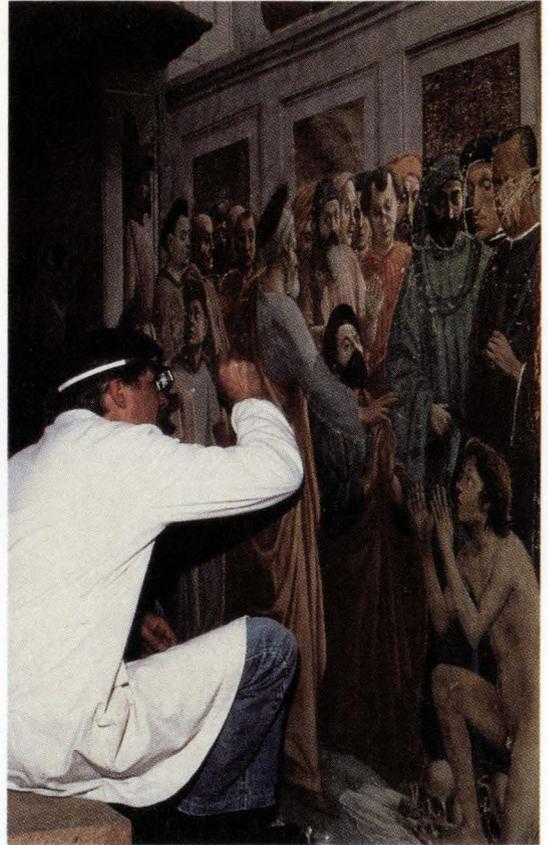
If a painting is digitized into pixels on a computer screen and each pixel is assigned a hue value, the computer can analyze the coded hue information and come up with the neutral hue using a chromatic average. After the computer suggests the colors to be used in the neutral hue, restorers can mix and apply paint into the required areas.

Some restorers, like Casazza, prefer to determine the mix of hues for the restored areas by eye. She says that in experiments with the computer, hues the computer proposed were practically identical to hues devised by the human eye. She prefers using the computer for cataloguing.

Damaged by environmental factors and seriously deteriorating in part because of the decomposition of the original vegetable-based painting materials used, Leonardo da Vinci's "The Last Supper" is being restored by hand. However, restorers are using a computer for the study and control of the microclimate, the surrounding environment that is vital to the painting's survival. In addition, AT&T has developed a sophisticated DBMS specifically to study the damaging effects of solar radiation on the painting.

The special government project, called "Consorzio Neopolis," at Pompeii, has IBM and Fiat working together to create a "territorial information system." The two-year \$25 million-plus nonprofit project uses many sophisticated computer applications in a preservation and restoration effort that is unparalleled for size and comprehensiveness. Now into its second year, Neopolis employs 108 young people who were trained by and work with 18 professionals from the two companies. Together these developers have produced almost all their own software.

Neopolis, which means "new town," was the name given to the Naples area by the Greeks some 2,000 years ago. Consorzio Neopolis's goal is to protect, evaluate, and exploit the cultural goods in the area of Mount Vesuvius, including the ancient



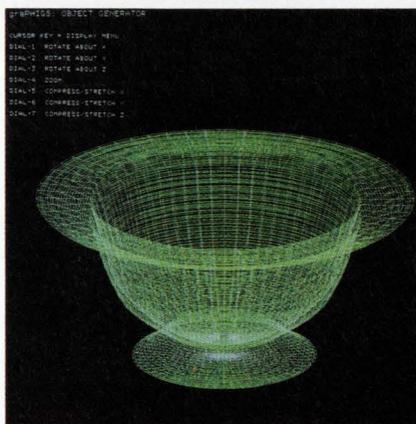
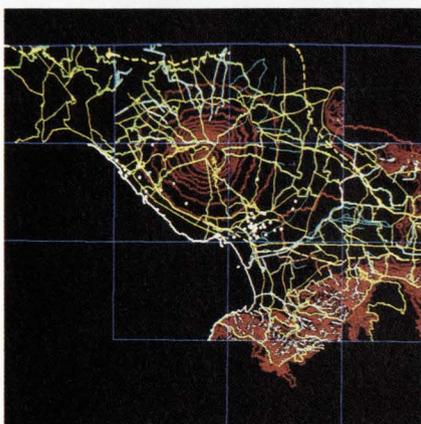
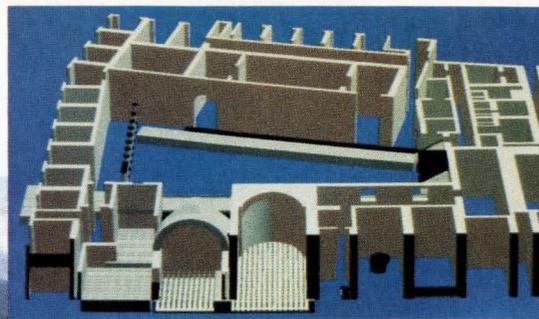
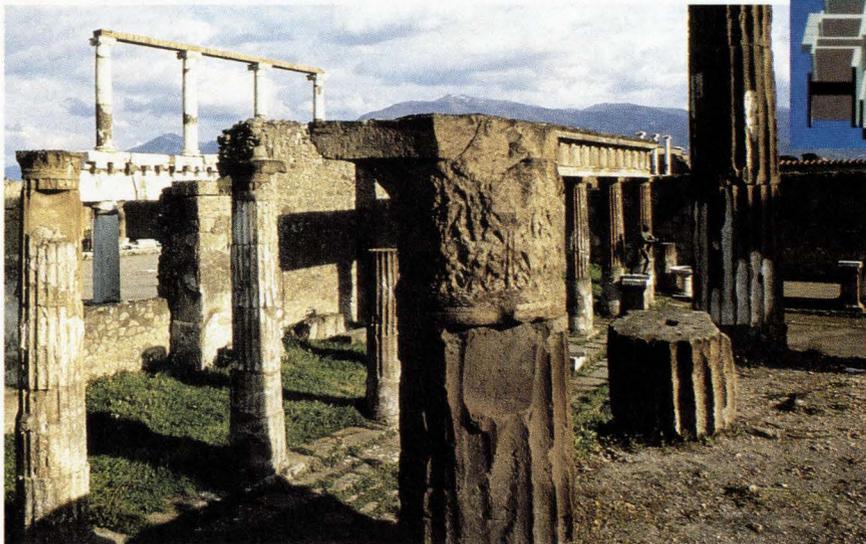
BRANCACCI CHAPEL: A restorer works on the frescoes.

city of Pompeii, which was buried by an eruption of the volcanic mountain in 59 A.D. Pompeii is the most frequently visited tourist site in Europe, accommodating over 2 million visitors a year—half of whom come from outside of Italy. The site was first excavated in the mid-eighteenth century, but little information about the area has been gathered on computer.

Experts estimate that more than 40% of the city within Pompeii's walls is still underground. Martino Politi, head of technologies at Consorzio Neopolis, says, "We've stopped digging at Pompeii because every time you turn over some new ground you find an artifact or fresco, and we haven't figured out how best to preserve and protect what we've already uncovered. Some frescoes, preserved underground for centuries, will fade quickly on exposure to air." Politi and his colleagues are tying together territorial, cultural, and geographical data to create an interdisciplinary information system that will serve historic, artistic, and tourism needs and will prepare the way for further restoration projects. All this is being done with computer systems built around an IBM 3090 Model 150E and SQL relational DBMS. The systems include PS/2s, 31XX graphics workstations, 5080s for mapping, and 7350s for document processing.

Setting Up Future References

"Neopolis is a two-year project," explains Politi. "We can't finish all the work



POMPEII (Counterclockwise from top left): Computers aid restoration of the Neapolis ruins. A 3-D mapping system maintains cartographic data on Neapolis. An expert system helps analyze artworks for restoration. A CAD "reconstruction" of a building in Neapolis.

on the territorial information system in this time, so we're creating a matrix design set in which we develop key parts of the matrix as modules that can be copied and used repeatedly as work in the area goes on over the years. We're using top technology and experimenting with methods we can propose to cultural researchers and restorers for future restoration and preservation in the area. Visiting historians and restorers are awed by the possibilities for preservation and restoration made possible by the use of technology."

One example is the use of image processing to decode deteriorated, burned papyrus documents that are over 2,000 years old. After the documents are digitized with an image processing system, researchers clean debris from a page, zoom in on a selected portion, and, most impressively, change colors and contrasts of foreground and background so that the

character images are more legible. A messy, illegible, black-and-white page changes dramatically when characters are made shocking pink with yellow outlines on a gray background.

The consortium spent months looking for the right software for their image processing system. Finding nothing suitable, they developed their own. Politi says, "The connection and storage of such a large amount of data tied to images is a first of this kind and size [in Italy]. We believe that we have the largest amount of images stored on optical and magnetic disks in the world."

Other areas of work include the digitization of mostly handwritten manuscripts dating from 1748 and pertaining to records of archaeological digs in the area. The consortium estimates there are over 15,000 pages of such records, of which over 6,000 are now on disk, cleaned up

and key-worded for easy subject searches.

At the end of the two years, all 12,000 frescoed walls within the city of Pompeii will be digitized and catalogued so that visitors and researchers can easily scan them by computer, enlarge portions, move from one wall in a building to another, and analyze them chromatically.

An elaborate 3-D computerized mapping system has been developed so that portions of the site can be cartographically updated, analyzed, and printed as needed. Another part of the project uses an expert system to analyze works of art and archaeological finds and simulate restoration possibilities or recreate the original structures.

Spin-offs to business from Consorzio Neopolis are already apparent. A major aircraft manufacturer is interested in the document processing technologies, while development work continues on the use of the 3-D object recognition technology for 3-D human face identification, and use of the 3-D cartography technology in construction and landscape planning fields. Also, the 108 young people undergoing training will continue working in the computer industry when the project officially ends in April 1989.

Politi dreams about the possibility of researching museums all over the world and cataloguing, on computer, all historic paintings, ruins, and documents that pertain to Pompeii, with the goal of recreating the city on computer as it originally existed before the Vesuvian disaster. The Vatican's Mancinelli, meanwhile, knows he will not be able to see all his pet projects begun in his term at the Vatican. "I'm already nearly 50," he says, "when the chapel is finished, I will have spent 13 years of my life and a good part of my Vatican career on that room alone."

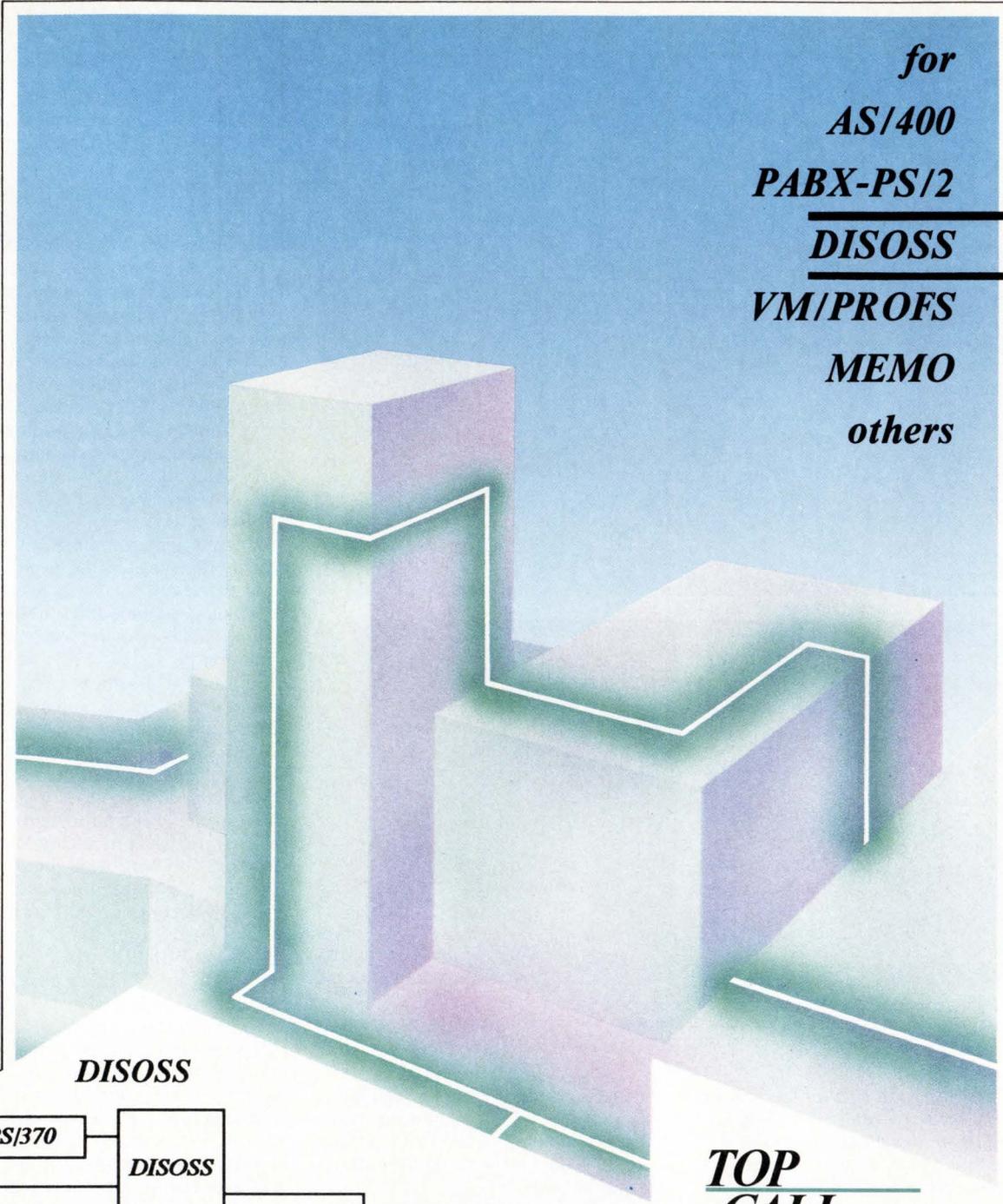
Like the monuments and works they are involved with, Politi and Mancinelli are battling time.

As art historian Federico Zeri puts it, "It's important to preserve what we have from the past because here are the beginnings." If it were not for the use of computer technology in these restoration projects, those beginnings might come to an end much sooner.

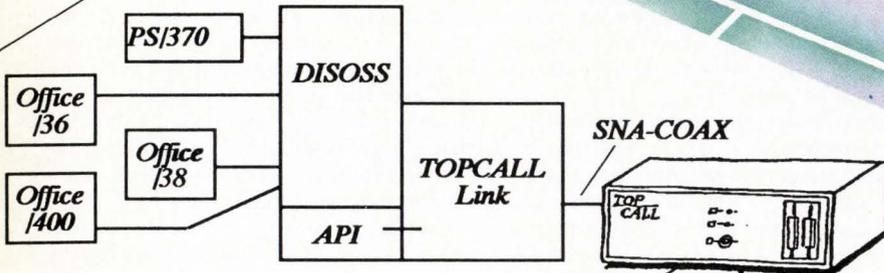
Janette Martin is DATAMATION's Milan-based correspondent.

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A Few New Looks in Optical and Imaging Systems

New optical storage products from ICI, Memorex Telex, and Kenda. From others, fiber-optic LANs, workstations, and small mainframes.

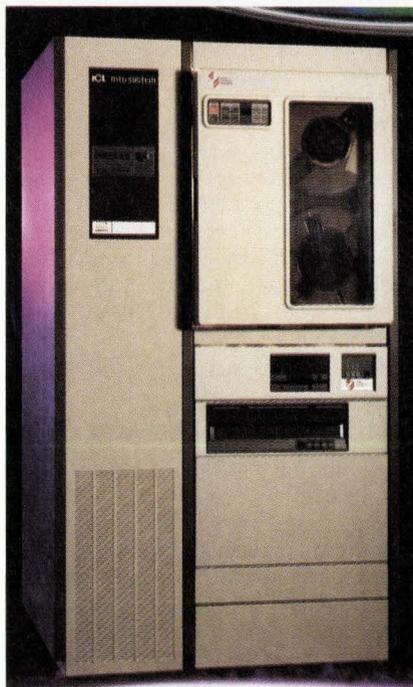


ICI's VP100: Provides near-photographic quality reproductions.

Imperial Chemical Industries (ICI) has launched a new company, ICI Imagedata, with products aimed at the expanding markets for low-cost bulk data storage and electronic imaging systems. The U.K. giant is hoping to profit from its strong research base.

Imagedata's Digital Paper is a unique optical storage material that can be slit into lengths as tape, stamped into disks, inserted into cassettes, or cut into strips or tags. Data is recorded with a solid-state laser and is indelible. ICI claims that a 2,400-foot reel of half-inch tape (similar to 10½ inches of mag tape) is capable of storing 600KB—and could lower the cost of storage to half a cent per MB.

Other new products include the ICI VP100, a dye diffusion thermal transfer material (D2T2) and printer system. For business graphics, desktop publishing, and presentation graphics, the material gives a near-photographic quality reproduction of any images stored in digital form. ICI IMAGEDATA, P.O. Box 6, Shire Park, Bessemer Rd., Welwyn Garden City, Herts AL7 1HD, U.K., (44-707) 32-3400. **Circle 210**



Kenda's optical disk storage system: Designed for ICL mainframes.

Plug-compatible supplier **Memorex Telex**, formed by the merger of Memorex International and Telex Corp. earlier this year, has introduced an optical storage subsystem based on WORM technology (Write Once, Read Many times) for IBM mainframes. Offering access of up to 1,363GB of data, the Memorex Telex 3500 consists of a controller and up to four automatic libraries of optical disks (similar to a jukebox) storing alphanumeric and image data. Each library can house between two and five drives, and up to 131 12-inch optical disks.

There are two models of controllers. The 3500-A20 operates in image processing mode under VM/SP, VM/XA, MVS/SP, MVS/XA, or ESA, and supports use of the Memorex Telex Filefolder image management package.

The 3500-A80, which emulates an IBM 3480 cartridge tape, allows the optical library to function as an automatic virtual tape library. The system can be run with any version of VM, MVS, or VSE with 3480 support. MEMOREX TELEX Hoogoordreef 9, 1101 BA Amsterdam, the Netherlands, (31-20) 97-4331. **Circle 211**

Kenda Electronic Systems has introduced an optical disk storage and retrieval system specifically designed for ICL Series 39 mainframes. Called the ODA 2000, it operates as a magnetic tape emulator connecting to ICL's HSMC (High Speed Magnetic tape Controller) unit. The HSMC then communicates with a Series 39 mainframe via a MACROLAN high-speed fiber-optic link. The base configuration includes an RSX 11M+ system, 80MB Winchester disk drive, console, optical disk controller, optical disk drive, KSME/ST/11 tape emulator, the HSMC, and costs \$96,488. KENDA ELECTRONICS LTD., Nutsey Lane, Totton, Southampton SO4 3NB, England, (44-703) 86-9922. **Circle 212**

Fiber-Optic LANs

Pilkington Communication Systems has developed a remote connection link for PC keyboards and screens, which, according to the vendor, improves security and simplifies the layout of larger commercial and industrial LANs.

Designed as a plug-in card, the Keyboard and VDU Remoter enables PC processor units to be rack-mounted in a secure, central place. Keyboards and VDUs are linked to the cpus over optical fiber, keeping network cabling to a minimum. Prices start at \$1,760. PILKINGTON COMMUNICATION SYSTEMS LTD. Kinmel Park, Bodelwyddan, Rhyl, Clwyd LL18 5TY, Wales, (44-745) 58-4500. **Circle 213**

Workstations

In line with its strategy to become Europe's number two workstation supplier, Nokia Data Ltd. has announced the Alfaskop WS386, a new 80386-based PC-workstation system. The WS386 provides high-speed 20MHz processing and is designed for use in either standalone, LAN, or integrated corporate systems. It features Microsoft's OS/2 support to run OS/2-based programs when they become available, and also runs multiple DOS applications under MS/Windows/386. A full graphics-based multitasking windowing system is provided by Microsoft's Windows Presentation Manager. Communications capabilities include Nokia's System 61 LAN range, and the company's



Alfaskop A91 workstation environment. About \$7,500 buys 2MB RAM, a VGA color graphics screen, 40MB hard disk, 102-key keyboard, MS-DOS 3.3, Microsoft Windows 386, cables, and a stand.

For the ergonomically minded, the company has also announced a new flat gas plasma monitor with a high-resolution, low-emissions display. Fully EGA-compatible, the Model 1010 has a resolution of 720 x 350 pixels, with a large active display area of 245mm x 179mm. Nokia says the display's extremely low radiation levels minimize health risks, and its low magnetic field reduces the build-up of dirt. NOKIA DATA SYSTEMS AB, S-163 98 Stockholm, Sweden (46-8) 793-7000. **Circle 214**

Performance Software

CMA Software A/S, a Danish company specializing in IBM data center operations and systems programming, has designed a new software package to improve IBM systems performance and productivity in TSO environments.

Called CMA-TSOPLUS, it frees the user from many of the delays and systems overheads inherent in TSO. The package comes with a variety of TSO enhancements. For example, TSOLINK allows users

to call a program without explicit reference to the library, and TSOCLAR allows users to switch automatically from line mode to full-screen mode. CMA-TSOPLUS runs on MVS/XA systems (SP 2.1 and SP 2.2) where TSO/E releases 2, 3, and 4 are installed. CMA SOFTWARE A/S, Marielundvej 46B, DK-2730 Herlev, Copenhagen, Denmark, (45-2) 91-88-33. **Circle 215**

Software Engineering

As part of its open systems strategy, Nixdorf Computer has introduced a computer-aided software engineering (CASE) framework to help users of its Unix-based Targon systems increase their software development and maintenance productivity.

Called NCAPE (the Nixdorf Computer-Aided Project Environment), it is a development environment that allows users to integrate third-party software tools. NCAPE's functions are accessed through a windows user interface and include systems analysis, design and maintenance, project management, and execution. NCAPE consists of three front-end CASE tools—a Delta-based program development system, a Docusys documentation system, and a database-stored project and product library. NIXDORF COMPUTER AG, Furstentallee 7, 4790 Paderborn, West Germany (49-5251) 150. **Circle 216**

Small Mainframes

Groupe Bull has announced its new DPS 7000/15 and DPS 7000/35 systems, targeted at small- to medium-size companies, and departmental organizations. Designed for use as departmental production machines running transaction-based applications, the systems use the Oracle relational database and the TDS transactional software program. Bull says they can be run as departmental machines in an all-GCOS environment or with IBM machines.

A DPS 7000/15 with 8MB of main memory, 1GB of magnetic disk storage, a streamer-type 1,600bpi magnetic tape drive, 15-terminal support, and an integrated CNP 7 telecommunications processor costs around \$125,000.

A DPS 7000/35 with the same main memory and mag tape drive, 2GB of magnetic disk storage, 40-terminal support, and a CNP processor with eight telecom lines sells for around \$250,000. GROUPE BULL, 121 Ave. de Malakoff, 75764 Paris Cedex 16, France, (33-1) 45-02-90-90. **Circle 217**

Prices are quoted when available.

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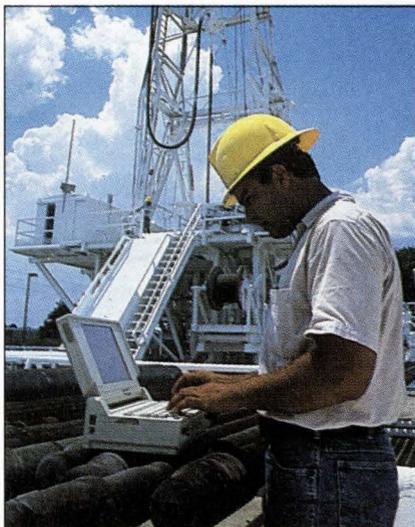
Compaq and NEC Debut Four New Laptops

Portability, light weight, keyboards are stressed in key announcements.

BY ERIC BRAND

First it was Santa Claus and his department store sitings. Then it was health clubs and their thigh-toning regimens. Now comes the latest wave to make laps chic: laptop computing. Currently hoping to ride that wave are two industry heavy-hitters. Compaq Computer Corp. has introduced the SLT/286 laptop, a slim, lightweight portable with power, says its maker. NEC Home Electronics Inc. has itself unveiled three new laptops—the modular ProSpeed 386 and 286 and the UltraLite, a four-pounder.

Based on the 12MHz 80C286 chip, the Compaq SLT/286 comes in 40MB or 20MB fixed disk drive models, with an access time of 29msec, according to Compaq. Most important, it weighs 14 pounds and measures 4 inches high by 13½ inches wide by 8½ inches deep. Other features on the battery-powered machine include what Compaq says is the industry's first



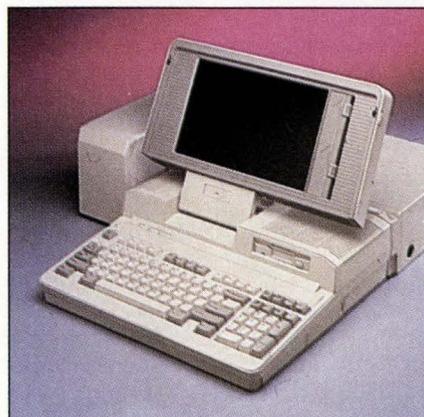
COMPAQ SLT/286: A slim lightweight, laptop.

internal 2,400-baud modem. The back-lit screen measures 9½ inches, and mass storage comes in the form of 1MB or 2MB silicon hard disk.

NEC says its 80386-based ProSpeed 386 is a modular system, and points to what it calls a Docking Station, which allows the user to plug and unplug the computer to "a customized array of desktop expansion and peripheral capabilities." The ProSpeed 286, based on the 80286, also offers expansion capabilities through internal expansion slots for system RAM, communications, and other functions. Both models use NEC's proprietary screen display, with a back-lit, black-and-white image of 640-by-400 pixels.

Available now, the Compaq SLT/286 Model 40 and Model 20 come complete with prices of \$5,999 and \$5,399, respectively. The NEC UltraLite, available this month, is priced at \$2,999. The ProSpeed 386 has been selling for the last month for \$7,699; the 286 will start selling next month at \$4,999. COMPAQ COMPUTER CORP., Houston. **Circle 269**

NEC HOME ELECTRONICS INC., Wood Dale, Ill. **Circle 270**



NEC PROSPEED 386: Modular in design with desk expansion capabilities.

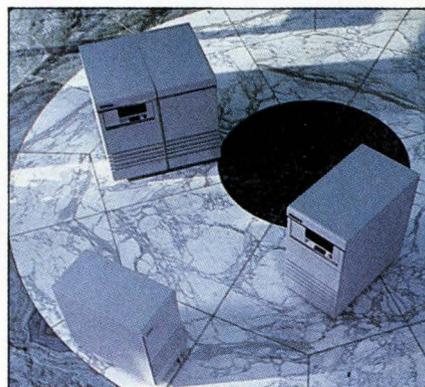
liquid crystal, supertwist VGA display with eight shades of gray in the resolution; and an 82-key removable keyboard with 101-key functionality.

Driven by the NEC V-30 processor running at 9.83MHz, NEC's UltraLite features a main memory of 640KB RAM, a full-sized, industry-standard keyboard, built-in DOS Manager and Lap-Link software, and an

Superminis and OS Are New from Harris

Testing the waters in the relational database management systems market, Harris Corp. has announced three enhanced models of its Harris HCX family, including a departmental system. Called the Harris HCX-2000 Series, the systems include the HCX-2500, 2550, and 2900, and run the vendor's enhanced CX/UX Unix operating system.

CX/UX is a dual-universe OS that provides both AT&T Unix System V and Berkeley extensions. It incorporates real-time features, says Harris; for example, the CX/UX process manager gives the system administrator control over task execution through priority task scheduling and memory-resident tasks. A user-friendly interface called the Directory Shell is provided by American Management Systems and is window based. The HCX-2000 Series features an intelligent communications processor board that interfaces to Harris's I/O subsystem, the Harris VME, an enhanced version of the industry-standard VMEbus.



The entry-level 2500 departmental system performs at 5MIPS and accommodates up to 64MB of physical memory and 64 directly connected interactive users. Up to 128 users are supported with the addition of a local area network. Prices range from \$99,000 to \$130,000.

The 2550, a more powerful departmental system, provides 8MIPS, up to 64MB of memory, and 64 interactive users. With the addition of a LAN, it will support up to 256 users. Prices range from \$149,000 to \$180,000.

The 2900 midrange system works at 8MIPS, has up to 128MB of memory, and can accommodate up to 512 users. Prices range from \$165,000 to \$250,000. All members of the HCX-2000 Series are available immediately. HARRIS CORP., Fort Lauderdale, Fla. **Circle 271**

NEW PRODUCTS

LN03 Plus Emulation For SmartWriter Printer

QMS Inc. has introduced a new SmartWriter 150 laser printer that supports LN03, LN03 Plus (AKA Tektronix 4014), and Hewlett-Packard LaserJet+ emulations. The SmartWriter 150 uses a 15 page-per-minute Ricoh 4150 print engine and has a 15,000-page monthly duty cycle. Features include dual 250-sheet paper bins, facedown paper output for a total of 500 sheets, and flexible paper support for letter, legal, A4, and half-letter sizes, according to QMS.



The vendor-designed internal controller is based on a 6800mpu operating at 16MHz and comes with 2.5MB of RAM and 1MB of ROM, which is used for emulations and the 19 resident fonts. The printer has dual Centronics parallel and RS232 interfaces for "plug-and-play" compatibility to most systems, says QMS, and can be attached to an Ethernet TCP/IP network via the QMS PrintLink controller. Available in January, the SmartWriter 150 carries a list price of \$6,995. QMS INC., Mobile, Ala.

Circle 272

2GB Tape Subsystem for IBM Mainframes

The 6860 Tape Subsystem is a high-density cartridge tape backup subsystem for the IBM System/38, 4300, and 9370 processors. The unit permits the storage of 2.3GB of data on a single 8mm tape cartridge, which, according to its manufacturer, reduces the time and costs associated with backing up data on standard, low-density tape reels.

The 6860 uses helical scan technology. Instead of a tape moving across a fixed recording head as in reel recording, recording heads are mounted on a drum that rotates at high speed as the tape is passed by.

Data is recorded at an angle, allowing a track length that, according to its maker, IPL Systems Inc., is nearly 10 times longer than the width of the tape.

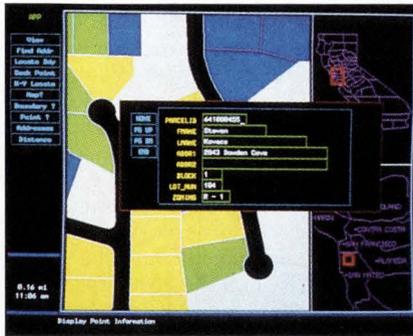
IPL claims it has designed the 6860 to be combined with its 6820 reel-to-reel tape drive to offer an integrated storage subsystem capable of performing a full range of storage applications on a variety of media. A total of seven cartridge tape drives can be driven by a single controller, says IPL, giving users the ability to back up the equivalent of over 84 tape reels in one session. The price of a basic IPL 6860 Cartridge Tape Subsystem, which goes on sale this month, is \$18,895. IPL SYSTEMS INC., Waltham, Mass.

Circle 273

SOFTWARE

Desktop Mapping Language and Software

A desktop mapping programming language and a new release of mapping software are the latest products from MapInfo Corp. The programming language, MapCode, allows users to create customized desktop mapping applications with the company's mapping package. Similar in structure to C, MapCode allows the creation of applications that combine graphic and textual databases, says its vendor.



Version 3.0 of MapInfo includes many new tools to make visual management of data more productive, according to the company. That includes, of course, the capability to run specialized applications created in MapCode. Other capabilities are whole world mapping, distance/area calculations, point analysis, on-screen scales, zoom layering, and multiple output per page.

Both run on the IBM PC with 640KB RAM, hard disk drive, and graphics capability. MapInfo 3.0 costs \$750, and MapCode is \$395. MAPINFO CORP., Troy, N.Y.

Circle 274

VM Software Upgrade Supports VM/XA SP1

VMCenter II, VM Software Inc.'s systems software for IBM's VM environment, is now in Release 2.0. According to the vendor, the new release simplifies installation, maintenance, administration, and systems upgrade.

Administrator functions have been consolidated onto one screen, enabling the system programmer to more easily install and upgrade components, add cpu IDs, load help files, and determine the status of individual components.

VMCenter II also includes support for the VM/XA SP1 environment, allowing customer sites running VM/XA SP1 to benefit from the same functionality currently enjoyed under VM/SP and VM/HPO environments. It's available right now for \$25,000 to \$88,000, depending on machine size and configuration. VM SOFTWARE INC., Reston, Va.

Circle 275

Statistical Analysis Package for Micros

The maker of SPSS/PC+ V3.0 says the new package brings more sophisticated, yet easy-to-use statistical analysis procedures to the microcomputer. Running on the IBM XT, AT, and PS/2, the package does not require a key diskette to operate, unlike its predecessors.

New data management facilities include the ability to process data files containing up to 500 variables; a file transposition facility that allows users to reorganize data to fit their analysis needs; and a facility that automatically recodes the values of variables into consecutive integers.

New statistical procedures include an exploratory data analysis procedure that produces a variety of univariate statistics; a ranking procedure; a nonlinear progression procedure; and a log-linear procedure. Additional microcomputer hardware and software that is now supported by the new package include Token Ring, Novell, and 3Com local area networks; dBase IV, Symphony 2.0, and Multiplan 4.0; and version 4.0 of PC-DOS or MS-DOS.

Applications include survey analysis, market research and product testing, personnel evaluation, decision support, health care analysis, and statistical quality control. Requiring 512KB of RAM, a hard disk, and PC-DOS or MS-DOS 2.0 or higher, SPSS/PC+ V3.0 carries a price of \$795. SPSS INC., Chicago.

Circle 276

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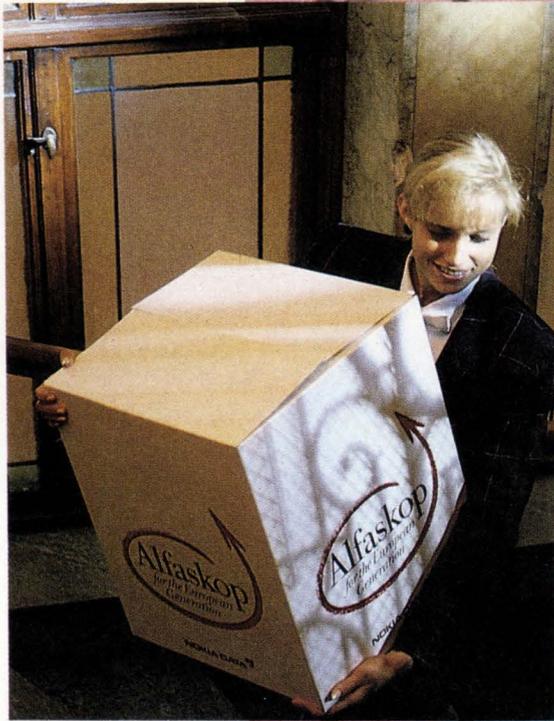
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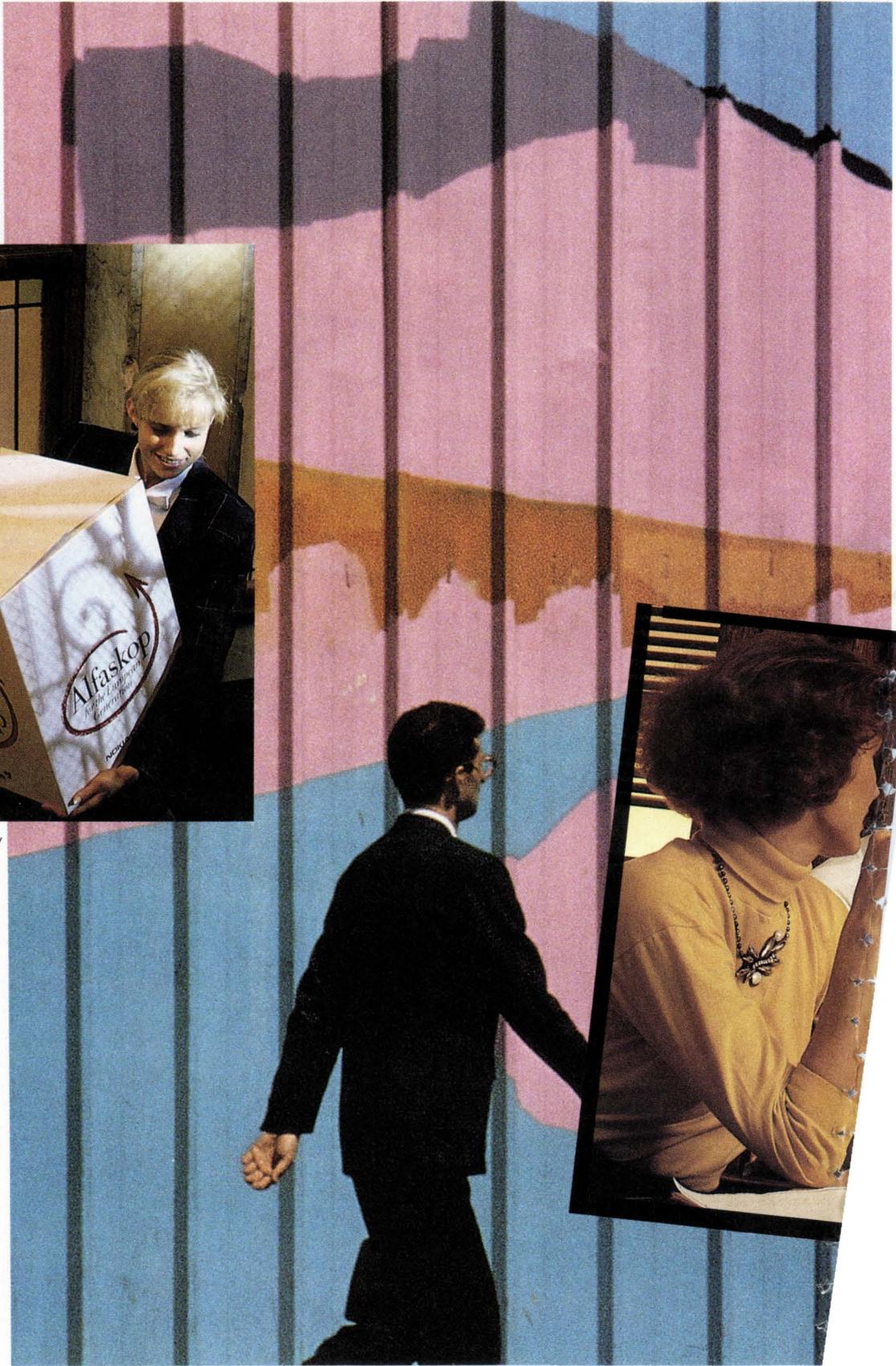
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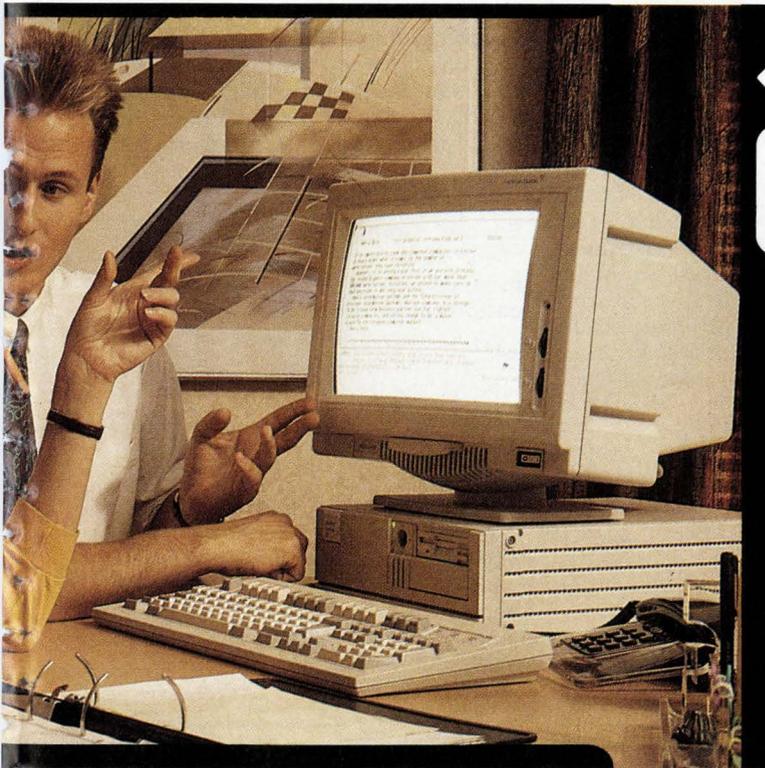
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Circle 55 on Reader Card

On-Line Reference for Microsoft Programmers

Microsoft Corp. is offering the Microsoft Programmer's Library, a CD-ROM tool that it says makes 20,000 pages of reference materials and sample code available online to programmers. The Programmer's Library comprises 48 books and technical manuals on Microsoft operating systems and languages, ranging from quick reference to detailed discussions. It is indexed and cross-referenced, and access can be gained to all material from inside the user's text editor or word processor and copied directly into programs or documents without rekeying, according to Microsoft. References are grouped into nine categories: MS OS/2, Windows, MS-DOS, C, BASIC, Macro Assembler, Pascal, FORTRAN, and Hardware.

Requirements are an IBM PC, XT, AT, or PS/2, with 640KB running DOS 3.1, 3.2, or 3.3; and a CD-ROM disk drive with MS-DOS CD-ROM extensions. A hard disk is recommended, but two double-sided floppy drives are adequate. The price is \$395 through Dec. 31; contact Microsoft for the price thereafter. MICROSOFT CORP., Redmond, Wash.

Circle 277

COMMUNICATIONS

End-User OSI Software

Touch Communications Inc. has introduced Touch OSI, a family of end-user networking products for the Open Systems Interconnection (OSI), and Touch OSI QuickStart Plus, a bundled training, product, and installation package for use with the Touch OSI family.

Touch OSI supports the Apple Macintosh, IBM PC, and Digital Equipment Corp. VAX/VMS computers. According to the vendor, Touch OSI interoperates with other vendors' implementations of Technical Office Protocol (TOP) 3.0, Government OSI Profile (GOSIP), and Manufacturing Automation Protocol (MAP) 3.0. Other features include allowing users to store files on remote servers and access them transparently using native commands and operations; the redirecting of standard print requests to remote network printers; and the redirecting of serial communications to remote hosts, allowing existing DOS and Mac terminal emulation applications, as well as other serial communications applications, to run across an Ethernet network.

QuickStart Plus includes a VMS server

package with a five-user license and any two-client combinations of DOS and/or Mac, and the necessary Ethernet network controller hardware. The three-day training, for up to 10 users, covers network installation and use of a Touch OSI network in addition to a Touch OSI Network manager course, a Network User course, and an "Introduction to OSI" course.

Touch OSI Macintosh runs \$395 for the software only, \$940 bundled with network controller hardware. Touch OSI DOS is priced at \$395 alone, and \$1,340 bundled. And Touch OSI VMS starts at \$3,000 for a five-user license. QuickStart Plus goes for \$7,495, including 30 days of telephone support. TOUCH COMMUNICATIONS INC., Scotts Valley, Calif.

Circle 278

Microwave System for Token Ring LANs

A new microwave system from Microwave Networks Inc. (MNI) is available for IEEE 802.5 Token Ring LAN applications. The MicroNet Token Ring Radio interfaces directly to the 4Mbps token ring network, according to MNI, to provide all the network advantages of LAN microwave links.

MNI says this link, operating at either 15GHz or 23GHz, can connect computer terminals to wiring concentrators or terminal to terminal when traditional cabling is either impractical or not possible. At the full network speed of 4Mbps, the MicroNet Token Ring Radio can extend all LANs that use the IEEE 802.5 Token Passing Ring Access Method, according to the vendor. Available now, it is priced from \$10,700. MICROWAVE NETWORKS INC., Houston.

Circle 279

Add-In Board Links PC and Fax

A new PC-to-fax product allows user to simultaneously send and receive multiple faxes or high-speed file transfers. The GammaFax Communications Professional (CP) from GammaLink Synchronous Communications is an add-in board designed for multiline use: as many as eight GammaFax CP cards may be installed in a single PC, says the company.

The CP has an on-board 80188 processor and 256KB of RAM, expandable to 512KB, and requires 65KB of the host PC's RAM. Its internal fax modem transmits data at 9,600bps. The communications software supplied with the CP includes a queue manager for scheduling unattended fax transmissions. Designed for use with an IBM PC, it is priced at \$1,095. GAMMALINK, Palo Alto.

Circle 281

BRIEFS

Rancho Technology Inc., Rancho Cucamonga, Calif., has unveiled three new **hard disk installation kits for Unix System V** users. An IBM AT version with 16-bit SCSI host adapter, software, and cables is \$245. An XT/AT version with 8-bit adapter is \$160, but with a built-in floppy controller on the host adapter board, it's \$215.

Circle 218

Control Data Corp., Minneapolis, has introduced four low-cost, high-performance models of its **Cyber 910 workstation**. At 10MIPS and 9MFLOPS, graphics performance is 85,000 3-D vectors per second and 5,900 gouraud-shaded polygons per second. Prices range from \$19,990 to \$34,990.

Circle 219

BOS National Inc., Dallas, has made an expanded version of the **BOS COBOL Programming Software** available. Version 6.1, with standard COBOL constructs and a screen formatter, is priced at \$1,500 for single-user applications and \$3,000 for multiuser.

Circle 220

Encore Computer Corp., Marlborough, Mass., has announced MAXuser, a menu-driven **user interface and applications platform** for its Multimax parallel processing systems line. For \$7,500, it will give you quick access to applications running under Encore's version of Unix.

Circle 221

VIA Information Systems Corp., Princeton, N.J., has enhanced its **VIA/DRE DBMS for PC LANs and WANs**. The VIA/Host Data Base Server costs \$3,500, and the VIA/COOL (C-based Object-Oriented Language) facility costs \$1,395; together, they're \$4,500.

Circle 222

Advanced Computer Communications, Santa Barbara, Calif., has given IBM MVS users a new software package that can **access non-IBM applications with full-screen ASCII terminal emulation**. It's available immediately at \$13,000. The vendor also sells a new high-speed interface that **connects IBM MVS and VM hosts to Ethernet LANs**; also available immediately, it sells for \$19,000.

Circle 223

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Sector Performance Update: Spotlight on Industry

Good news dominates reports from three industrial sectors: electronics, industrial, and metals.

BY MADELINE FRANCHI

In the electronics sector, growth in 1988 was the best since 1984. Renewed equipment investment by business, increased opportunities for exports, and the upward momentum of the business cycle propelled electronics industry growth this year. To keep pace with the influx of new orders, electronic manufacturers have expanded their output levels about 8% so far in 1988. Electronics sales climbed almost 11% through July compared with the same period last year. Shipments are forecast to total \$258 billion this year, compared with \$212 billion in 1984.

For many companies, this rebound has meant a return to increased profitability. For IS in the electronics sector, the news potentially translates into more dollars for staff and equipment. During 1988, the electronic and electrical machinery industry invested roughly \$18.2 billion in new plants and equipment, which represents a 19% hike over the spending rate in 1987.

The industrial machinery and automotive sector is also doing well. Nonelectrical machinery sales were up about 16% compared with 1987. This increase encompasses factory shipments of general industrial, farm, and construction

machinery.

A big boost is the booming export market. In order to increase capacity to meet the demand, machinery makers invested roughly \$15 billion this year in new plants and manufacturing equipment.

The domestic auto industry is benefiting from less import competition due to the weaker dollar. In the first seven months of the year, domestic auto sales rose 8% above sales for the same period last year. Sales of light trucks continue to boom. Through July of this year, sales of class I and class II trucks were 9.6% higher than a year ago. At this pace, year-end sales are expected to advance 8.6% to nearly 4.7 million units, making 1988 the fifth consecutive year of record-breaking growth in truck sales.

However, don't look for the auto manufacturers to put any extra dollars into their equipment budgets right now. They spent billions in 1984 and 1985, so growth in their capital spending will be squeezed for some time to come. The industry's expenditures for new plants and equipment are expected to shrink about 5% in 1988 compared to a year ago.

Metal products are also rebounding. In-

dustrial production of fabricated metal products expanded 10% from August 1987 to August 1988, and more gains are expected. The combined forces of a declining U.S. dollar and strong foreign economies produced a strong demand for U.S. capital goods, including forgings, stampings, and structural metal products.

Capacity utilization in this industry hit 84.4% in August, the highest monthly rate since October 1979. Metal manufacturers are now investing in new plants and equipment to keep their factories and information processing needs running smoothly. If spending continues as expected, this industry will have sunk about \$4.4 billion into capital stock this year.

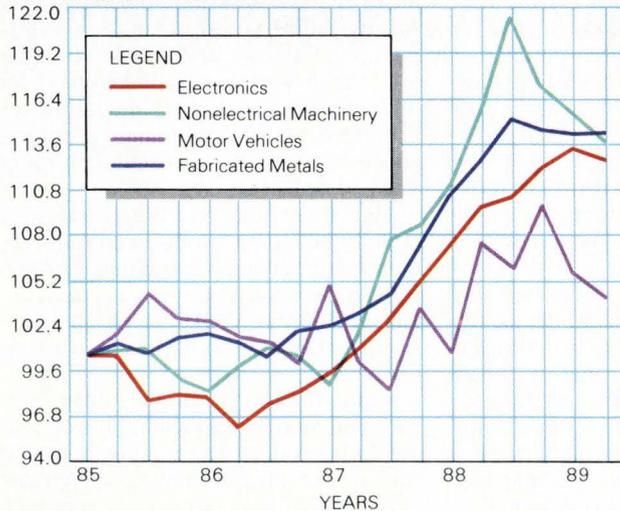
Once each quarter, Information Economics will report on the health of various U.S. economic sectors. Future issues will cover the action in food and beverage, pharmaceuticals, petroleum and petrochemicals, process industries, retail, utilities, banking, insurance, health care, transportation, and government.

More economic information can be obtained from Cahners Economics Department, 275 Washington St., Newton, MA 02158, (617) 964-3030.

Industrial Production Index

The sharp updraft in production is coming to an end: 1989 numbers may approach late-'87 levels.

1985 Q1 = 100



Source: Federal Reserve Board and Cahners Economics

Economic Spotlight Tidbits

Gauge your industry's health by following these economic indicators (in \$ billions).

	Actual 1987	Forecast 1988
Electronics*		
Shipments	\$235	\$258
Average capacity utilization	75.4%	77.4%
Plant/Equip. spending	\$16.6	\$18.2
Nonelectronic machinery**		
Shipments	\$156	\$180
Average capacity utilization	74.5%	80.0%
Plant/Equip. spending	\$13.9	\$15.0
Motor vehicles		
Auto shipments (millions/units)	7.1	7.6
Average capacity utilization	79.2%	80.3%
Plant/Equip. spending	\$11.9	\$11.3
Fabricated Metals		
Shipments	\$135	\$144
Average capacity utilization	78.2%	83.1%
Plant/Equip. spending	\$4.0	\$4.4

*Includes computers and office equipment, tv and radio, communications equipment, electronic components, and scientific and engineering instruments

**Excludes computer and office equipment shipments

Source: Commerce Dept., Federal Reserve, Motor Vehicle Mfrs. Assn., Cahners Econ.

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OPINION

The Viral Age

The creation of computer viruses may prove to be the signature crime of our era, like kidnapping in the 1930s, highway robbery in the eighteenth century, or bootlegging in the 1920s. After years of attention from the computer press, the ARPANET virus has put computer viruses into the media mainstream. Now you can watch vapid anchorpersons mispronounce computer terminology and misunderstand computer technology at almost any hour of the day or night. The current viral attack has even produced a star of sorts—a lanky, Jimmy Stewart-type perpetrator with a shy smile who is probably now fielding offers for the miniseries rights to his story.

What none of the mass-journalism stories have seemed to notice is how large a role was played by "scale" in the ARPANET incident. Had not young Robert T. Morris Jr. made an error of scale, specifying a wrong number of cycles to determine its growth, it's likely his hack might never have been discovered. (A programmer friend with whom I was discussing the case said, "I tell you, that C code is *so* hard to debug!") John M. McAfee, chairman of the Computer Virus Industry Association, told the *New York Times*, "There have been 800 large and small [viral] incidents in the last eight months." If, as I suspect, this is only the visible tip of the iceberg, then error-free viruses are probably a lot more prevalent in today's computer systems than people are willing to admit, doing everything from skimming cash to poisoning databanks, in small-scale increments, unnoticeable to most, or all, users. (Young Morris's crime didn't pay off in cash but in power. Granted it was the power to disrupt, but power it was.)

All this suggests attention to another item that has been discussed in the computer press for as long as have viruses: questions about security and Unix. What effect will publicity about the ARPANET virus have on the Unix market?

But I think back to an article I wrote nearly 15 years ago about how easily any networked computer system could be invaded, and realize that while Unix may have its own security shortcomings, the problem isn't system specific. It is, instead, like other crimes that somehow come to define the eras in which they occur, almost inevitable—growing naturally from a technology or behavioral climate. Highway robbery was a natural concomitant of a technological breakthrough—highways passable in most weathers—as great for its time as are networked com-

puters today. And a miniseries about the young Morris's exploits may be as inevitable as were the vastly popular poems that celebrated the highwaymen of the past.

—Parker Hodges, *Managing Editor*

The Fairy-Tale of Fortress Europe

Once upon a time, across the ocean and far away in a land called Europe, were many countries who suddenly wanted to be friends. For at least a millennium they'd been spending their time devastating each other's cities and killing each other's citizens. But now they were all very sorry and thought they would be better off working together.

So they met in a large gray and glass castle in Brussels and decided that on the last day of 1992 they would all become one big happy family, trading courtesies, goods, and services freely among each other. To make it happen, they decided to call on the special magic of technology, which let everyone trade with each other easily.

After a while, though, some of them got worried. A lot of the best and cheapest magic seemed to come from distant and strange countries. "What if," asked the worried, "the promised land turns out to be a place where the milk and honey have to be imported from somewhere else?"

The solution, some decided, was a new fortress. Built out of trade penalties, soft sanctions, ramparts of import duties, and bureaucratic procrastination, the fortress was supposed to protect the new group of friends from the greedy forces of the West and the mysterious hordes in the East.

Well, as in many fairy tales, this turned out to be an awesomely stupid thing to do. As any self-respecting toad knows, fortresses invite siege, and, besides, this one was built on very shaky foundations. A lot of the European countries and industries depended on outside money, products, and technological magic to build the thing in the first place.

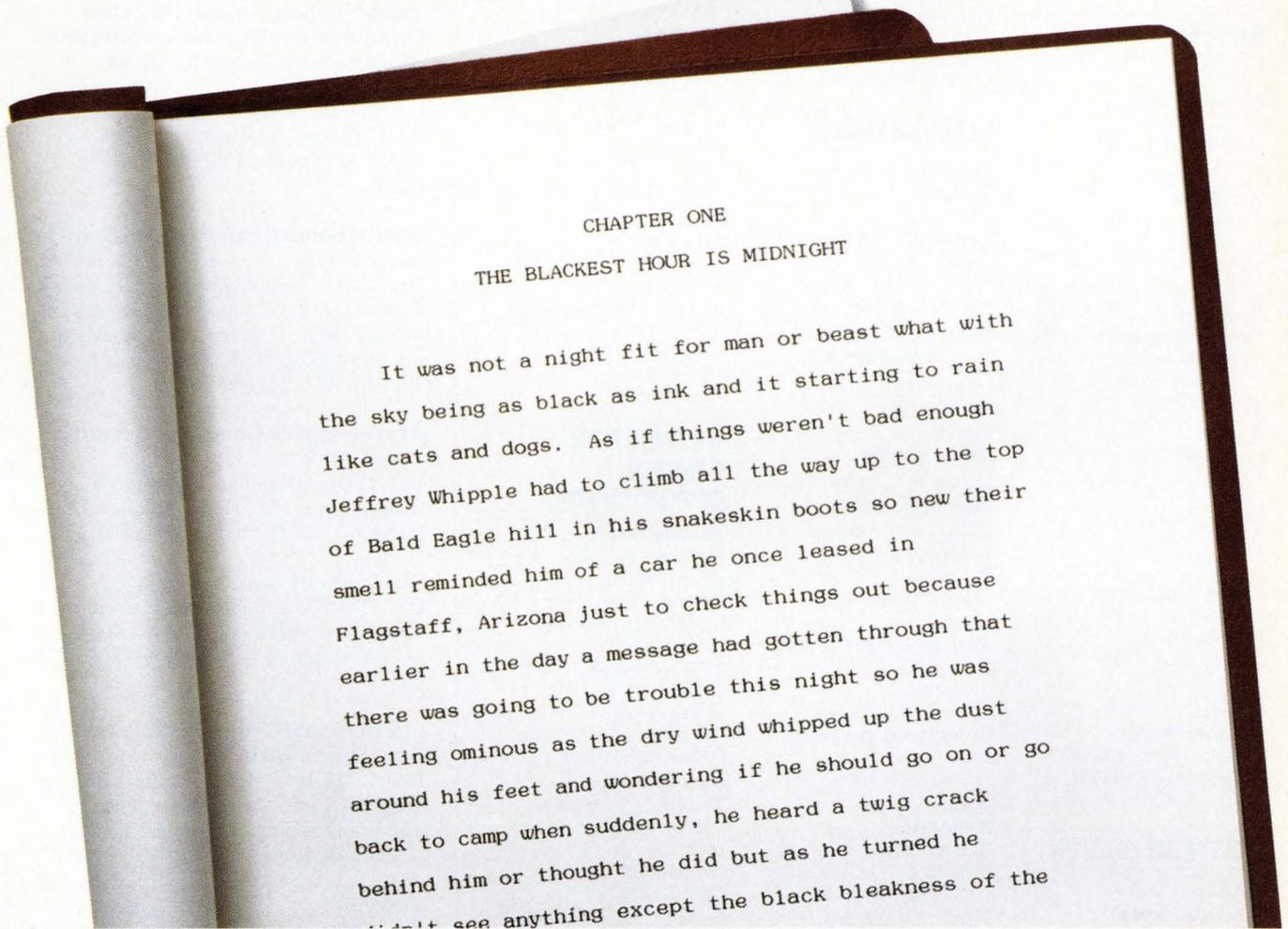
The cornerstone of a free market was undermined by the ironic need to create more trade barriers surrounding Europe. And finally, it wasn't the way that things in fairyland were going. The free global market was what everybody else was working on.

So the fortress became less like a fortress and more like a prison. Lots of people lost international trading partners. And lots of local technology magicians went out of business after all the reprisals.

Nobody lived happily ever after.

—Paul Tate, *International Editor*

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International Conference on Com- puter Vision

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Ruzena Bajcsy, Computer & Information
Science Dept., University of Pennsylva-
nia, 200 S. 33rd St., Philadelphia, PA
19104-6389, (215) 898-6222.

4th Aerospace Computer Security Conference

Dec. 12-16, Orlando, Fla. Contact Mar-
shall Abrams, 1820 Dolley Madison Blvd.,
McLean, VA 22102, (703) 883-6938.

EDI Systems Conference

Dec. 13-14, Washington, D.C. Contact
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International Computer Science Conference '88

Dec. 19-21, Hong Kong. Contact Dr. Kam
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Supercomputing Solutions '89

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MECOM '89

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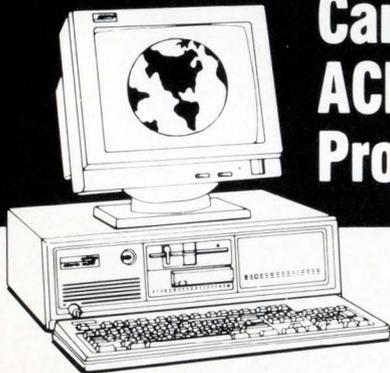
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