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SEPTEMBER 1, 1987
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REPORT

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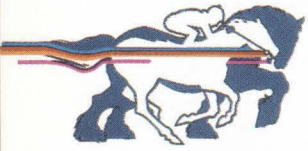

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NEWS

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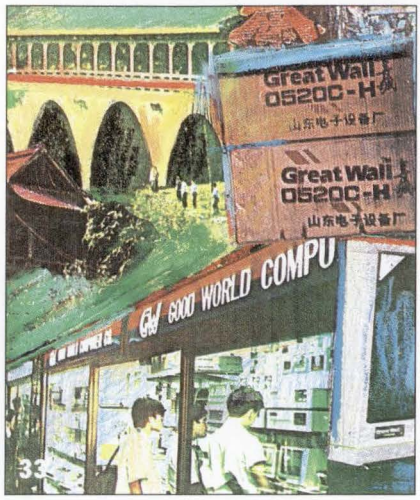
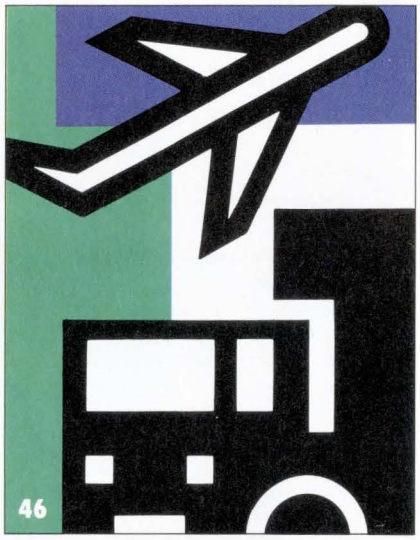
After exclusive interviews with Chinese officials, Paul Tate and John H. Maier file their report, "Dateline Beijing: The China Syndrome," which explores China's attempts to step up the pace of computerization in its society and the implications both for the country's national computer industry and its relations with the foreign firms with whom it did $50 billion worth of business in 1986.

FEATURES





46 **COVER STORY: Industry by Industry IS Survey**
What are your competitors spending on information systems? DATAMATION's survey of 120 large U.S. companies in 12 industries shows that the average MIS budget at the top U.S. companies is about 2% of total revenues, but big users in heavily automated industries can spend over 6% of revenues on computing. This year, their IS spending will approach or top $30 billion. Here's how IS execs in those top shops allocate their world-class resources.

92 **Living with the High Yen**
BY ROBERT POE
In 1986, Japan was the land of the rising yen. The 29% ascent in value over the dollar left the IS suppliers that comprise DATAMATION's Japan 10 unable to protect their bottom lines—especially IBM Japan. But the sun also rises: the market for IS experienced reasonable growth and user budgets in Japan increased.

98 **Network Management: Keeping the Connection**
BY BILL MUSGRAVE
With all the tools now available to monitor virtually every piece of a datacom network, the vital function of network management should be as easy as, oh, building a tower in Babel. The hitch here, too, is communications, involving common carriers, common standards, and some basic equipment incompatibilities.

ION

REAL TIME

4 **Letters**
A segment producer for ABC's *20/20* writes that our recent article on software bugs helped put the issues involved in focus; the author of *Crunch Mode* responds to our review of his book; and a professor of industrial psychology comments on our story on establishing shift schedules for an around-the-clock operation.

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123 **Calendar**
This is the month for Info '87 in New York.

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Does not appear in all copies.

-5 **India's Soft Hopes**
BY ROBERT POE
For India, the passage to the world technology market is software development. India boasts low labor costs and a high level of technical expertise, but restrictions on the use of foreign currency reserves to purchase developmental hardware—not to mention the defection of professionals to the U.S.—are among the problems in its path to a leading role in the field.

Cover Illustration by Javier Romero

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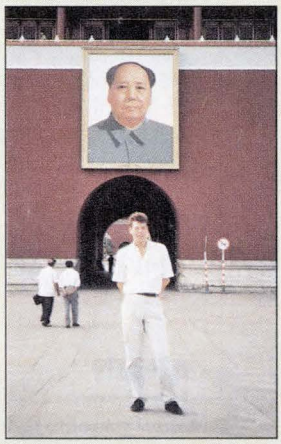
1987 JESSE H. NEAL AWARD

Editorial

Breaking Down The Great Wall



INTERNATIONAL EDITOR PAUL TATE

Although diplomatic and business channels between China and the rest of the world have grown increasingly wider in the last two decades, the country is still forbidding to multinational end users and information technology vendors trying to set up shop there. Last year, China traded $50 billion in goods and services with other countries. Yet, U.S., European, and Japanese executives forming strategies for doing business in and with the country of more than 1 billion people still view the journey ahead as difficult.

That's why DATAMATION sent international editor Paul Tate to China in the early summer. Tate finds that the Asian giant's efforts to use information technology to build a modern economy and to support a massive expansion in international trade is going in slow motion. "For international companies, especially those selling technology-based services or technology products, it makes doing business with China as complicated as a Chinese puzzle," Tate reports. Chinese authorities, he discovers, are doing everything possible to make the puzzle less complicated. The exclusive Behind the News report, "Dateline Beijing: The China Syndrome" (p. 33), we believe, contributes to that effort.

On his return from China to his London base, Tate stopped off in Japan long enough to give Tokyo bureau manager Robert Poe a hand at compiling our annual ranking of the top 10 information systems companies doing business in Japan ("Living with the High Yen," p. 92). The pair analyze the impact of the appreciation of the Japanese yen against the U.S. dollar, discerning that the shift dampened the bottom lines of IS suppliers far more than the appetite of Japanese customers for computers and communications equipment.

Tate has returned to London and his usual beat managing DATAMATION's international coverage, while Poe continues to monitor developments in the Pacific Rim.

Tim Mead

TIM MEAD
EDITOR-IN-CHIEF

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Letters

Bugs on Tv

I enjoyed very much your article, "Software Bugs: A Matter of Life and Liability" (May 15, p. 88), and found it especially useful because we were in the middle of producing a segment on the Therac 25 for ABC's *20/20* tv program.

Your mapping of the borderline between technology and the law was cogent and compelling, and for us, at least, very timely.

JONATHAN WARD
Producer
The Universe Group
Washington, D.C.

A Reply

I read your review of my book *Crunch Mode* (Books, July 1, p. 86).

I have found that most of us who make our living doing "crunch mode" projects develop an individual style for dealing with the problems they present.

Most of the projects I have been called in on had gotten into trouble because the well-known practices of top-down design, structured programming, and project tracking had been laid aside in the rush to get the software built. A great deal of my initial effort is spent on getting everyone to slow down and set up a plan that can be followed. A point I tried to make in *Crunch Mode* is that planning is possible in this environment, but that it may not be possible to set up the plans with the level of detail that could be achieved with additional time.

I remain troubled by the fact that there seems to be no good way to estimate software cost or time rapidly. Approaches such as the COMOCO model described by Boehm simply take too long to develop. We are forced back to rely on a combination of expert opinion, analogy, and bottom-up estimating. I face the estimation problem on a regular basis since most of my work is done under fixed-price contract, and I have yet to come upon a consistently reliable method that does not rely upon the combination of techniques mentioned above. The important point raised in the book is that some method must be used other than simply dividing up the time available and pretending that all the tasks will fit into their allotted slots. Again, this is second nature to the experienced project manager.

The review did contain one factual error. Louisville Downs is a real racetrack, located in Louisville, Ky. Throughout the book, where company names are used, they are the names of real companies. Dynatote's systems and assets were purchased by United Tote of Shepard, Mont., about three years ago.

JOHN BODDIE
Landenberg, Pennsylvania

Talk to a Pro

I read with considerable interest Morris V. Polston's report, "Staffing Your 24-Hour Computer Center" (July 15, p. 75), and was pleased to learn of Miles Laboratories' success.

But as an investigator of work systems who has studied shift work for many years and has helped improve how shift work is done, I suggest that it is very important to wave a serious warning flag. In the past 20 years, we have learned a lot about the hazards of shift work. There is evidence that worker preferences do not always match what is needed to maximize their health, happiness, and productivity. Poor choices can lead to increases in accidents, errors, and worker compensation payments.

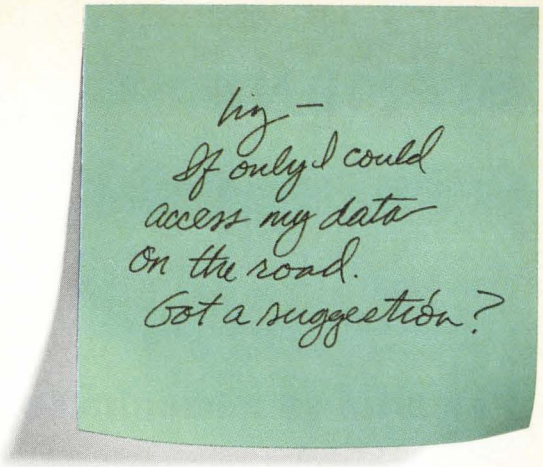
Shift work issues are complex, and making recommendations with regard to work systems is as much art as it is science. This does not mean that it must be guided by amateur human factors specialists. When new computer systems are needed or old ones need attention, a good manager seeks quality, experienced help from an appropriate specialist. When work schedules are the issue, a good manager should seek assistance from a professional human factors specialist with the appropriate training and experience. Why settle for less?

DONALD I. TEPAS
Professor and Director
Division of Industrial and Organizational Psychology
University of Connecticut
Storrs, Connecticut

Correction

In "CCA Is Going Back to the Basics" (July 15, p. 28) an editing error wrongly attributed a quote. Ken Draeger, now president and ceo of AutographiX Inc. told our reporter, early in 1986, "We had an opportunity to sell CCA to another software company [which he declines to name]. I think it was a good option but the Crowntek board decided against it. Then came the dent in the DBMS marketplace created by DB2."

The editing error incorrectly attributed the statement to Larry DeBoever. We apologize for the misattribution.—Ed.



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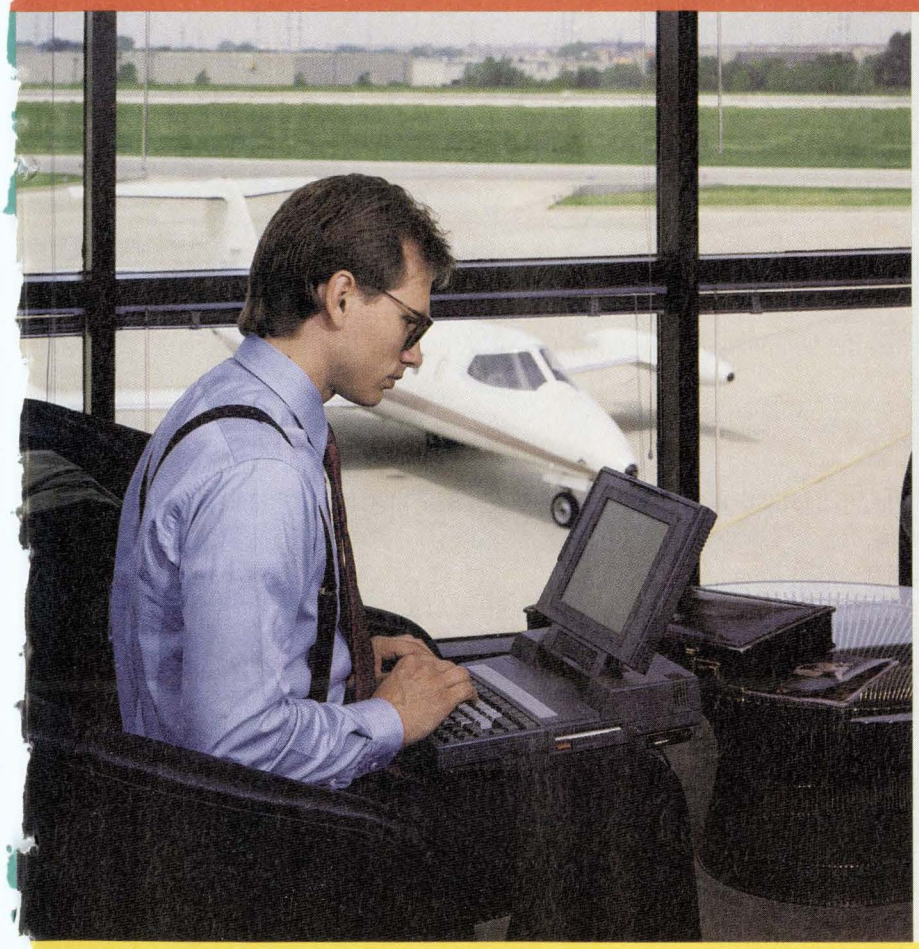

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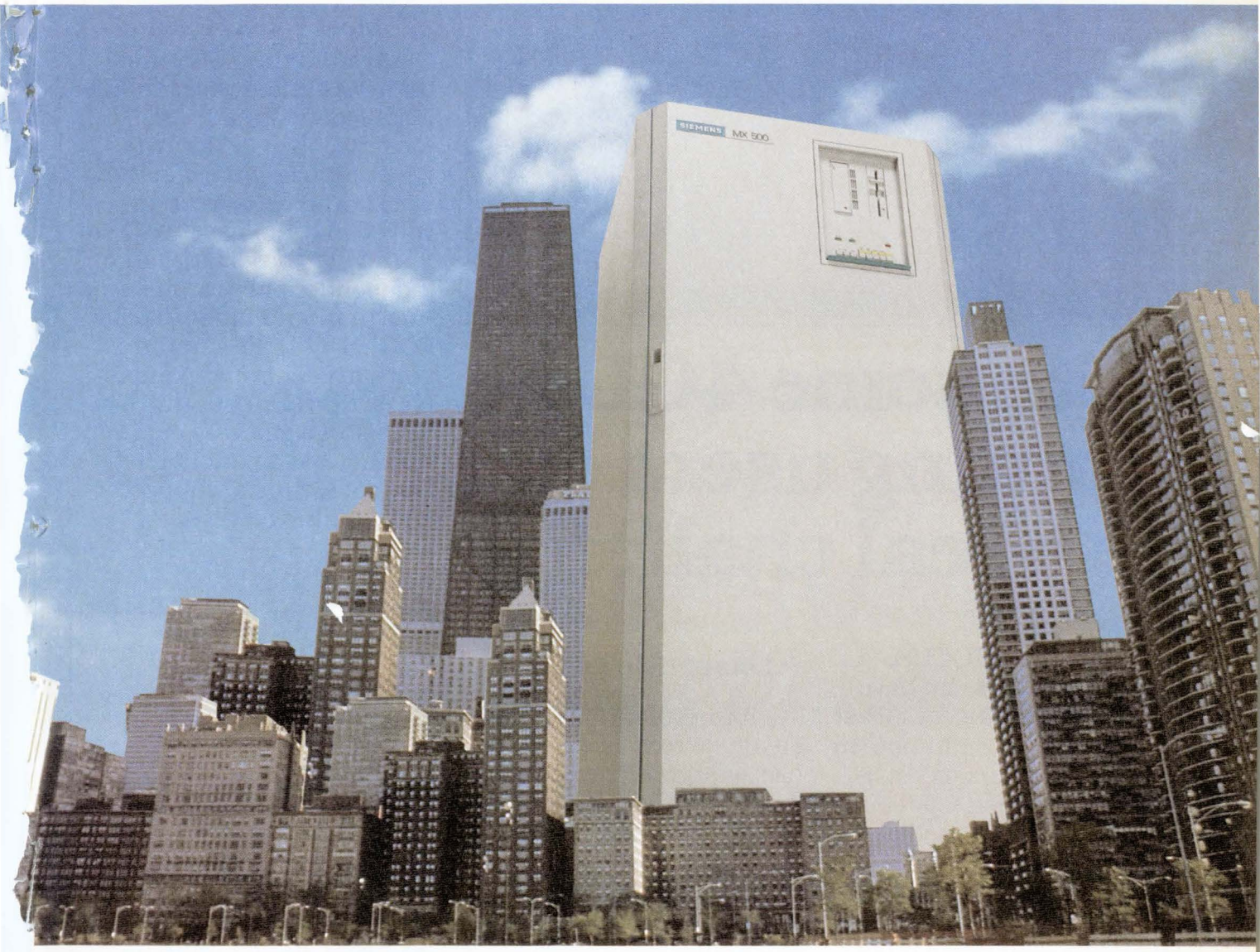
SIEMENS MX 500

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Look Ahead

SLOW PATH TO EXTINCTION

BURLINGTON, MASS. -- It won't happen overnight, but IBM is telling key analysts about a plan to migrate DOS/VSE users to a repackaged version of MVS. The migration will be stretched out due to changes needed in 9370 computer hardware and in MVS itself, says Brad Friedlander, senior consultant at Arthur D. Little Inc. He says that IBM already has a name for the implementation: MVS Integrated System (MVS/IS). The proposed version, like the XA version of MVS, will support 32-bit addressing. Friedlander cautions that the IS implementation "is way out in the future," but provides the clearest indication to date of IBM's strategy to move DOS/VSE users to a new environment.

DEC'S ABOUT-FACE

PONTIAC, MICH. -- Digital Equipment Corp. has formed an emergency MAP committee and has done a quick 180° turn on its MAP position after several of its key customers put a two-week hold on purchases from the mini maker, sources say. Apparently, the customers were responding to DEC's May MAP attack, when the company stomped on GM's toes over a joint statement of MAP support (see "What's Behind Digital's Public Criticism of MAP?," July 1, p. 19). Sources say DEC has promised both to join the General Motors booth at next June's Enterprise Networking Event (ENE) and to have a production code MAP version 3.0 product ready by the fourth quarter of 1988. Previously, DEC had committed only to showing its flag at the Corporation for Open Systems booth at ENE and it wasn't supposed to have a 3.0 product until 1990. A DEC spokeswoman says the economic boycott "hasn't come to our attention" and that the company's position on the 3.0 product "hasn't changed." It promises to be a hot topic at this month's MAP/TOP User Group meeting.

PAVING A PATH FOR SPECTRUM

CUPERTINO, CALIF. -- Hewlett-Packard, as part of its ongoing effort to help HP 3000 users migrate to its new Spectrum architecture system, has begun to ship a set of software evaluation tools and is planning to begin marketing a migration consulting service. The new migration tool kit is intended to detect object code routines in applications that would be incompatible with HP's new MPE/XL operating system for the HP 3000 Series 930 and 950 Spectrum systems. So far, through testing at its Software Evaluation and Migration Center here, HP has discovered that some HP 3000 users and third-party software designers exploited what HP calls the "privileged mode" of the predecessor MPE V operating system and, therefore, the applications are incompatible with MPE/XL. The consulting service, to

be called Fastlane 3000, will allow HP field support staff to help users migrate to Spectrum and MPE/XL by drawing on the experience of the 100 users that have migrated to Spectrum at the center here. HP has set up migration centers in West Germany at Böblingen and in the U.S. at Atlanta, Baltimore, and Minneapolis to support the consulting service. Another center is planned for Australia.

REMEDY FOR PROGRAMMER SHORTAGE

TOKYO -- Japanese computer firms are turning to their users for software expertise to relieve a national shortage of systems engineers and programmers. A large proportion of Japanese software talent is employed by corporate end users, who prefer to maintain large staffs to develop custom software in-house rather than purchasing ready-made packages. Manufacturers working with their customers for software development include Fujitsu with Toray Industries and Taiyo Kobe Bank, and IBM Japan with Hokkaido Takushoku Bank and Tokai Bank.

KEY TO THE FUTURE?

SANTA CLARA -- The good news for users in search of a transaction-oriented alternative to MVS is that Key Logic Corp. and the Department of Defense's Computer Security Center (CSC) have agreed on a way to evaluate the level of access security offered by Key Logic's KeyTXF/KeyKOS operating system. The bad news is that it could take up to four years for CSC to complete its evaluation of KeyKOS. Previously, CSC was having trouble deciding how to judge KeyKOS's security, since the unique object-oriented OS, unlike MVS and other systems, incorporates security at its lowest levels. If KeyKOS makes its way through CSC's evaluation process, it could be approved for DOD use.

WHAT'S NEXT FOR PEROT?

PALO ALTO -- When former EDS chairman H. Ross Perot decided to invest $20 million in Steve Jobs' Next Inc. workstation company, Jobs explained the odd pairing by saying he and Perot "share values." That may not be all they'll end up sharing. Sources say that as part of his investment, Perot sought exclusive rights to sell the Next workstation into markets not initially targeted by Jobs. Specifically, Perot would sell the workstation to government users and to such business markets as aerospace, while Next itself focuses on education, audio, and video markets. A Next official denies that Perot has locked up any exclusive marketing rights to the Next workstation so far, but, she adds, "An arrangement like that can't be ruled out."

(continued on p. 12)

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Look Ahead

AVOIDING ANOTHER BHOPAL

STOCKHOLM, SWEDEN -- New international safety standards for industrial software will be thrashed out at a meeting here in November of the U.N.'s 17-member International Electrotechnical Committee, which includes technicians from Europe, Japan, and the USSR. The idea is to create standards that will help prevent industrial accidents and computer-related disasters at industrial sites. Draft proposals will be handed to national governments in July 1988.

PC BOARD FROM HONEYWELL

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

NOW THEY'RE TALKING

CHELMSFORD, MASS. -- "Verboten" used to describe Apollo Computer Inc.'s view on selling its technology. No longer. After breaking with the past by unbundling several Domain software products, industry sources claim Apollo is now soliciting interest in the RISC technology brewing in its labs. A spokesperson declines comment. Pressure from rivals MIPS Computer Systems Inc. and Sun Microsystems Inc., which already sell their RISC technology, may have forced the change.

MIT-SIEMENS PROJECT

PRINCETON, N.J. -- The U.S. research labs of Siemens of West Germany, which is Europe's leading information systems company, and MIT's Laboratory for Computer Science will start collaborative research into machine learning over the next few months. The long-term project will focus on image, voice, and text recognition, and will eventually involve MIT's Brain and Cognitive Science department.

RUMORS AND RAW RANDOM DATA

Among the vendors poised to jump into the workstation ring is U.K.-based Whitechapel Workstations, which will launch a 10MIPS Unix-based color graphics system this month. Built around MIPS Computer Systems Inc.'s R2000 RISC chip set, it will support X Windows and the NeWS distributed window management system. . . . Meanwhile, Stellar Computer Inc.'s entry into the high-performance workstation market is delayed until December, says vp R.G. Edmonds. The machine was supposed to debut in August.

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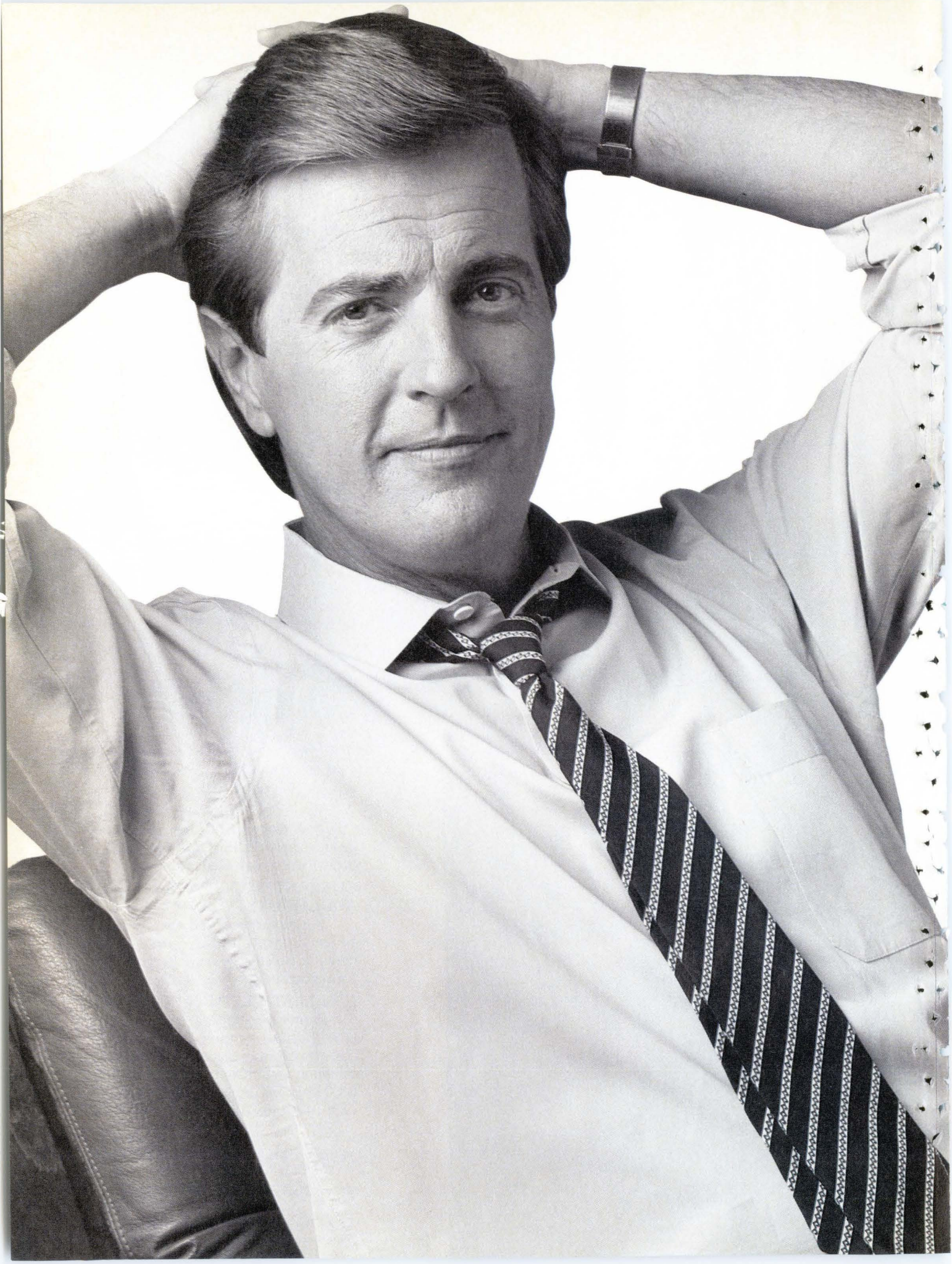

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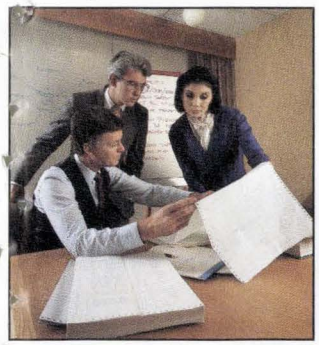

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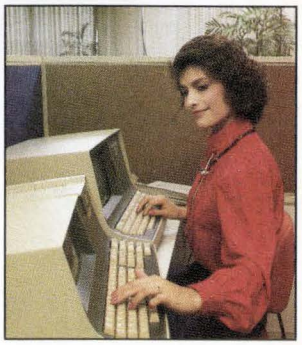

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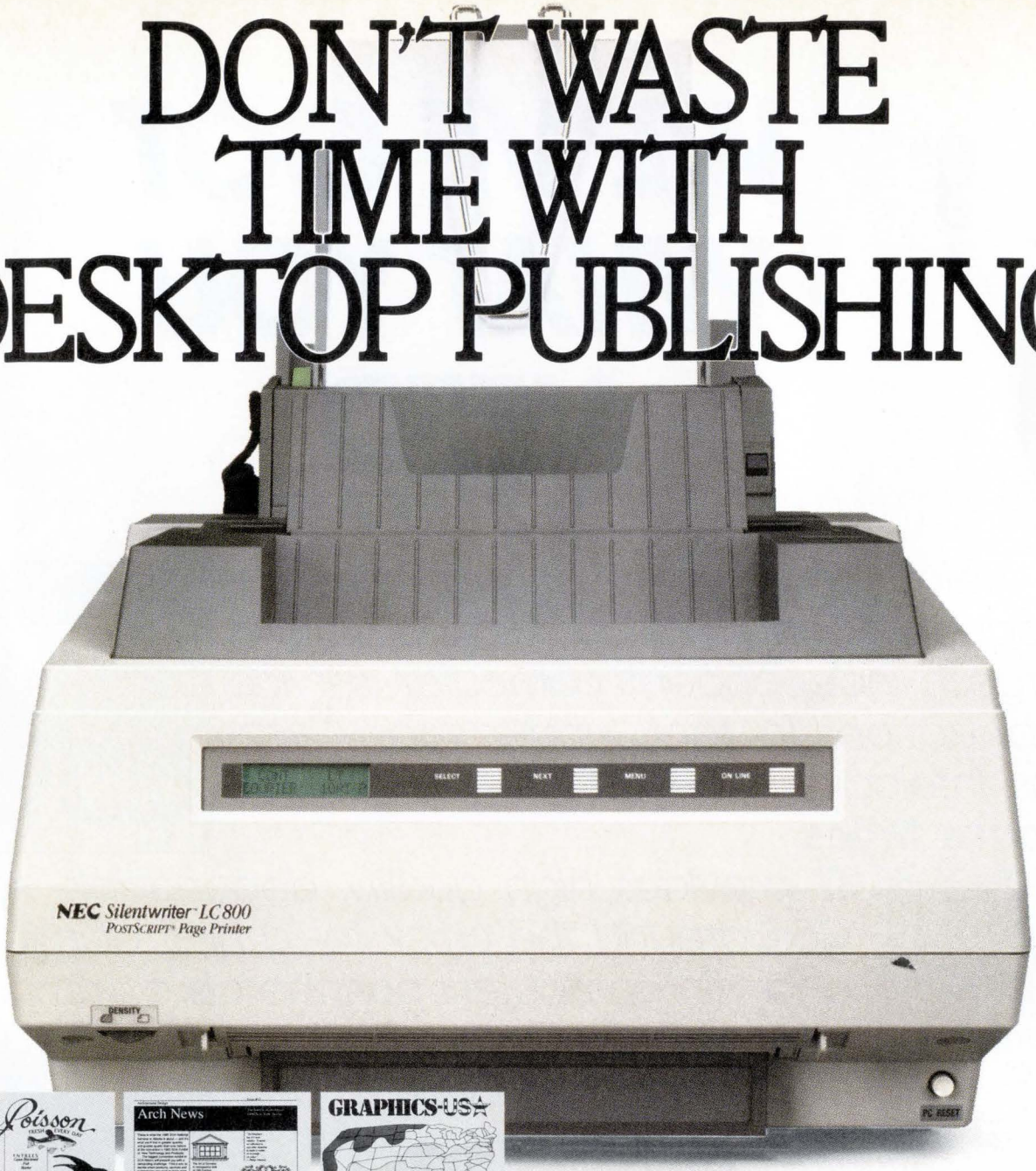

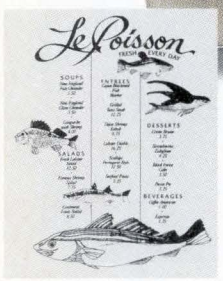

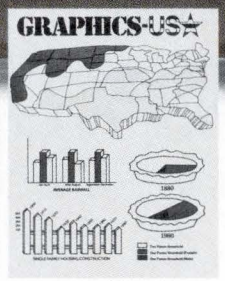

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MAINFRAMES

Hints of Summit Delay Extend Life of 3090

With IBM indicating a Summit release in 1990 or later, users are reevaluating their mainframe shopping lists, to the benefit of the 3090.

BY JEFF MOAD

It's time once again for many MIS executives to play that old guessing game called, "When will IBM unveil its next mainframe product generation?" The game may not have the general ratings appeal of *Wheel of Fortune*, but it does have its own brand of excitement and its own winners and losers. Winners time their mainframe purchases to coincide with the availability of the new mainframe generation. Losers don't, and they get stuck with outdated equipment or worthless long-term hardware leases.

In recent weeks, MIS executives have been receiving some new clues that may help them play the game. Specifically, in public and private statements, IBM reportedly has been telling users not to expect shipment of its next mainframe product line—the so-called Summit series—until 1990 or afterwards. That's about a year later than many users and analysts had been predicting Summit would appear. Some observers view hints of the delayed Summit as a thinly veiled attempt by IBM to boost short-term sales of the 3090. Many users, however, are reexamining their mainframe purchase plans in light of indications that the current 3090 IBM mainframe line may have a longer-than-expected life.

Five Years For 3090?

"IBM's been giving us indications that it will be 1990 or later before we see a 3090 follow-on," says Bruce Curry, director of computer resources at Montvale, N.J.-based Peat, Marwick, Main & Co. His company has a 308X and, until now, had not been considering an upgrade to the 3090. "We've seen the 3090 as a positive machine, but there haven't been many features that really differentiate it from the 308X," says Curry.

As a result of IBM's message and some new 3090 features believed to be on the way, that may be changing. "We had been concerned about getting in at the middle or at the end of the [3090] product life cycle. But now it looks like there may in fact be three to five years left in the 3090," reports Curry. Therefore, Peat, Marwick, Main & Co. is currently reevaluating its 308X-to-3090 migration strategy and may start buying 3090s rather than waiting for the Summit.

Other users have also heard that the Summit will arrive later than expected. According to Daniel J. Cavanagh, senior vice president at Metropolitan Life Insurance Co., New York, "When IBM made their low-end 3090 announcement this spring, they called the 3090 the machine for the decade. Now, based on what we've been hearing, it's becoming clear that it's the machine for into the 1990s also." Metropolitan Life already is committed to the 3090 and the company is considering the purchase of a 3090 600E high-end system.

Also actively considering upgrading to a 3090 600E is Cigna Corp. of Philadelphia, which recently completed a conversion from 308X to 3090 hardware. "We had some fairly candid conversations with IBM and felt that the 3090 would have enough years left in it to allow us to get back our investment," says Cigna senior vp Harvey DeMovik. "We still feel that is the case," he adds.

IBM won't comment on its Summit plans, but company officials, who request anonymity, repeat the message that "it's way too early to start talking about the end of the 3090."

Most users expect IBM to continue to add significant new functions, as well as higher performance, to the 3090. Analysts and users are expecting a 3090 performance boost to close to 100MIPS from 77MIPS as early as February. In addition, IBM is expected to announce larger disk storage devices and faster channels for the 3090 in the first quarter of next year. Add to that the 3090's expanded storage capability and the recent addition of a more powerful VM/XA operating system option, and many observers say IBM is finally giving users a reason to choose the 3090 over the 308X.

3090 Sales Improving

There are some signs that IBM's 3090 efforts are beginning to pay off. Although the company's second-quarter financial report indicated an actual year-to-year drop in 3090 shipments, there was a 20% improvement in new orders.

In addition, Dataquest Inc., San Jose, is reporting a 40% increase in 3090 user interest based on the number of surveyed users saying they have a 3090 on order or are looking at, testing, or planning to order the system.

That's not to say that everyone believes the later

SCENARIO.

Photo by Bill Kelly

Summit scenario. IBM's pcm competitors, for example, are taking the news with a grain of salt. "IBM once told users the 3033 would live forever and that the 308X would be field upgradable to the 3090," says Carl Claunch, director of marketing for pcm vendor National Advanced Systems (NAS), Santa Clara. "IBM's motive is very clear: they don't want to discuss what is coming next year, because people won't want to buy what they have this year."

A later Summit introduction wouldn't be all bad for pcm competitors NAS and Amdahl Corp., Sunnyvale, Calif., which currently are at least holding their own against the 3090. But, says Claunch, the plug-compatible vendors have to assume a worst-case scenario: a 1989 Summit announcement. "We have to be ready for that. We can't afford not to plan conservatively."

Fiber-Optic Tie for Summits

When Summit does come, IBM users and competitors alike expect what Claunch calls a "firmly coupled" multiple processor architecture, with processors each having their own operating systems and main memory but sharing the equivalent of the 3090's expanded storage memory. The Summit processors—each between 30MIPS and 35MIPS initially—would be tied together with a very fast fiber-optic channel, and the system would be expanded to include at least eight processors for total system performance well in excess of 200MIPS. If the introduction of Summit is in fact delayed, however, many observers expect performance of the initial Summit uniprocessor to be between 40MIPS and 45MIPS. IBM then would have a shot at escaping its current predicament of having the smallest uniprocessor among IBM-compatible mainframe vendors.

Ironically, if IBM does postpone Summit shipments until 1991, there is little its pcm competitors can do to take advantage of that delay other than to match 3090 interim upgrades. Although both NAS and Amdahl now are competing against IBM's six-processor 3090 600E with four-processor, high-end systems of their own, they are not in a good position to leapfrog the 3090 performance by going to six-way designs. "The cost to engineer and build such a machine would be too great at this point," says NAS's Claunch. "We wouldn't want to announce a six-way implementation only to see IBM announce Summit with a substantially different memory management design, for example."

Even if the Summit doesn't show until 1991, most observers do not expect an eight-processor version of the 3090. It would be hard for IBM to get enough added performance out of an eight-processor version of the current architecture to justify the added cost. Nor do most observers anticipate a significant MVS operating system upgrade for the 3090 to achieve increased system address space, although some users report they already are running into performance problems with MVS/XA's 31-bit addressing scheme.

Most users, though, seem to be pleased with IBM's current 3090 performance upgrade schedule and would be happy to see the 3090 stay around a little longer. "Upgrades to the 3090 have been tracking fairly well with our performance needs," says Joseph T. Brophy, senior vice president at Travelers Corp. and an IBM loyalist. "We've already installed one 3090 600E, and our plan is to install more over the next couple of years," he says. "What we're hearing from IBM confirms that plan." ■

ARTIFICIAL INTELLIGENCE

Users, Vendors Team On Expert Systems

Customers get products tailored to their applications and vendors learn how to commercialize their products.

BY SUSAN KERR

Dissatisfaction with off-the-shelf expert system offerings and a desire for packages that are customized for specific applications has led some of America's top corporations to join artificial intelligence vendors in the development of expert systems software. The craving for expert systems is so great that even though the products these companies are developing today may one day be sold to their competitors, it hasn't stopped them from avidly pursuing the technology.

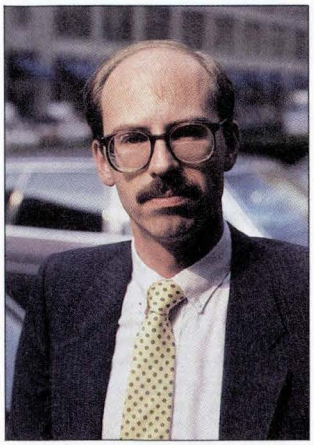
While there's nothing new about users and vendors seeking close ties, or about users developing in-house applications, it is unusual for a technology and its makers to depend so heavily on customer input. In the case of AI, however, users and vendors agree that despite the risks, joint development is the only way to go.

"Expert systems technology has a lot of promise," says Mike Golibersuch, information systems consultant with Liberty Mutual Insurance Co., Boston. As for Liberty Mutual's decision to help Waltham, Mass.-based Artificial Intelligence Corp. develop an IBM mainframe expert system shell (see "Expert Systems Development Projects"), he says, "Maybe the most important reason is to have a chance to exert some influence as to what the final product can do. . . . Although it [the expert systems concept] has been around in the academic world for quite a while, it's pretty spanking new in the commercial world. There's no risk-free way to get involved with this technology."

Likewise, vendors are trying to get a grip on the technology and to commercialize it successfully. Rob Elmore, insurance industry marketing manager with Syntelligence Inc., Sunnyvale, Calif., says, "When talking

AI CORP'S HARRIS: Users are happier because the vendor is not the sole source of knowledge.

Photo by Marty Katz



GOLIBERSUCH OF LIBERTY MUTUAL: The risks are inevitable.

about expertise, that's something we've never been able to put in a computer before." He feels that "there's no alternative to doing it this way," in reference to the company's decision to work with five insurance and banking codevelopment partners.

Vendors' development efforts differ. Some choose to have the end user take an equity position and participate in running the vendor company. Only a handful of firms appear interested in that level of involvement, however. Most users prefer a more hands-off relationship, whereby they invest in the technology, not the vendor.

Users Foot the Bill

In the latter case, users usually pay the vendor up front and must be prepared to expend manpower and management time. Many of these experimental projects receive little, if any, funding from MIS, though. Instead, corporate management usually makes the decision to fund the project separately and agrees to reassign valued employees to it (anywhere from three to 15 employees, companies report).

The high level of interest is easy to defend. "It's a new technology regarded as a strategic technology, and they don't come along often," says Alexander Jacobson, founder and chief executive of Inference Corp., a Los Angeles maker of expert systems development tools, partially owned by Ford Motor Co. It's strategic because vendors can point to potential bottom-line gains. Although their figures are unproven, Syntelligence claims that its product could help insurance companies garner total net operational savings of $35 million during a five-year period.

But to most end users, the technology's great promise is still just that: a promise. Few have had much experience with expert systems. One of the attractions of these kinds of agreements is that in return for providing funding for the development project and insight into how their industry works, companies get extensive training with expert systems as well as a system fine-tuned to their needs.

"I don't know if any insurance company would have the expertise Syntelligence does," says Rich Kisielewski, assistant corporate secretary at American International Group, New York, which is helping Syntelligence to write an insurance industry software package called Underwriting Advisor. "They obviously provided us with a better product than we would have [built]," he adds.

Beyond the expertise, companies believe they benefit by receiving an expert system earlier than their competitors will. AI Corp. consortium members will get a prototype version six to 12 months before a commercial product is released, plus approximately six months of on-site consulting by AI Corp. personnel. That amount of consultation is not the norm for AI Corp., says company chairman Larry Harris. He estimates that with the future commercial version, customers will receive considerably less assistance, probably amounting to 10 days of technical support and a one- to two-week class.

In some cases, though, companies don't have to worry about competitors. Sometimes, if an equity investment is made, corporations may limit to whom the end product can be sold. That was a standard provision agreed upon by Teknowledge Inc., Palo Alto, in return for funding from such companies as Procter & Gamble Co. and FMC Corp., in Chicago.

In the majority of cases, however, competitors find themselves working with the same vendor. One essential is the protection of what is viewed as proprietary knowledge (e.g., in underwriting, each insurance company weighs factors differently); and users are demanding and receiving the final say as to what is released in a product.

The degree of interaction varies. Workers at the end-user companies of the Syntelligence project tend not to meet with each other. "We would not want to disclose business plans to competitors," explains Kent Urness, vice president of St. Paul Cos.' commercial insurance division. In fact, Syntelligence's Elmore says the com-

Expert Systems Development Projects

Transamerica Insurance Group, Los Angeles; Southern California Edison, Rosemead, Calif.; and Liberty Mutual Insurance Co., Boston. In June 1987, these three companies became the first announced members of Artificial Intelligence Corp.'s (Waltham, Mass.) Knowledge Based Management System Consortium, charged with developing an expert system shell for IBM mainframes. No equity investment involved.

Ford Motor Co., Dearborn, Mich. In October 1985, Ford invested $14 million in Inference Corp., Los Angeles, to develop financial services and industrial engineering applications for vehicle assembly. At the same time, Ford invested $14 million in Carnegie Group Inc., Pittsburgh, to develop customer service applications. Ford owns approximately 10% of each company.

Wells Fargo Bank NA, San Francisco; First Wachovia Corp., Winston-Salem, N.C.; Fireman's Fund Insurance Cos., Novato, Calif.; The St. Paul Cos., St. Paul; and American International Group, New York. These companies are independent development partners of Syntelligence Inc., Sunnyvale, Calif., which plans to sell industry-specific applications. Wells Fargo and First Wachovia signed agreements in August 1985 and October 1985, respectively, to develop a lending advisor package. The three insurance concerns signed on between March 1985 and August 1985 to help create underwriting advisor packages. As part of their contracts, the insurance companies have the option of purchasing stock in privately held Syntelligence; none had done so by press time.

General Motors Corp., Detroit; Procter & Gamble Co., Cincinnati; FMC Corp., Chicago; Framatome SA, Paris; and Nynex Corp., White Plains, N.Y. Between June 1983 and July 1985 these companies invested in Palo Alto-based Teknowledge Inc. The agreements specify terms that prohibit Teknowledge from soliciting business from competitors of these companies. At the time of Teknowledge's initial public offering in March 1986, these five firms each owned between 6.1% and 8.4% of the AI company.

Photo by Marty Katz

pany steered clear of using the word consortium due to the "antitrust concerns" of its partners.

Conversely, with AI Corp., which has two insurance companies in its four-member (openly titled) consortium, everyone gets together to discuss progress and general design issues at two-month intervals. While users are wary of giving away corporate secrets, AI Corp. chairman Harris says he feels member companies "look forward to getting together since we [the vendor] are not the sole source of knowledge."

No Guarantee of Success

Despite their enthusiasm for the projects, a certain wariness remains. These companies are working with, and even defining, prototypes with no guarantee of success. St. Paul Companies' Urness says, "What we've done to date is a massive R&D project. We haven't field-tested it yet, much less implemented it. We view this as an investment in underwriting with a potential payoff but with no guarantee. If it works extremely well it will provide us with an excellent training device and a good management information system that doesn't exist now."

From the vendor side, the risks are few and the potential rewards great. Artificial intelligence has a long way to go toward commercial acceptance and these alliances are crucial. Learning how to merge AI products with, for example, DB2 or IMS databases is invaluable to the vendors.

There's certainly a difference in perspective, however. "I go at it from 'Here's a technical abstract,' " says AI Corp.'s Harris, "and they [the end users] are coming at it from 'We have a problem and we want a solution.' " But he adds, "The two get closer each time we meet." ■

STRATEGIES

Honeywell Bull Users See Overlaps in Three DPS Lines

New prominence for the French-made DPS 7 has thickened the fog, but HB officials say the DPS 6, 7, and 8 will evolve separately—until the mid-1990s.

BY GARY McWILLIAMS

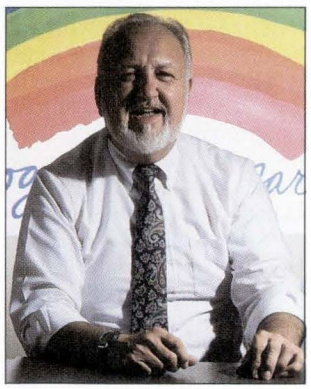
When Jacques Stern opens the North American Honeywell Bull Users meeting this month, he's likely to get a rousing reception. The company and its charismatic chairman are basking in the glow of new user confidence.

In the months since the March investments by France's Compagnie des Machines Bull and Japan's NEC Corp., Honeywell Bull has eased users' worries about the company's viability as a standalone business. Moreover, the introduction of a new generation of computers in the company's three mainstay lines—the DPS 6, 7, and 8—has quelled concerns over its continuation of all product lines. The company last year rolled out the DPS 6 Plus and the DPS 8000. The new DPS 7, the French-made 7000, had its debut this past April.

"The new management understands what their customers want and are going to care for them," says Daniel J. Cavanagh, senior vice president of information systems at Metropolitan Life Insurance Co., New York, and a DPS 6 user. Jerry C. Smith, director of information systems at Rockwell International's Measurement and Flow Control Division, Pittsburgh, concurs, "They've convinced me and our management by their activities and straightforward manner that they're for real."

Amid all these positive vibes, however, lurk users' concerns about overlapping product lines. Honeywell Bull is up front about plans to converge all three lines eventually, but some users see a stiff challenge now facing the company in sorting out the three lines' price/performance overlap. "The capabilities are similar in all three boxes," says Joe Van Cura, vp of information systems at United Way Inc., Los Angeles.

For instance, midrange DPS 6 Plus computers support between 16 and 160 users and can be configured with one to four cpus for up to 4MIPS total performance. Prices range from $90,000 to $410,000. The 32-bit DPS 7000 supports between 20 and 1,000 users, with performance spanning from .65MIPS to 3.8MIPS, according to Datapro Research Corp., Delran, N.J. Prices within the five-member DPS 7000 line range from $127,000 to over $1 million.



UNITED WAY'S VAN CURA: The overlap is a problem.

New Models May Overlap

Meanwhile, a new DPS 6 Plus model dubbed the HRX (High Range Extension) is expected next year. While its performance is not known, Multics operating system users on the more powerful DPS 8 have been told that the HRX could serve as their migration path (see "Multics Users Face Their Maker," May 1, 1986, p. 102). Also, rumors of quadratic DPS 7000s due out next year are spawning speculation about their impact on the DPS 8 and 8000.

"The [DPS] 7 and 7000 is really overlapping the [DPS] 8 and 8000," says United Way's Van Cura. "That's going to be a problem because the 7000 will sell for a hell of a lot less than the 8 or 8000." Over the long term, the overlap will force Honeywell Bull to decide which is more strategic, he believes. "It's going to be difficult to make a choice." The DPS 6 has a worldwide installed base of 50,000; the DPS 7 has a worldwide installed base of 55,000, only 400 of which are in the U.S.; and the DPS 8 and higher-performance DPS 88 are installed at 1,400 sites worldwide.

Another DPS 7 user, Jim Simkins, dp manager for the High's Division of Southland Corp., Laurel, Md., says, "From what I've heard, there are DPS 7s in Europe that are [performing up to] the middle of the DPS 8 line now."

Tom Sexton, vice president of information systems at Klein Tools Inc., Chicago, adds, "The DPS 7000 is a product with one hell of a range. The 7000 should be able to wipe out the DPS 8 and the old 6s." Sexton says the "jury is still out on the 6 Plus," but adds that the pair he installed last December could have been been replaced by 7000s.

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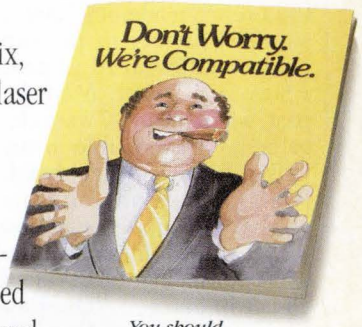

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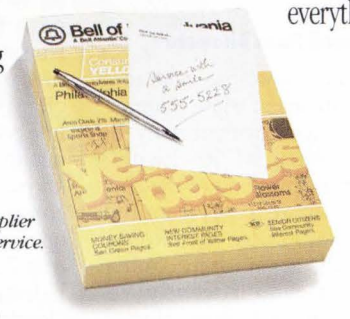

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"If I'd known the 7000s were coming," he says, "I'd never have bought the 6s."

On the one hand, Honeywell Bull is proclaiming that the French-made DPS 7000 is an equal partner to the two U.S.-manufactured lines, which is a switch from the past, when the DPS 7 was relegated to a minor role in the U.S. On the other hand, Honeywell Bull officials strongly dismiss the notion that the new embrace of the 7000 will impinge on the DPS 6 and 8 lines (see "Overlap Worries European Users"). DPS 6s, 7s, and 8s "will go on for a long, long time," says Maurice J. Gervais, Honeywell Bull's director of DPS 7 operations. "In my mind, the MIPS overlaps are not that problematic. There are other differences," he feels, that will drive the decision to purchase each system, such as what the customer does and the applications solutions required.

No Common Underpinning Yet

Vice president of marketing and planning Jim Bloom insists that the three lines will evolve separately for another five to seven years. A common "technical underpinning" won't be reached "until the 1990s. It won't happen in the next generation."

Meanwhile, Honeywell Bull's marketing plans for the 7000 cast some doubt on its claim that the system is on equal footing with the other lines. The 7000 will be marketed in specific geographic areas and applications markets, say company officials. While Bloom initially said that the 7000 would be sold exclusively by a dedicated U.S.-based, 50-member sales force, a company spokesperson later corrected him, saying the dedicated sales force was formed to target the health care and manufacturing markets, where applications software is now available. Bloom estimates sales of only 700 over the next six years.

In the meantime, Honeywell Bull seeks to consolidate the varying peripheral offerings for the systems and bring out common software tools.

For instance, the relational database Oracle, from Oracle Corp., Belmont, Calif., is available on the DPS 6 Plus and DPS 7000. A version for the DPS 8000 also is in the works, say Honeywell Bull officials. Users report that the Mantis programming language, from Cincom Systems Inc., Cincinnati, is being moved to the DPS 6 Plus. The package is now available on the DPS 7000 and 8000. In the long run, the common peripherals and software tools should enable the company to resolve direct conflict. "As time goes on," says Met Life's Cavanagh, "I think we will see some of that overlap disappear."

Rockwell Faces Dilemma

For now, the midrange overlap poses some dilemma for users, as evidenced by the experience of Rockwell's graphics division in France. It received proposals from Bull for DPS 7s or 6s, says Robert Rinaldi, a senior technical analyst who recently returned from France. Honeywell and Honeywell Bull, he says, "really have not come up with a clear-cut means to say that whenever the application is such, this [particular machine] is what they'll pitch."

Users are hoping to get some answers at the North American Honeywell Bull Users meeting. An unprecedented 40 members of the European Federation of Bull and Honeywell Users will attend this month's meeting to exchange information. Met Life's Cavanagh holds an optimistic view. "It's clear they know they have to do some consolidating of the lines into one—at least the DPS 6 and DPS 7," he says. "Bull and Honeywell Bull leadership clearly understand major users like ourselves depend on the DPS 6 and the growth of that line. They've assured us that they will make sure the migration path to the 6 Plus and beyond will be there for users." ■

SOUTHLAND'S SIMKINS: DPS 7s are performing well into the range of the DPS 8s.

Photograph by Marty Katz

Overlap Worries European Users

Bull executives in Paris are busy assuring DPS 6 and 7 users that the company is committed to supporting both systems. The French want to allay users' fears that the DPS 6 might be phased out to make room for the DPS 7 and its follow-on, the 7000. Philippe Diebold, Bull's strategic advisor on mini and mainframe systems, concedes that there is considerable overlap between the lines, but says that the performance of each system as well as the types of environments in which they are implemented have established a role for each. He is adamant about the vendor's commitment to the DPS 6: "DPS 6 users' worries are absurd because there is no question of our abandoning an installed base of 50,000 systems. That is a capital asset we have to nurture."

DPS 6 users in France weren't worried for nothing. Alarms went off when Bull introduced the DPS 7000 in the U.S. and France in April. French users had yet to see the DPS 6 Plus, which made its debut in the U.S. one year earlier. Confusion over Bull's intentions was leading to a confrontation at the general meeting of the French Bull User's Club (Cube) in June, but the company doused the fire by announcing at the meeting the availability of the DPS 6 Plus in France.

"The initial concern of DPS 6 users was real," observes Rolans De Conihout, vice president of Cube and president of the European Federation of DPS 7 Users. "But in my opinion it was more of a psychological problem than anything arising from the way the products were presented. Given the context, it is not disturbing that there are two series which overlap a little since they have different origins and different purposes." De Conihout is confident that Bull does not intend to give priority to one product line over another. "They will be given equal treatment in world markets, with a policy of uniformity in terms of the availability of peripherals, so there will be no differentiation at that level," he says.

BY JAMES ETHERIDGE

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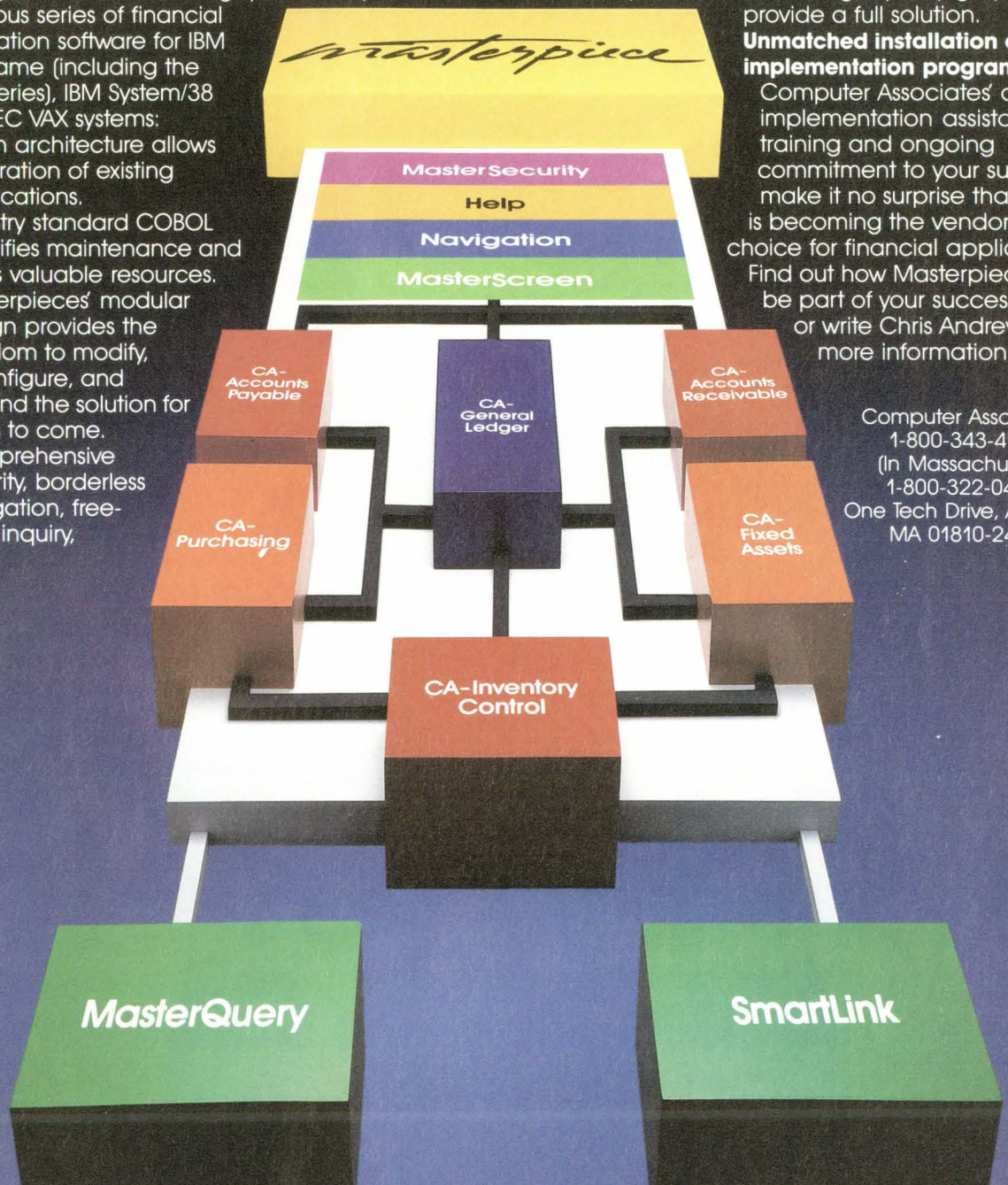

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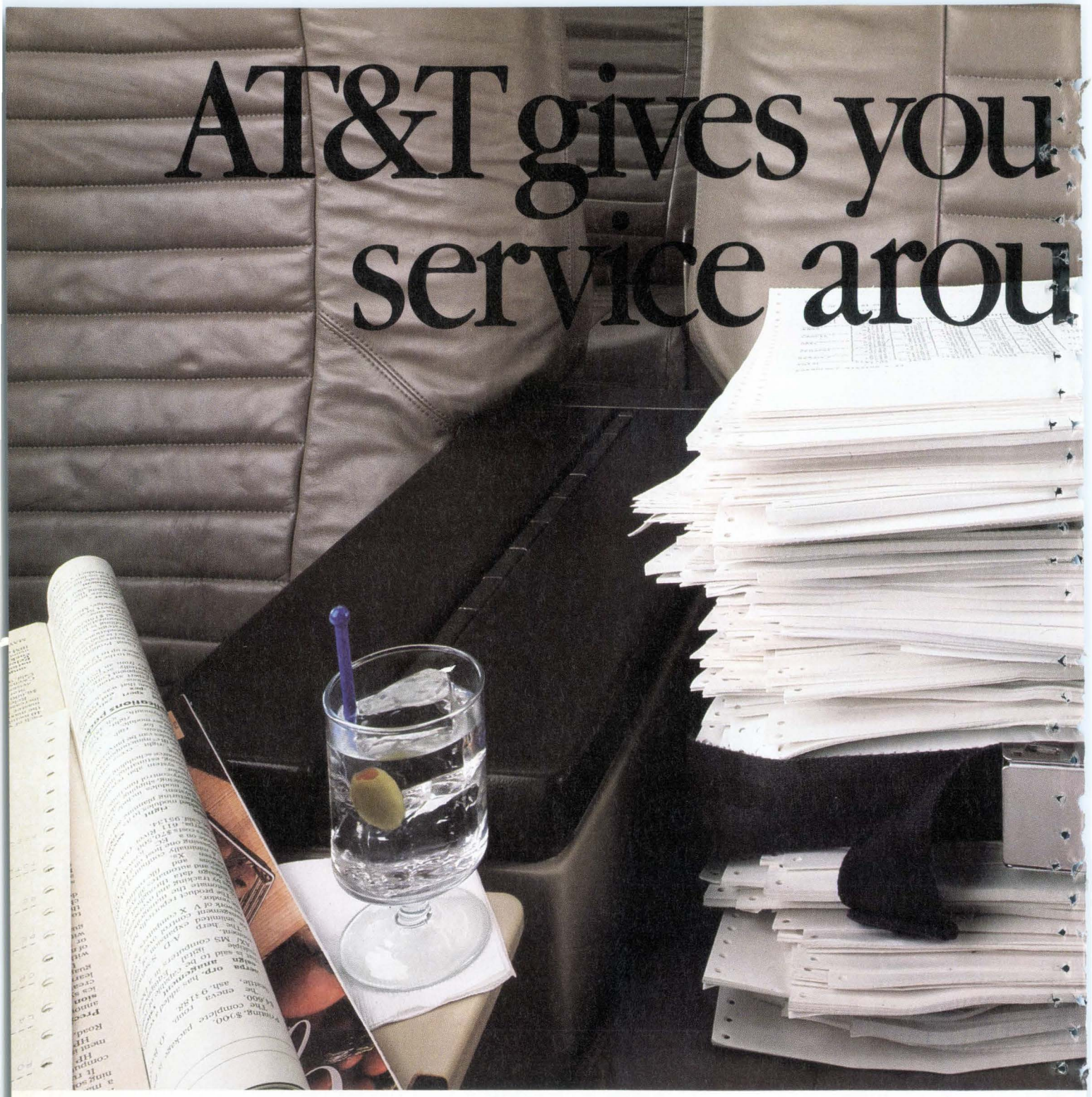

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SOFTWARE

MIS Split Over Hardware For Project Management

Mainframes and minis still have their supporters even as momentum grows for micro-based solutions, but some micro users want more training and more capabilities.

BY THERESA BARRY

Once popular only in military and industrial settings, project management software has made inroads into the MIS world. Such packages have been leading confused lives, however, often split among mainframes, minis, and their micro brethren.

Determining just which of these hardware camps offers the most suitable project management environment has become a major task for users. Often the answer is as complex as the circumstances in which users find themselves. Many have not joined the mainframe-to-micro migration, citing the micro's lack of power. Others have chosen to maintain micro-based systems, as well as mini- or mainframe-based systems. Still others have moved the task completely to micros.

There may be no black-and-white solution, but many agree that micro-based project management packages, while becoming more attractive with their enhanced functionality, still need even more capabilities. Users also are demanding more education and vendor support.

"The beauty of the micro is that it provides local control," says Frank Sisto, who heads up project management administration at the retail banking division of Manufacturers Hanover Trust Co., New York. "You can tune the process to the needs of a particular business area."

Sisto, whose shop uses Project Workbench from Applied Business Technologies Inc., New York, on IBM ATs, contends that before the advent of micro-based project management software, "there wasn't a mainframe system that would meet my needs." Although he feels mainframes are better at certain tasks, such as creating PERT charts, he wants to see micros handle them, as well as do high-level summaries.

Norman Jennett, a management systems specialist at Rockwell International's Space Transportation Systems Division, Downey, Calif., has a somewhat different view. While agreeing that micros are good tools for proj-

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ect management, he says, "They just don't have the power yet to allow users to share databases."

Nevertheless, users are embracing the micro technology in what seems to be an inexorable, although perhaps not total, migration. Industry consultancy Computer Intelligence in La Jolla, Calif., for example, predicts significant growth for micro-based project management programs in the years ahead.

Range of Micro Pricing

Micro-based project management software prices range anywhere from $99 to $5,000. Capabilities between the high and low ends vary. There are sophisticated programs grown from mainframe packages that can handle thousands of tasks, and much less sophisticated packages for users with limited project management requirements.

Project Software and Development Inc. (PSDI), of Cambridge, Mass., was among the first to introduce a micro-based package. Quiknet, a micro version of its 18-year-old mainframe product, Project/2, debuted in 1983. Bill Sawyer, PSDI's vp of operations, says the move into micros introduced the concept of distributed processing in project management. At the same time, he says, the integration of companies' databases with project management programs has combined with the increased acceptance of relational DBMS technology.

In May, PSDI came out with Quiknet Professional, which can be used as either a standalone project manager or as a distributed node on a larger system using mainframe-based Project/2. PSDI is also incorporating Oracle's RDBMS into its Project/2, and plans to include interfaces to Ashton-Tate's dBase and Lotus's 1-2-3 for the next release of Quiknet Professional.

Other vendors have decided to build their own relational databases into their project management packages. Metier Management Systems of Houston, for example, uses its own 4GL and relational database in the high-end micro version of its Artemis Project product.

Stephen N. Crans, program manager for project management systems at Boeing Computer Services in Wichita, Kansas, is currently in the process of moving some of his 15,000 users to the micro version of Artemis Project from the mainframe version. Crans's operation has 20 different IBM mainframes running VM/CMS. He chose Metier because of its 4GL and fully relational database which, he asserts, allow an enormous variety of users to customize their tasks.

Crans doesn't foresee micros completely taking over the project management task from mainframes, but he feels they will "drive the successful use of mainframes" in project management by building a confident user base. Mainframes, says Crans, will be used in situations where their processing power is needed, e.g., enhanced graphics reporting and networked communication. An ideal situation, Crans feels, is one in

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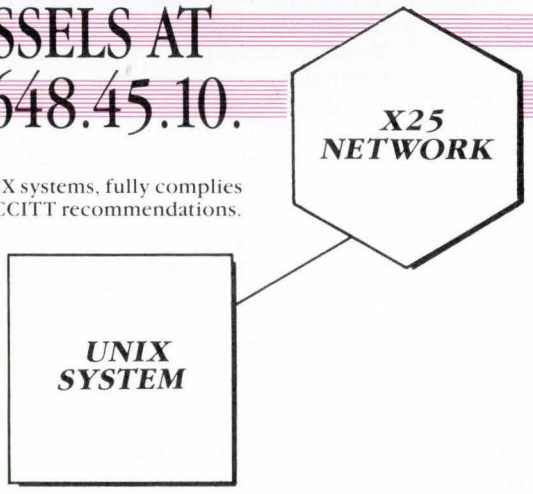

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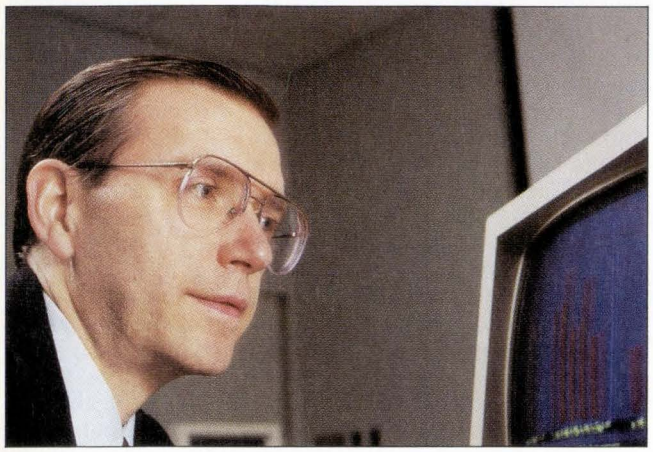

ABT'S MURRAY: Mainframe products are not efficient tools.

which data from dozens of micros using a project manager are put on one mainframe so that tasks like resource scheduling can be done effectively.

Crans wants to see better graphics and more sophisticated resource leveling in micro-based products in the future, but, more important, he wants better training from the software vendors. Crans contends that vendors train users effectively during implementation, but that afterward "the user is on his own."

Interplay with Mainframes

Rockwell's Jennett uses PSDI's mainframe-based Project/2 running on an IBM 3090 for a change control project for the space shuttle. Jennett says the micro is a good tool for project management and feels it will eventually replace the mainframe for this task. He says mainframes are still much more capable when it comes to graphics tasks and data manipulation.

Like Crans of Boeing Computer Services, Jennett thinks an ideal situation is one in which users on several micros use a micro-based project manager and then transmit data to the mainframe project manager, where Jennett feels it's easier to control information. Jennett also concurs with Crans that the most important issue for the future of project management programs is user education. Users, Jennett thinks, are now spending too much time maintaining their programs rather than analyzing data.

Applied Business Technologies entered the project management market directly at the micro level. Chris Murray, ABT's cofounder, has strong opinions about the microcomputer as a tool for project management. "Every attempt at putting project management on a mainframe has failed," he contends. "Systems implemented on a mainframe *account* for projects, they don't provide a *tool* for managers to work with."

Murray does not think that enhancements like the integration of databases into project management packages is where the payoff is for users of project management systems. "The methodology is what's important," he asserts. ABT will, however, incorporate features like graphics and databases, Murray says, "because we have to."

Undoubtedly, the debate over the right hardware for project management software will continue, but this may just come with the turf. Says PSDI's Sawyer, "Project management as a science has been adopted, but it is more of an end-user device now." ■

BENCHMARKS

Vendors Bid for Government Network

Computer Sciences Corp., El Segundo, Calif., and COMSAT, Washington, D.C., have joined forces in an attempt to win what could be a $200 million contract for the State Department's next telecom network. The Department of State Telecommunications Network (DOSTN) will link about 275 domestic and foreign locations of the State Department and other U.S. foreign affairs agencies. It will provide worldwide integrated data, voice, and video conferencing services. Work on DOSTN is scheduled to begin next year and to be completed in 1992. The State Department's request for proposal is expected in November or December, which leaves plenty of time for competitors to join the fray. And, of course, Congress must approve the whole deal.

Apollo Names President

Workstation maker Apollo Computer Inc., Chelmsford Mass., has appointed Roland D. Pampel to be president and chief operating officer. The position was held by Thomas A. Vanderslice, who will retain his position as ceo and chairman of the board. Pampel, who will report to Vanderslice, was serving as senior vice president of technology, manufacturing, and marketing. He joined Apollo in January 1986 as senior vp of technology and marketing. His new responsibilities include directing and overseeing R&D, North American sales and customer service, federal systems, and the newly created staff operations position.

New Marketing Plan For Data General

A $65 million third-quarter loss has prompted Data General Corp. to abandon an end-user sales push and look instead to resellers for new customers. An increase in users' preference for IBM and Digital Equipment Corp. products is behind the new emphasis on reseller sales, says president Edson de Castro. This new tack reverses a direct sales campaign started five years ago when the company released its Comprehensive Electronic Office automation software. The latest quarterly loss was accompanied by a new round of consolidations in which some 950 employees were fired and three facilities were closed.

Contel To Acquire VSAT Makers

Contel American Satellite Corp., Atlanta, has entered into two acquisition deals that should greatly strengthen its role in the very small aperture terminal, or VSAT, satellite network business. Pending shareholder and regulatory approvals, Contel plans to acquire industry pioneer Equatorial Communications Co., Mountain View, Calif., for roughly $73 million. Financially troubled Equatorial is a leading supplier of C-band VSATs. Contel earlier agreed to purchase COMSAT's Ku-band VSAT business.

Apple Subsidiary Hires Two Vps

Apple Computer Inc. has christened its recently formed software subsidiary and has begun filling out its executive ranks. As previously announced, the new venture, now named Claris Corp., will market applications software for the Apple II and Macintosh lines and is expected to become an independent company within the year. John Zeisler, formerly Apple's business marketing manager, is Claris's marketing vice president. Yogan Dalal, who is cofounder of Metaphor Computer Systems, has been picked as the new company's product development vice president. ■

Photograph by Bill Kelly

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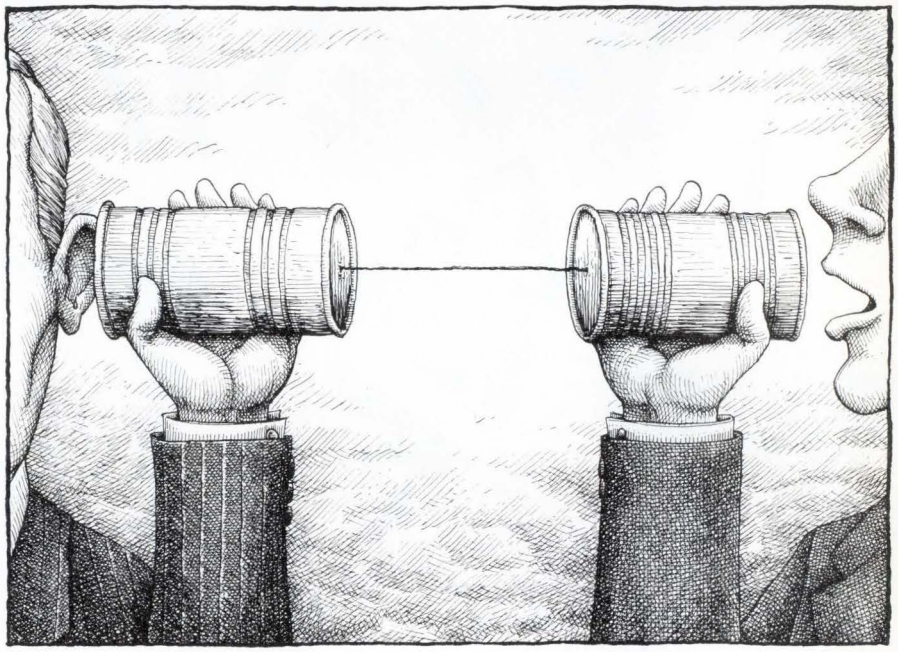

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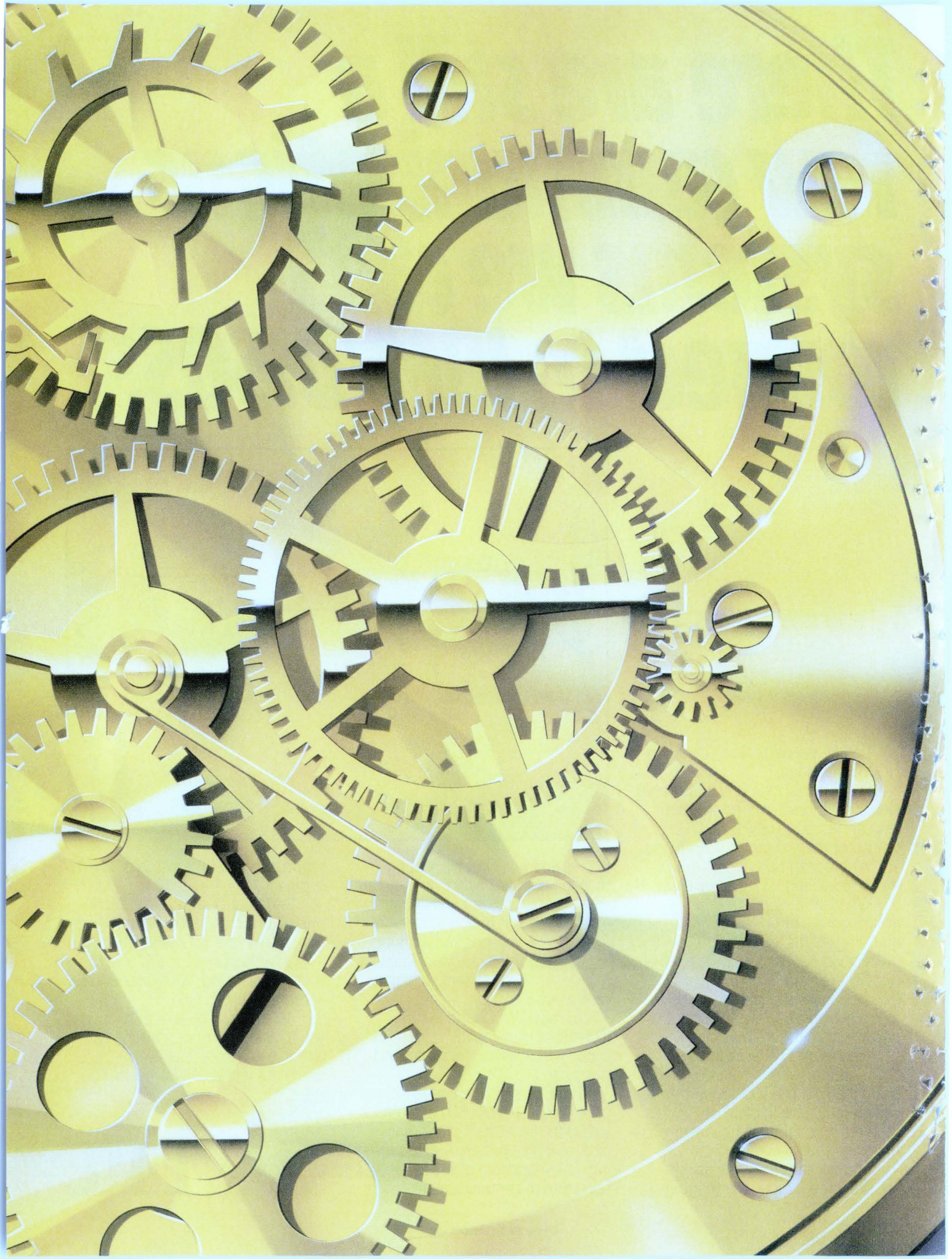

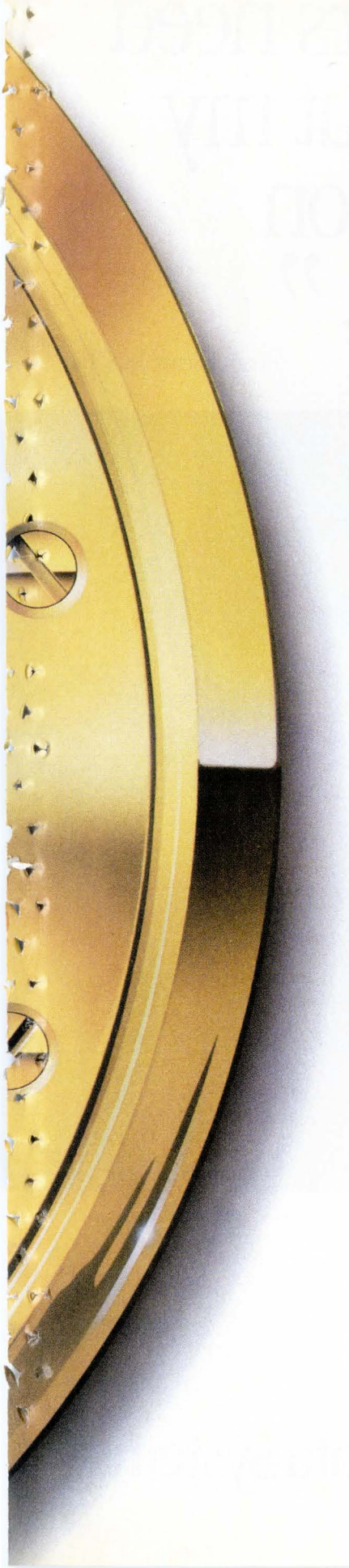

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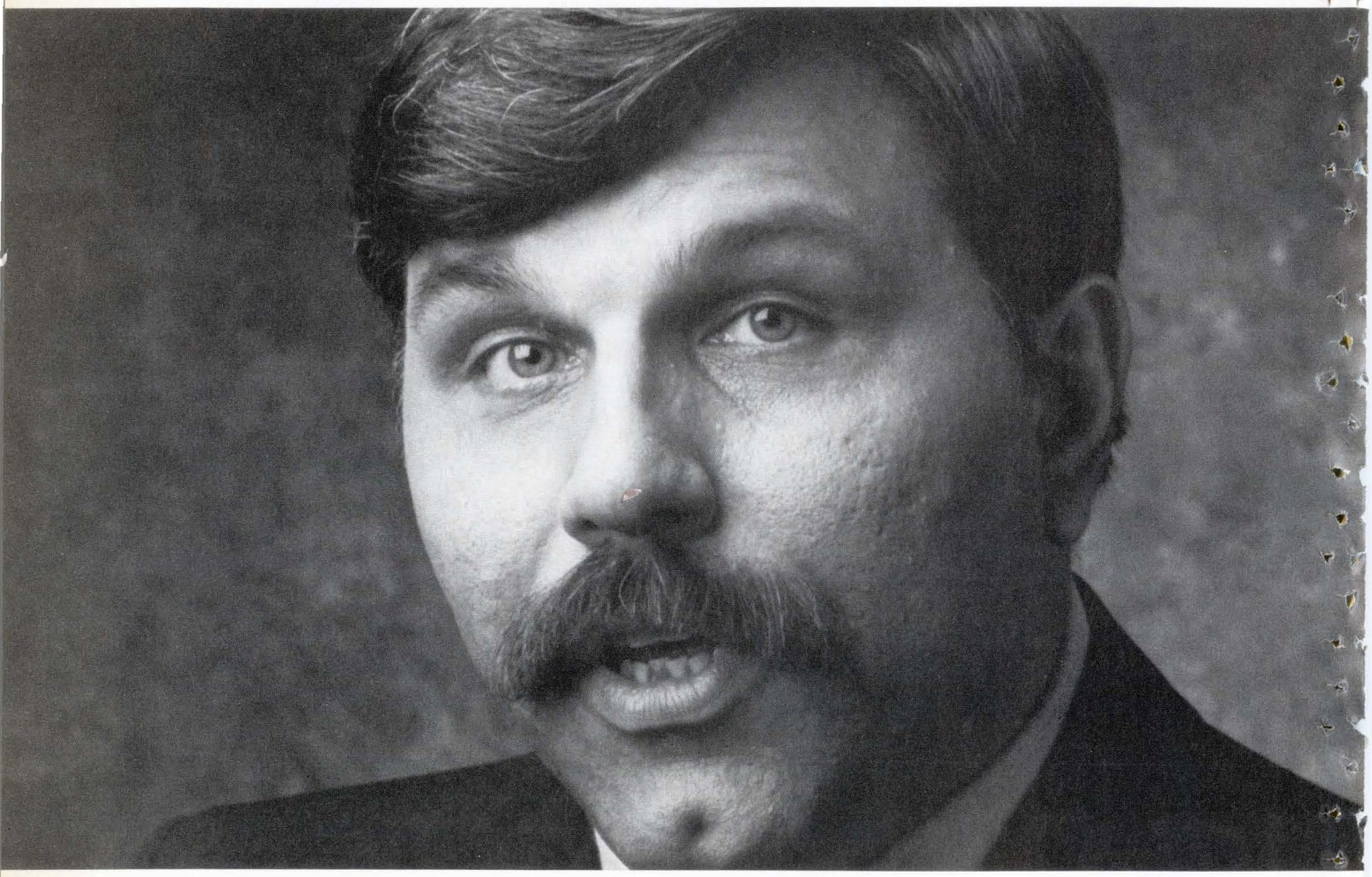

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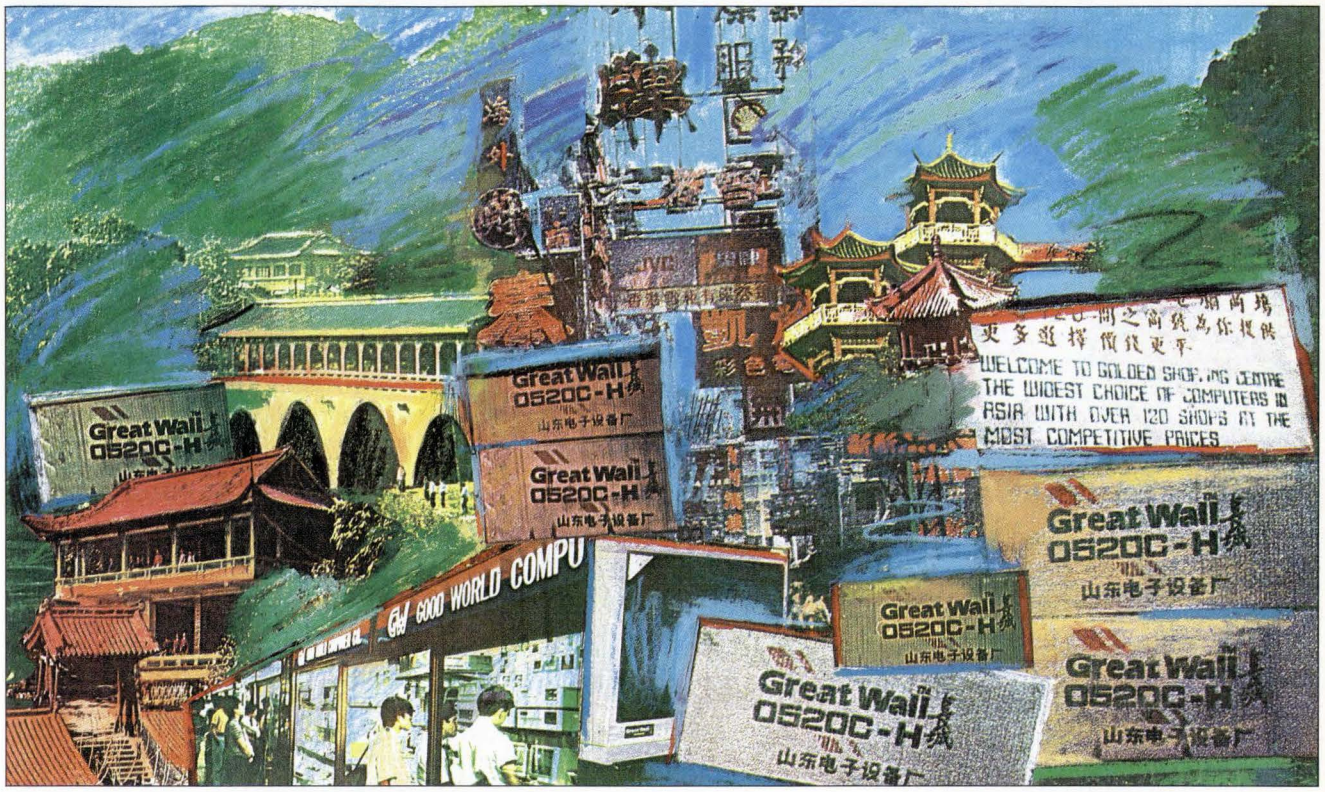

Illustration by Jane Sterrett

Dateline Beijing: The China Syndrome

China has set out on perhaps its most important revolution—implementing computer technology in what is still a largely agrarian economy.

BY PAUL TATE AND JOHN H. MAIER

During an exclusive interview with DATAMATION in Beijing, Prof. Hu Qiheng, the president of the Chinese Computer Federation, explained, "Closing the gap between China's hopes for using computers in the modernization of the economy, and what is really happening, is the task we are working on day and night" (see "Closing the Gap"). That's welcome news for the huge number of ambitious international companies attracted by China's wealth of natural resources, its market of 1.1 billion people, and its quickening move from Marxism to marketing.

Last year, those companies engaged in $50 billion worth of trade with China; that total is predicted to hit $75 billion by 1990. The growth in trade may rise even faster following the recommendations of a recent congressional Office of Technology Assessment report, *Technology Transfer to China*, and the imminent changes to U.S. laws concerning exports to China (see "A Brighter Shade of Green"). What eager companies don't find out until they start dealing with China, however, is that overestimating the business environment, and underestimating the Chinese people, can prove to be commercial suicide. "You can't simply implement the normal standard of corporate systems here, however much your business depends on it," points out Guenter Szwoch, manager of Siemens' communications and information systems group in the main China office. "For any commercial application, people's experience and thinking does not go beyond the level of the IBM PC."

Setting up operations in China is particularly difficult for the information systems departments of foreign companies. Trained computer personnel in China are few due to the country's lack of foreign funds to buy appropriate hardware and software. In addition, there is virtually no networking, the electric power supply is erratic, and, most important, the lack of applications knowledge precludes most efforts to create effective systems. It is that systems gap, more than almost any other element, that is helping to keep China's bureaucracies big, as well as limiting economic growth and hindering international trade.

Computers Key to Modernization Policy

The Chinese government, under the reforming leadership of Deng Xiaoping and premier Zhao Ziyang, is pushing ahead with its plan to modernize four key areas: industry, agriculture, the military, and science and technology. This plan was adopted as a national policy in 1978. Speaking at the Second International Conference on Computers and Applications, held in Beijing in late June, the head of the China State Council's Committee for Electronics Innovation, Li Xiang-Lin, told delegates that the coun-

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try "regards computers as one of the key development objectives." The hope is that the use of computers can aid the transformation of the country from a largely agrarian and local craft-based society into a major world economic power in the twenty-first century.

Li Xiang-Lin estimates that by the end of 1986, China had an installed base of 8,000 minicomputers and mainframes, and over 200,000 micros. The number of LANs is still low, but it's growing rapidly. There are currently over 170,000 computer professionals in China, half of whom are involved in developing new applications. So far, Li estimates, systems have been developed covering 20,000 application program areas.

According to a 1986 report from the U.S. embassy in China, over 60% of the computers in China are used in transportation and industry, 17% in science and education, and only 3.4% in commerce and finance. The remainder is spread thinly in the cultural, health, and agricultural areas, as well as other sectors.

More significantly, the report suggests that one major reason for China's lack of widespread automation is gross underutilization of the systems the Chinese already have. "China could virtually double its computer processing by better training of its operators and the purchase and development of advanced software already available in the West," says the report. That may be underestimating the problem. Many people working in the information systems sector in China, including the Chinese, suggest that computers are being used at between only 15% and 25% of capacity.

The Role of Foreign Vendors

Much of the technology underlying those statistics has come from foreign firms—in the U.S., Japan, and Europe, (see "China's Computer Imports"). Over the last 10 years, China has imported an estimated $2 billion of foreign information technology. IBM, Digital Equipment Corp., Hewlett-Packard, Unisys, Fujitsu, Honeywell Bull, and Siemens have all had their share of those deals.

IBM regards its growing business in China with such seriousness that it set up an IBM China Corp. in Hong Kong in 1984. According to a statement from the IBM China office, "IBM's business in China is still very young. It is a very challenging environment, and we are still learning more about it every day."

Siemens is more forthright. "If you look at the world map and ask where are the areas of opportunity, then China is the biggest," says Szwoch. "Whether it will become a computerized society in 10 or 20 years I don't know, but if we're not here and it does, then we will have missed the boat."

One of the limiting factors to technology trade now is the shortage of foreign reserves available for foreign purchases. This is largely the result of overzealous expenditures during the first few years of the open door policy. A Chinese manager who was given a budget to im-

Closing the Gap

PROF. HU QIHENG

In an exclusive interview with DATAMATION in Beijing, Prof. Hu Qiheng, the president of the Chinese Computer Federation (CCF), detailed China's next moves.

Prof. Hu is among China's leading computer professionals. Born in 1934 and educated at the Moscow Chemical Mechanics College when China and the USSR were still close, she has worked on both process control and computer systems during her career. She now holds key positions within the Chinese scientific community. She is the founding president of the CCF, which was set up in 1985, and is also the deputy secretary general of the Chinese Academy of Sciences, the president of the Chinese Association of Automation, and a council member of the International Association of Pattern Recognition.

Her understanding of the underlying issues involved in China's computerization is clear. "The problem [of modernization] goes very deep into our culture," she explains. "It is a problem that results from the enormous size of our country and our organizational structure. This involves many unreasonable processes, and we must reform these processes. If we do not, then computerization will not be effective. You cannot just take the way we do things today and add a computer. That will not help. We must encourage political reform, then economic reform so that we can make the best use of computers."

She is also aware of the shortcomings in China's development of key application systems. "There are not many computers being used in the office and administration side of our country," she confirms. "This is the least effective area of application at the moment. In industry and science, computer use is much better."

The solution, she believes, is to "teach our people more about systems analysis, more about what computers can be used for."

The CCF takes an active role in this educational effort. It is made up of 24,000 members throughout China and is linked to local societies in 28 provinces. More important, it cuts across the traditional hierarchical structure of Chinese organizations. The CCF runs about 40 conferences a year, acts as a technical and high-level strategy consultancy for Chinese organizations, holds computer training courses for department heads in different industry sectors, and, through the use of the broadcast and publishing media, works to popularize computing with the Chinese people.

The efforts to expand computer use are limited by the scarcity of appropriate hardware and software in the country. Importing technologies to solve the problem isn't easy, however. "Money is in short supply for us, and we must establish a balance of trade with the West," says Prof. Hu.

She therefore believes that China must adopt a two-tier strategy for the future. "It is important that we buy systems and software that will help us to reform effectively," states Hu. "We must also be able to use our existing systems more effectively."

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port Western technology would spend it on anything rather than give a cent of it back. They weren't prepared for the consequences.

"They were not aware of the enormous investment needed to get the right software and to implement a system," comments Siemens' Szwoch. "There's some magnificent equipment here that isn't being used. Millions of dollars of equipment. In the past, they got skinned, and they'll be more careful about what they buy in the future. They have learned the bitter lessons. Now they are overcareful. We have to regain their trust."

For a while, the Chinese thought that modernization meant having the right machines. Now they are learning that it is a systems game. China's guidelines for technology acquisition reflect the country's change of emphasis; systems must be above the level available in China, must be of practical use, must contribute to China's eventual self-sufficiency, must foster economic and social development, and must be useful for generating foreign exchange.

Not all of China's technology comes from abroad. It has its own computer traditions (see "The Long March") and is actively creating an internal computer industry, centered in Beijing and in Shanghai, much of it under the control of the newly formed China Computer Development Corp. (CCDC).

Set up in early 1987, the CCDC's stated aim is to become "China's IBM." It pulls together many of the disparate computer development and manufacturing facilities in China into one organization. The aim is to coordinate the country's production of machines and help ensure that the people with talent are given the right environment to work in. Cutting across the traditional hierarchies of Chinese state-controlled organizations is essential if this is going to be effective.

Thirteen factories that build the Great Wall microcomputer are part of the CCDC. Together, they produce 25,000 pcs a year. Factory Number 3, in Beijing, manufactured minis from 1965 until 1983, when it began producing 8-bit machines. Now it sells the IBM-compatible Great Wall, which it builds using Intel microprocessors and memory chips from Oki of Japan. It also makes a Motorola 68000 multiuser Unix system called the BCMS 68000. "What we would like to do is to make Digital's MicroVAX here," says Pan Tianbao, deputy chief of production at the plant.

FIGURE 1 China's Increasing Computer Imports*

(IN $ MILLIONS)

COUNTRY	1983	1984	1985	1986
France	5.8	1.6	2.8	9.2
West Germany	1.3	7.3	7.1	11.1
Italy	0.4	0.8	1.1	1.2
U.K.	2.3	4.0	6.0	4.3
Japan	25.7	49.9	83.7	84.9
U.S.	35.3	77.6	154.7	189.7
Total	70.8	141.2	255.4	300.4

*All figures include computer systems, cpus, and peripherals.

Source: Official Customs Statistics

The Long March

The first Chinese computer was completed in 1958, two years after the establishment of the Beijing Institute of Computer Technology (ICT) by the Chinese Academy of Sciences. The vacuum tube-based machine, called the Model 103, was not sophisticated, and was probably built with the help of Soviet technicians.

In 1960, the Soviet Union withdrew all of its technical aid from China. For the next two decades, computer development was solely in Chinese hands.

China's two second generation machines were announced in 1965. ICT developed a 32-bit computer called the Model 109B, while a much slower, 21-bit machine was produced by the Beijing Telecommunications Factory. Both of these were only laboratory models and never went into production.

In 1966, a massive blow to China's scientific development occurred—Mao's Cultural Revolution. While scientists in the West were building a computer industry, Chinese universities were shut down for almost 10 years. Scientists and the intelligentsia were forced to work in the fields and were hounded by the Red Guards.

Some development was protected, however, and IC-based machines built by researchers in Beijing and Shanghai began to emerge in the early '70s. However, China's various computer developers pursued extreme independence in those early years, producing 21-, 32-, 36-, 39-, 42-, 44-, and 48-bit architectures. These were mostly incompatible with international trends—and with each other.

More important, there was no successful, widespread penetration and diffusion of the technology into China's vast economy and society.

The turning point for China came in 1978 when a National Science Conference proclaimed that China's future modernization would be science driven and no longer ideology driven. Improvements in computing were identified as a high-priority national goal. China opened its doors to the West, and the result over the last 10 years has been substantial growth in Chinese computer development.

While China has imported more than 1,500 mainframes and minicomputers, and more than 150,000 micros since then, it is establishing its own industry. The Chinese, apart from setting up or expanding manufacturing plants to produce minis and micros, have also grappled with the problem of automating the ideographic Chinese language. In addition, they recently announced a 10MIPS array processor and a 100MIPS supercomputer called the Galaxy—or, translated literally, the River of Stars. The supercomputer project is a good example of the strategies and setbacks in Chinese computer development today. Though it is an ambitious system and was designed by the Chinese, it uses imported components. Reports in Beijing indicate that its performance is not very dependable.

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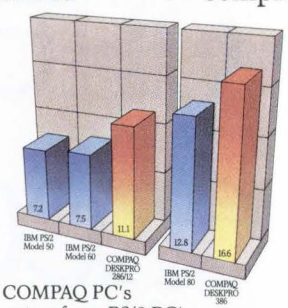

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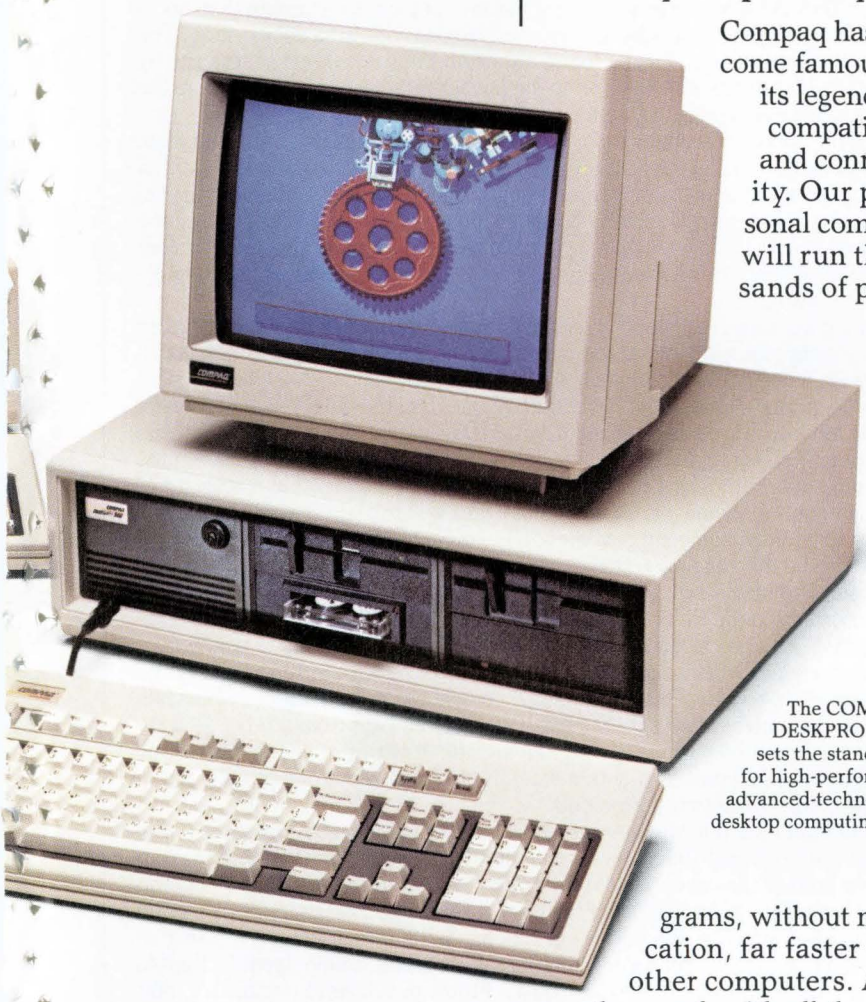

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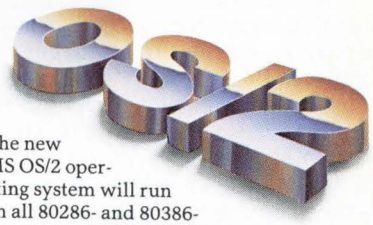

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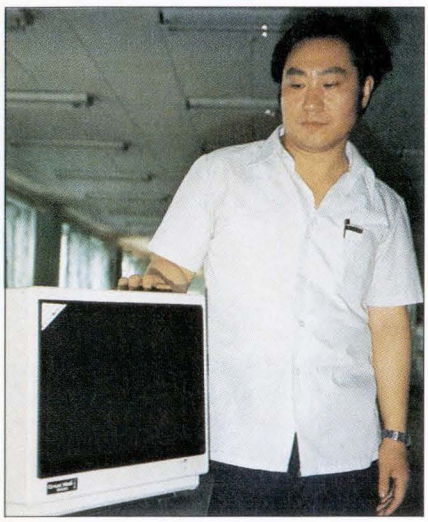
There are now an estimated 2,600 joint ventures between Chinese organizations and foreign firms. Though not all have been successful, many foreign computer firms are looking for a stake in one particular joint venture: to build a mainframe assembly plant in China. The chances are that the company that wins the deal will also win a massive share of China's growing mainframe market.

Naturally, IBM is interested. "We have been holding discussions regularly with the Chinese authorities on the possibility of cooperative projects," states an IBM China spokesman. Also in the running, according to local speculation, are China's other main suppliers: Unisys, Hitachi, Siemens, and perhaps Digital.

Installing the systems after they are made is another story. Jacques Witasse, corporate marketing manager for Honeywell Bull's new DPS 7000 range of systems, was running seminars in Beijing for Chinese users in June. He remarks, "There's nowhere in the world like this because they don't use computers the same way we do. Applications are almost exclusively scientific and numeric. When it comes to the automation of administrative tasks and offices, they don't do it. The networking side is also very difficult here because the communication system is so basic. I don't expect our machines to be used the same way here as anywhere else. They don't know what transaction processing is—and that's going to be the key."

The lack of networking hinders computer users in China in other ways. "Remote diagnostics simply isn't possible here," says Siemens' Szwoch. "Users have to wait until an engineer can get to them when there's a problem."



Thirteen factories produce the Great Wall pc.

Improvements to China's networking ability are in the early stages (see "Networks to Come"). On the applications side, though, there already are examples of the way ahead for China.

In the buildings of the Municipal Government of Nanjing in the Jiang-su province is one of China's more sophisticated information systems. The main application is office automation and it supports Chinese character electronic mail, Chinese word processing, and a data-based management information system. Twenty people can use the system at any time via terminals and a fiber-optic LAN.

One of the system's developers, Xue Xing, a PhD student at Nanjing University, explains that they had to start

Networks to Come

China's computer networking plans, first announced in 1978, are now well behind schedule. Although there are an increasing number of local area networks in operation, very few computer users have ever come across wide area networking. The wide area links that do exist can be found either on the basic internal nets run by the rail, airline, and military sectors, or on the few leased-line connections from the offices of foreign companies to satellite earth stations.

All this is about to change, and the scientific community is taking the lead. China has made an official application to join Bitnet, the academic and research network that now includes over 200 member institutions in 17 countries. The plan is to make the first network broadcast from China on Oct. 1, 1987, and, by June 1988, to have linked 17 Chinese nodes via a prototype national research net called Chinanet. This will provide a long overdue practical example of national and international networking.

Setting it up, however, won't be easy. The main problem with networking in the country is the notoriously bad telecommunications system. Today, almost 10 years after China began its technological revolution, only one in 200 Chinese people have a telephone—one of the lowest telephone densities in the world. What's more, most networks are still unreliable, and getting a good line, even within some of the major cities, is fraught with delays, misrouting, and operator interventions.

Combine that with a lack of trained networking personnel and a scarcity of networking equipment, and it is obvious that China still has a long way to go.

There have been some improvements, however. China's telecom inventory now includes an expanding microwave network between 17 major cities; two Chinese communications satellites (successfully providing voice, data, and video service, according to the Chinese, though still experimental and with limited transponder capacity); several leased Intelsat transponders for domestic use, with a footprint covering all of China; a sparse national twisted wire infrastructure; and some special point-to-point links, including a coastal cable. In addition, China has installed 53 transmit/receive satellite earth stations and approximately 2,000 receive-only earth stations. China is also moving ahead with the use of fiber-optic technology, and that, combined with a satellite strategy, could eventually solve many of the country's network problems.

With demand for telecom services by Chinese and foreign companies now increasing rapidly (in mid-1986, there were 100,000 organizations waiting for communications links in the country, and that's only the beginning), China has become a suppliers' market for international telecom companies. For example, Belgium ITT, now merged into the new Alcatel group, has a $350 million joint venture in China to manufacture stored program control switches, while Japan's Fujitsu signed a $3.5 million deal in June with China's Fujian province to establish a joint software development center for digital switching systems.

Meanwhile, the Chinese network team, led by Prof. Qian Shixiang, chairman of the computer sciences department of the Beijing Institute of Aeronautics and Astronautics (BIAA), hopes to complete the initial Beijing branch of Chinanet this year using a local, dedicated fiber-optic network in the Haidan Qu district of the city. This will connect the BIAA, Beijing University, Qinghua University (China's equivalent of MIT), the Institute of Computing Technology of the Chinese Academy of Sciences, and perhaps other institutes in the area. During early 1988, this will be connected via 17 nodes across China to other universities and institutes.

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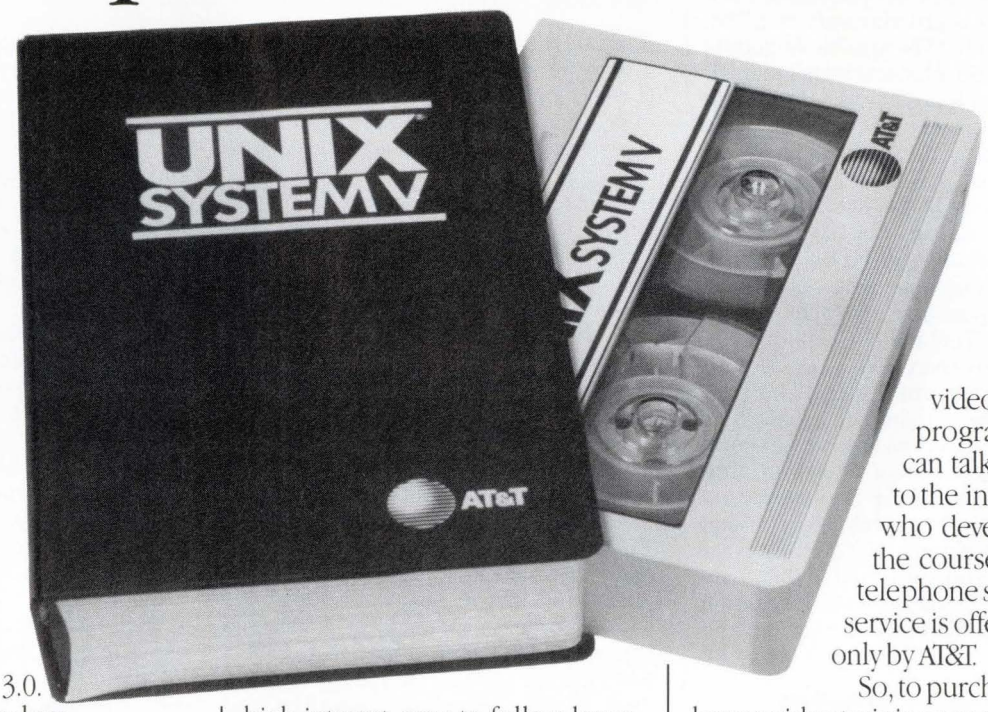

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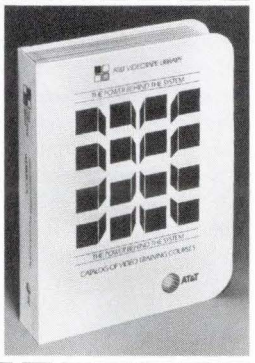

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from scratch. "There are not many systems using this type of application, but it is an area that is growing very fast," according to Xue. "The trouble is getting the money to develop and install them."

Access to more advanced software tools would help cut the cost of development, and that is the goal of China's national software engineering program. Run by Bosheng Zhan, associate professor and vice chairman of the computer science department of the Beijing Institute of Aeronautics and Astronautics, the program is sponsored by China's State Science and Technology Commission and involves researchers in 13 Chinese universities and institutes. The program's review committee, however, is not Chinese. It is made up of experts from the University of Maryland, College Park. The software engineering environment they are developing is based on Unix and written in C. "We think that some of our tools are better than anything in the U.S., and we would like to sell the ideas outside of China," says Bosheng.

A Base for Developing Applications

Complex software problems already have been overcome in China, particularly those connected with the major task of automating China's ideographic language—there are over 400 different Chinese character entry processing systems to choose from.

Now that the language has been automated with some degree of success, there is a base for developing administrative and office applications. Though the expertise needed to create effective systems is limited, this will change as the many Chinese students in the U.S., Europe, and other Asian countries—around 30,000 in 1986—return home after being exposed to Western management methods and techniques of systems analysis. Probably the most influence on the future of China's information systems development will come from foreign companies. They will set examples, make money, and, if they want to maintain and expand their systems in China, they will probably transfer some of their know-how to their trading partners.

Both the outside companies and the Chinese are becoming aware that they have to make realistic plans to account for limitations in the use of information systems as a base for business. China, meanwhile, is beginning to focus on closing its applications gap.

If international trade is supposed to be a process of mutual benefit, then trade with China will have to be a process of mutual education for a few years. "And then," as Prof. Hu puts it, "once the friendship has been established, the world will seem a smaller place." ■

Paul Tate is DATAMATION's international editor. John H. Maier is an independent computer and networking consultant in Fort Worth. He has been involved with Chinese computing for eight years and has recently spent a year lecturing in China on the computer sciences.

A Brighter Shade of Green

China has been off the export hit list since 1983, when it was transferred to country group "V" under the U.S. Export Administration Act. The green zone was added to the Commodity Control List that same year. The list determines what number of products can be sent to a country under what type of export license. The green zone demarcates items likely to be approved for export.

Among the green zone's original seven listings were semiconductor production equipment, computers, and computerized test equipment. The zone was expanded to 27 commodities in 1985 by the Coordinating Committee for Multilateral Export Controls (Cocom), which includes the NATO countries and Japan. Thus, technology within the new limits could be shipped to China at the exporting country's discretion, without preexport Cocom review.

Now, the green zone's grown again. The Department of Commerce's (DOC) latest guidelines expand to 285 from 155 the processing data rate (PDR, a measurement of computer performance) for machines sent to China. The guidelines, which had allowed disk drives to be exported disassembled, now allow assembled drives to be sent to China.

"I think Commerce finally recognized that U.S. companies need these kinds of guidelines to compete against the West European companies that have less stringent export controls," says Kelly Shea, a high-tech analyst at the National Council for U.S.-China Trade. The group of about 350 companies, including IBM, Digital Equipment Corp., Hewlett-Packard, and NCR, had recommended to Congress a further widening of the green zone to a PDR of 300.

According to the congressional Office of Technology Assessment's (OTA) report "Technology Transfer to China," 134 China applications valued at $145 million had been in the export pipeline for more than a year as of January 1987. While average processing for China cases had declined to 57 days in April, the processing time for referred China cases (those reviewed by agencies in addition to DOC) continues to take an average of almost six months.

"OTA's research confirmed that other countries are generally able to reach a decision on even sophisticated dual-use exports in a few weeks," the report says, "while the U.S. frequently requires months or even years. In addition, only the U.S. unilaterally imposes controls on items not on the list of Cocom-controlled items, and requires that exports to allied countries, if reexported to third countries, be again subject to the original licensing. The latter requirement has caused considerable discord between the U.S. and other Cocom members."

According to OTA, computing equipment alone made up almost 80% of the value of 1986 export licenses approved to China. So while U.S. controls aren't the critical factor determining the overall volume of trade with China, they don't exactly help China get what it wants when it wants it.

Expanding the green zone is a start. But OTA suggests Congress not stop there. It recommends a six-day licensing policy for green zone cases; giving DOC the authority to approve licenses unless formally appealed to the President, with an automatic approval of cases that have been held up for too long; developing plans to enlarge the green zone; and ensuring that U.S. controls are in line with Cocom allies, even if that means dropping unilateral controls.

Should all this come to pass, it still doesn't guarantee a run on licenses by the computer industry. The desire to export "all depends on the company," says Jim LeMunyon, senior manager of government relations for the American Electronics Association. "And the new green zone combined with the OTA report should make it easier for U.S. companies to compete."

BY WILLIE SCHATZ

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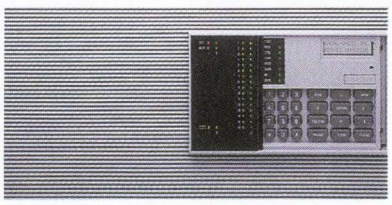

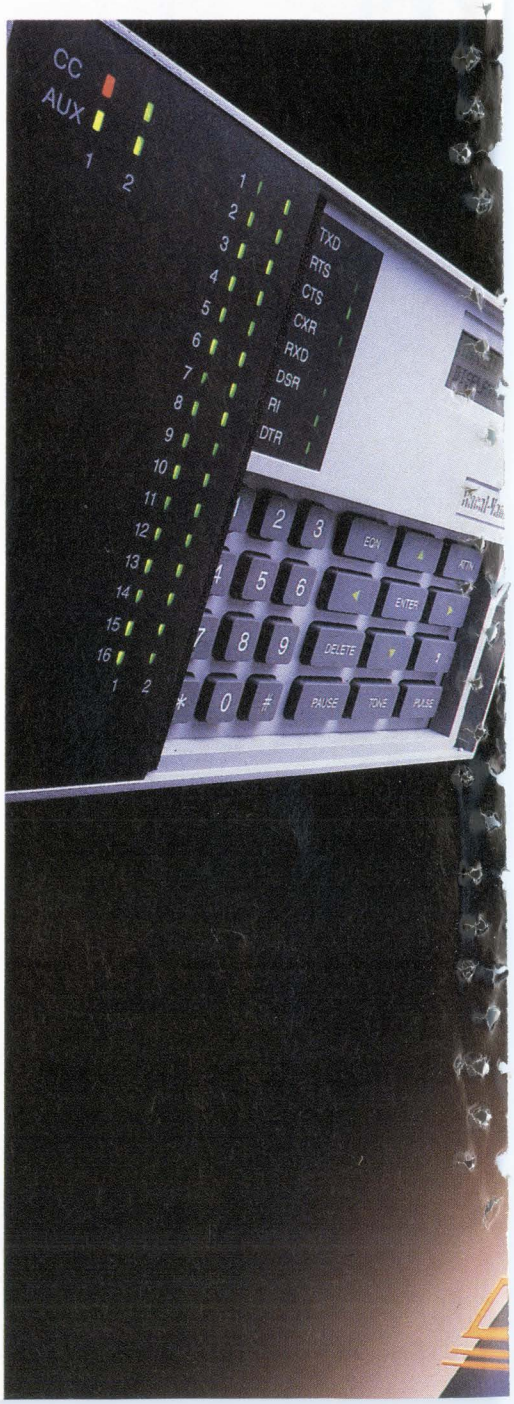

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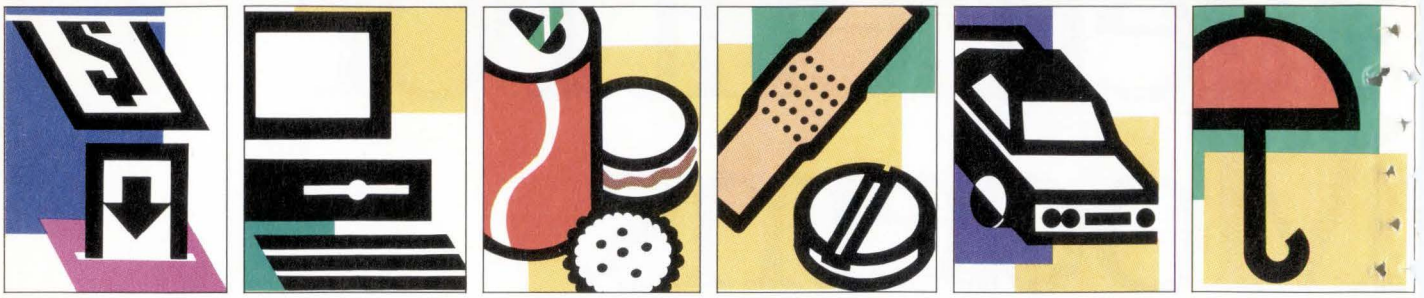


Industry by Industry IS Survey

The late senator from Illinois, Everett Dirksen, once said, "A billion here, a billion there, pretty soon it adds up to real money." We studied information systems spending at 120 of America's largest companies, industry by industry, and discovered that, indeed, we're talking real money, an average of just under 2% of total corporate revenues. Here's how IS is allocating its resources in a dozen industries.

A DATAMATION REPORT

The enterprises DATAMATION surveyed had an aggregate revenue of $1.5 trillion during the last fiscal year, which comes to something like a third of the U.S. gross national product. The total information systems expenditures made by these 120 giants of industry and commerce amounts to about 2% of their revenue as a whole. This works out to more than $27 billion, a sum that is in excess of the gross domestic product of New Zealand. Last year, about $9 billion of this was spent on hardware alone. A larger amount, $13 billion, was allocated to personnel expenses. Smaller portions of the total went for software ($2.5 billion) and overhead ($2.7 billion).

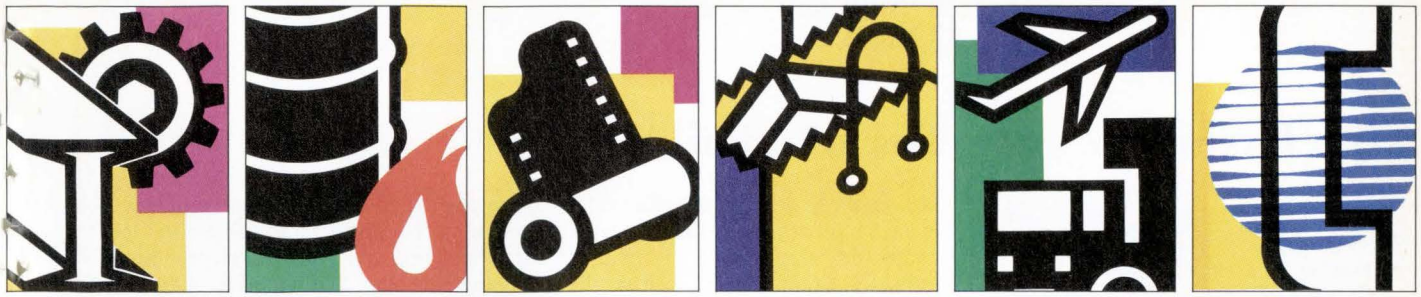
This year, IS budgets for individual companies will rise by anywhere from 3% to 20%, and total information systems expenditures will approach or surpass $30 billion. If the economy stays on track, the prospects for 1988 are even brighter.

Among fast-growing companies, the share of revenue going to information systems may decline this year compared with last, but many of the top computing executives indicate that their expenditures during 1987 are still subject to change. Because many of these users make significant hardware purchases late in the calendar year—as reflected in the revenue patterns of the computer industry's vendors—the actual totals for 1987 can't be known until the user organizations wind up this year's accounting work in the early spring.

Despite the enormity of these amounts, IS budgets substantially understate the actual computing expenditures within most companies. The chieftains of DATAMATION's top shops indicate that their companies spend considerable sums on computerization in addition to the specifically budgeted amounts. While the off-budget computing expenditures at some companies are insignificant, most information systems directors we queried estimate that their coworkers are independently spending sums equal to 5% to 50% of IS's budgeted total. In a few cases, information systems executives say that expenditures outside their corporate IS budgets may equal or exceed budgeted funds. For such companies—e.g., holding companies or certain franchisers—the corporate IS budget is really not a valid consolidated item, the way it is at a fiscally integrated enterprise.

The pattern of expenditures varies among the industry groups, as does the portion of corporate revenue that is allo-

Illustrations by Javier Romero



cated to IS departments. Companies that are mainly processors of information—banks, for instance—spend a greater share of income on computers than enterprises with huge plants and enormous raw material requirements, such as petrochemical outfits. Within the budgets of each group, the differences in the way funds are allocated—software versus personnel, or hardware versus software—reflect industry and corporate traditions. In some cases, the allocations are affected by what's available from hardware and software vendors.

Many users say they would prefer to use canned, standardized software, but they maintain that the packages on the market simply don't meet their requirements. These users spend money on personnel that might otherwise go to a software house with the right product. For some applications, the computer industry has made it cheaper to add MIPS than to add efficient programs. In other cases, such as applications where only special purpose number crunchers can do the job quickly, users have little choice but to go with exotic, and often costly, hardware. As a result, users with extensive algebraic workloads may spend more on hardware and less on software, compared with the national average.

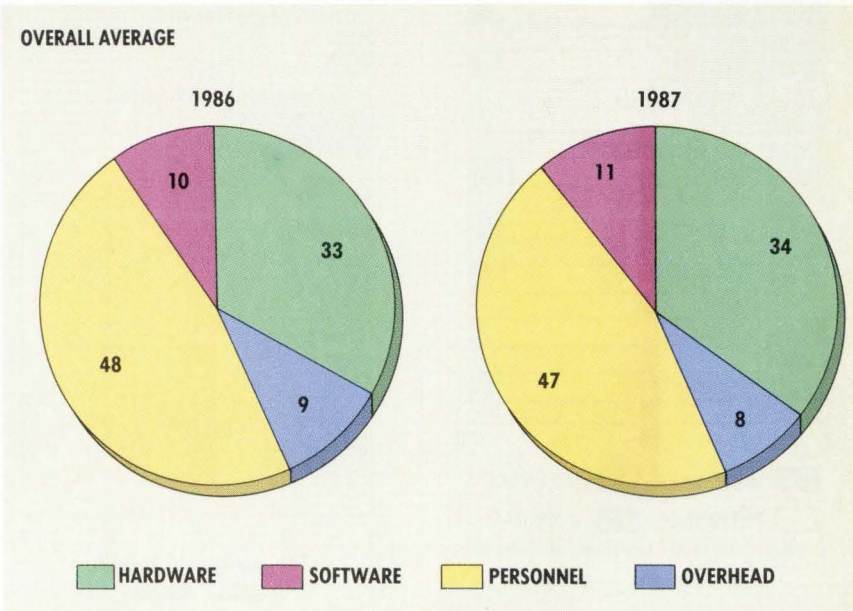
Despite all the difficulties faced by top shop managers as they try to cope with their dynamic departments, the results of this survey indicate that they are doing well. Common patterns within industry groups and even across group boundaries show that there are indeed norms. And despite the constant discussion among users about the perennial problems of computing, the leading IS executives generally report that they are satisfied with the results they are getting. More important, they indicate that their companies are also generally satisfied with the way their computing operations perform. ■

Industry by Industry Budget Summary

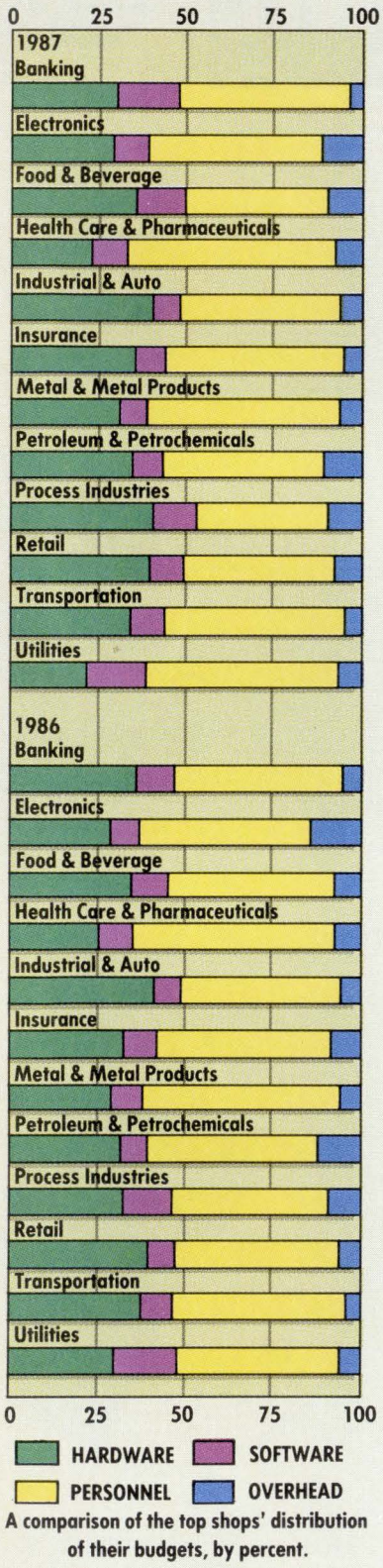
INDUSTRY	IS AS % OF REVENUE	IS BUDGET	REVENUE	PROFIT
Banking & Finance	4.5	$ 3,904.4	$ 86,968.2	$ 4,867.4
Electronics	3.7	4,839.8	131,274.4	8,121.4
Food & Beverage	1.6	1,657.1	104,334.3	6,282.8
Health Care & Pharmaceuticals	0.6	270.6	48,789.5	4,043.6
Industrial & Automotive	2.7	7,432.4	273,394.5	10,490.5
Insurance	1.7	1,678.5	100,115.5	5,182.4
Metal & Metal Products	1.1	495.0	45,083.3	–1,572.7
Petroleum & Petrochemicals	1.3	3,312.3	261,975.1	10,324.1
Process Industries	1.6	1,572.8	99,029.9	5,167.7
Retail	0.2	327.7	167,211.4	3,917.9
Transportation	1.3	712.7	54,994.5	89.5
Utilities	1.0	1,189.0	121,687.4	10,172.5
Totals	1.8	27,392.3	1,494,858.0	67,087.1

All dollar amounts are in millions.

Distribution of IS Funds by Percent



How They Spent



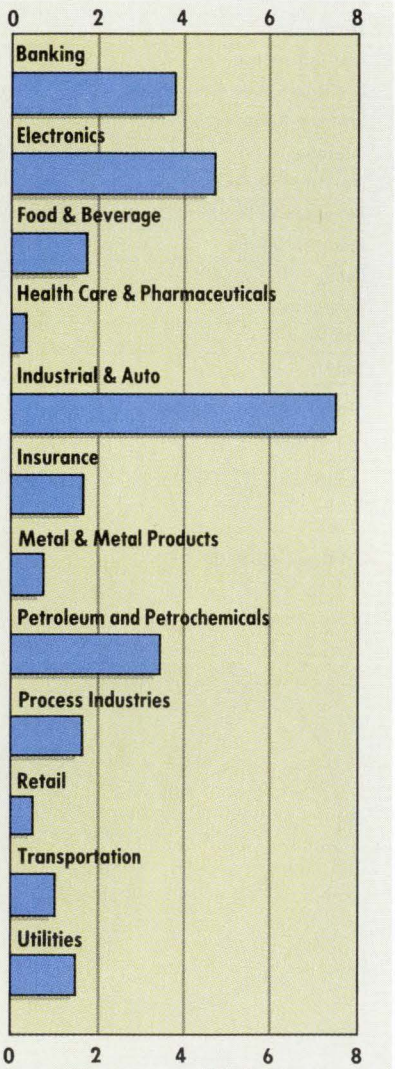
A comparison of the top shops' distribution of their budgets, by percent.

How to Read the Charts

Data in these graphs and tables reflect aggregate expenditures for the companies in each industry group. The data are presented in two ways. First, the groups are compared by aggregate information systems budgets and by average computing intensity. Computing intensity is the percentage of revenue devoted to budgeted IS (not including estimates of off-budget expenditures). Second, each sector's budget breakdown is presented in tabular and graphic form.

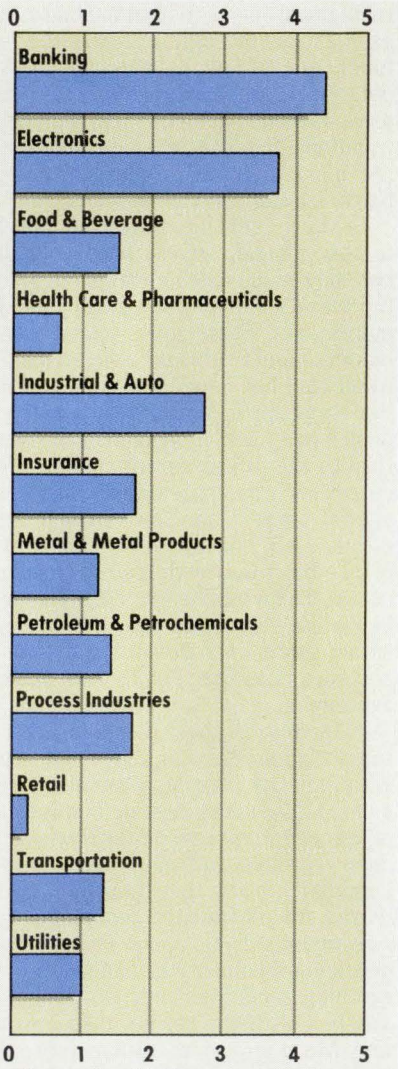
The table for each sector shows the companies in each group, their computing intensity, their size, their profits, and their accounting years. The computing intensity icon shows how each company in a group compares to others within that group. An equal sign (=) indicates that a company spends about the same percentage of its revenue on information systems as the mean for its group. A plus sign (+) means that a company spends a significantly larger proportion of its revenue on IS. A minus sign— means that a company spends a significantly smaller percentage of its revenue on information systems.

What They Paid



The aggregate IS budgets, in billions of dollars.

IS's Cut



The top shops' budgets as a percentage of their companies' revenues.

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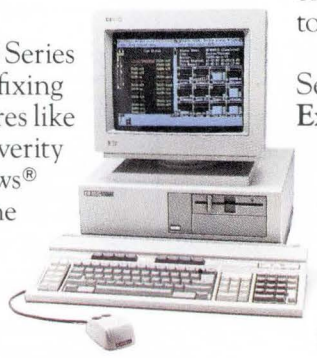

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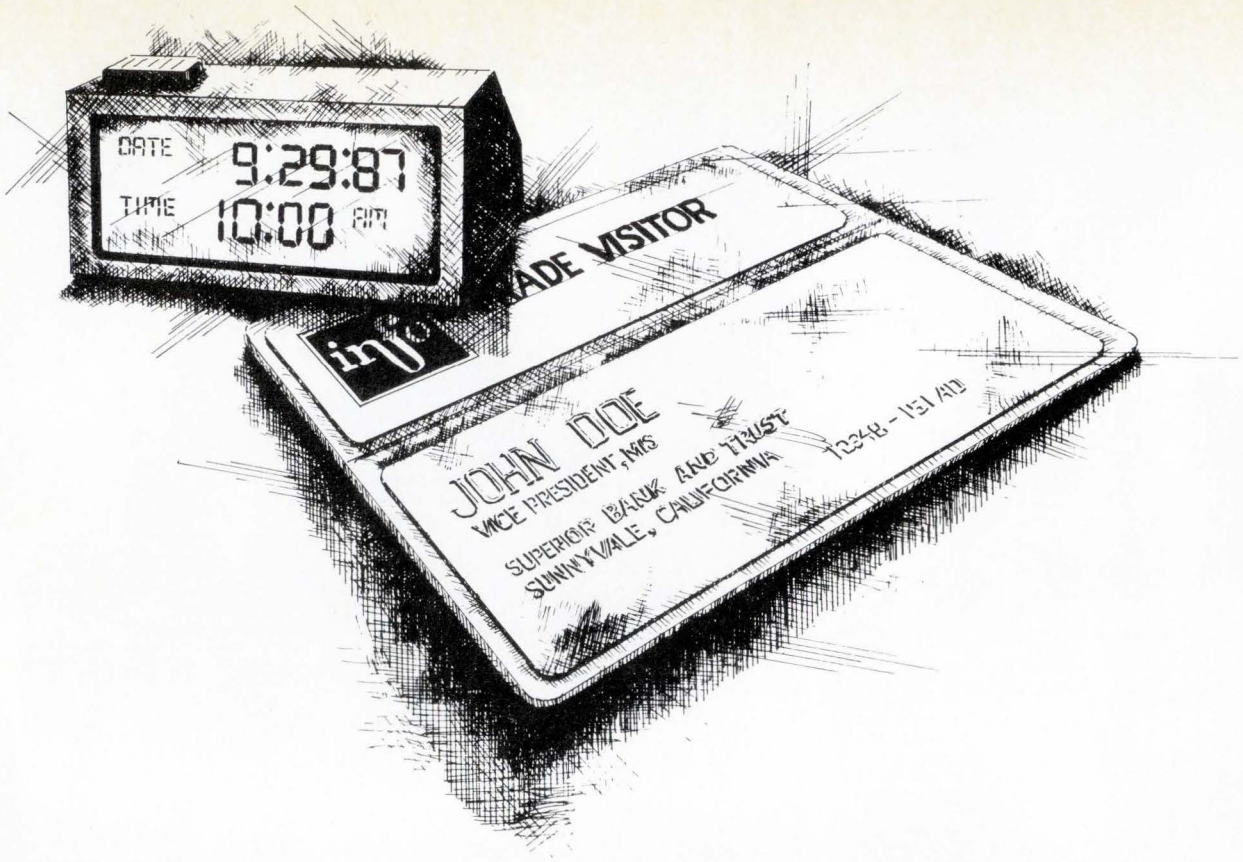

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Money Is Information

Banks these days seem like giant computer systems. Automated teller machines (ATMs) take in deposits and dispense cash. Human tellers are often operators of complex workstations. Even less visible bank activities, like the management and trading of financial instruments, require computer technology. Little wonder, then, that banks proportionally spend more than twice the national average on information systems. Nonbanking financial companies, such as brokerage houses, similarly use high levels of automation to create and deliver their services.

In the banking and financial community, computer budgets are proportionally larger at the shops that provide a greater number of financial products to a large customer base. Banks that rely heavily on retail operations use more computing than their merchant banking counterparts.

In New York City, where Citicorp makes its headquarters, the megabank's ATMs seem as common as telephone booths. This huge bank is also a major provider of consumer credit services, a business that means processing mountains of paper. Its facilities range from an ATM around the corner from Manhattan's Dakota apartment building to an enormous charge card complex in Sioux Falls, South Dakota.

By contrast, J.P. Morgan, the bankers' bank, is a relatively light computer user, with far fewer customers but much larger typical transactions in its substantial business. If this institution's clients would let it round off after three digits, it might be able to manage its $7 billion books on a couple of pcs. But even Morgan's relatively lean annual IS budget is in the tens of millions.

A similar pattern of computing can be found among stockbrokers. Merrill Lynch is not only the largest company on Wall Street, but one of the most sophisticated when it comes to computing. The firm's retail side provides on-line services to thousands of sales personnel serving millions of investors. In addition, the computers for Merrill's retail operations must maintain the records and print the reports that clients and government agencies require.

There is also an institutional side to Merrill. At the firm's Capital Markets operation, giant mainframes running APL are used for programmed trading applications developed by so-called rocket scientists, in much the same way as humble pcs are pounded by Lotus-loving bean counters.

By contrast, Salomon Brothers' clientele is primarily institutional. Because Salomon does not have to provide computer support for a myriad of individual investors, as does Merrill, its computing budget is perceptibly smaller.

Far less computer intensive is Fannie Mae, the Federal National Mortgage Association, which deals with one genre of financial instrument and does not have to link its executives with the world's markets in stocks, bonds, commodities, and currencies.

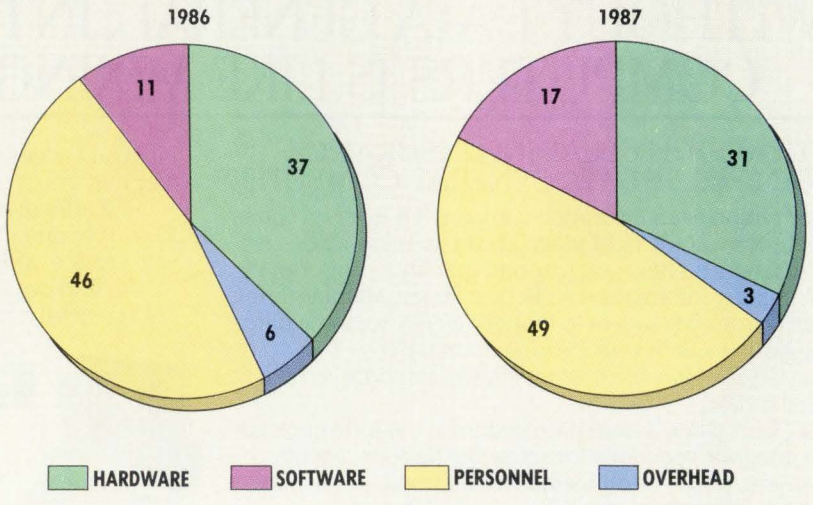
The Top 10

COMPANY	IS INTENSITY*	REVENUE ($ MIL)	PROFIT ($ MIL)	FY END
American Express Co.	=	14,652	1,110	Dec. 31
Federal National Mortgage Assn.	–	10,540	183	Dec. 31
Citicorp	+	10,400	1,058	Dec. 31
BankAmerica Corp.	=	10,131	–518	Dec. 31
Merrill Lynch & Co. Inc.	+	9,606	469	Dec. 31
Manufacturers Hanover Corp.	=	7,965	411	Dec. 31
Salomon Brothers Inc.	–	6,789	516	Dec. 31
J.P. Morgan & Co. Inc.	–	6,672	873	Dec. 31
First Interstate Bancorp.	=	5,290	338	Dec. 31
Bankers Trust New York Corp.	+	4,923	428	Dec. 31

* = means company spends about the same percentage of its revenue on IS as the group mean; + means it spends a larger percentage; – means less.

Distribution of IS Funds by Percent

Banking and finance are the most IS-intensive sectors of U.S. business, with average information systems spending using about 4.5% of revenues.



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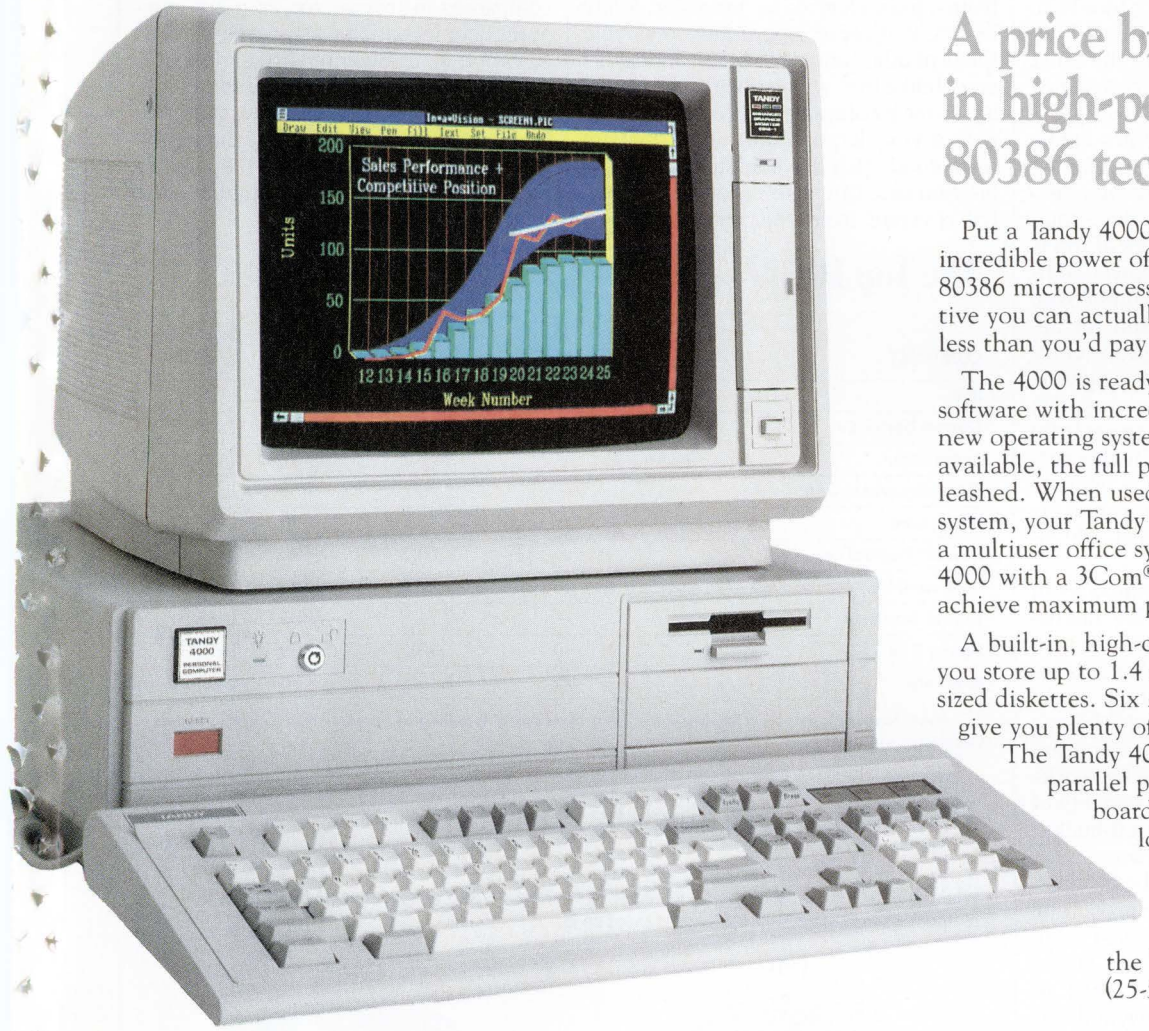

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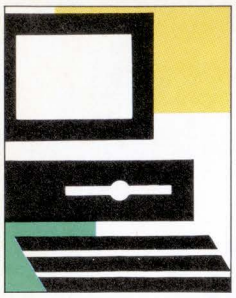


The Vendor Is a Consumer

The electronics business not only dishes out computers—it takes them, too. With an aggregate information systems budget of nearly $5 billion during the most recent fiscal year, the leading companies in this sector have put their own products to wide use. The electronics industry is one that is continually developing new applications and customizing existing ones. So it is no wonder that, compared with the national average of top IS operations, this sector has lower software costs and higher personnel costs, due to the man-hours required for applications development. The proprietary circuit design and simulation programs that characterize this business may also account for some of the differences from the national norms displayed by this sector. Other factors that affect IS budgets are the relatively high salaries and expensive facilities that are typical of high-tech manufacturers.

Executives at the top companies in electronics say there can be wide fluctuations in their IS budgets from year to year. Their shops grow in spurts as whole new systems are brought up to handle new applications. In addition, as engineering departments' computers are linked into enterprisewide networks that can store databases, the budgets of IS directors will grow, while off-budget expenditures will be pared down.

The biggest spender in the group—proportionally, as well as in terms of total expenditures—is also the biggest company, IBM. Increasingly, IBM has added databases and interactive facilities to support its marketing, planning, and service groups. As the number of installed IBM products has burgeoned with the workstation market, the company's record-keeping burden has increased substantially. In addition, IBM has pushed out the frontiers of its business by ramping up semiconductor production, adding numerous software products, and accelerating the pace at which it produces, catalogs, and distributes information within its empire. IBM's top executives have stated that they are increasing their ability to monitor and control costs, and that of course means more and more information systems.

A much smaller portion of revenue goes to information systems in companies like Control Data Corp., which is far from a pure electronics producer. Many of CDC's diverse operations resemble those of other nonelectronic manufacturers. Unlike IBM, which obtains the majority of its income from direct sales, CDC gets a very large chunk of its revenue from goods that are sold in large lots to distributors. CDC also receives substantial revenue from the services sector. Nevertheless, Control Data, like all the companies in this sector, is a big computer user by national standards; its classification as a low-intensity shop really reflects its place among a group of technologically sophisticated users. Between CDC and IBM lies Intel, not only the supplier of cpus for a majority of the world's microcomputers, but a substantial computer user in its own right.

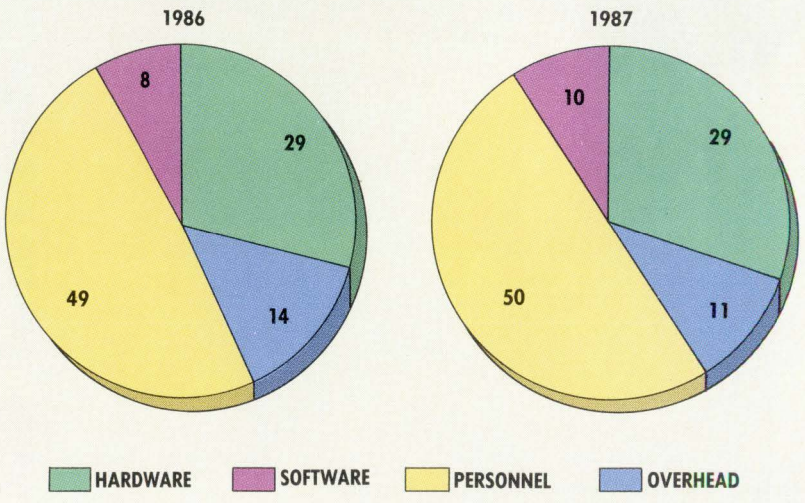
The Top 10

COMPANY	IS INTENSITY*	REVENUE ($ MIL)	PROFIT ($ MIL)	FY END
IBM	+	51,250	4,789	Dec. 31
General Electric Co.	=	36,725	2,492	Dec. 31
Xerox Corp.	–	9,781	487	Dec. 31
Digital Equipment Corp.	=	7,590	617	June 28
Unisys Corp.	=	7,433	–43	Dec. 31
Hewlett-Packard Co.	=	7,102	516	Oct. 31
Honeywell Inc.	=	5,378	–398	Dec. 31
Control Data Corp.	–	3,347	–265	Dec. 31
Square D Co.	–	1,403	99	Dec. 31
Intel Corp.	=	1,265	–73	Dec. 26

* = means company spends about the same percentage of its revenue on IS as the group mean; + means it spends a larger percentage; – means less.

Distribution of IS Funds by Percent

While the electronics sector comes in second in average percent of revenues devoted to IS, one company spends more than 6.6% of revenues on IS.



A SPLIT PERSONALITY HAS ITS ADVANTAGES.

Datasouth's CX Printers Are Plug-Compatible With Your Mainframe And Your PCs.

Face it.

You've got an identity crisis.

How can you get the output you need for your mainframe and your PCs from one printer? Stick with an old, slow, expensive 3287 printer, and depress your productivity? Or patch together some schizoid arrangement with an ASCII printer and a black box?

The answer to your problem is staring you right in the faces. Datasouth's CX3180 and CX3220 high performance matrix printers.

These true coaxial printers attach directly to a 3274/76 cluster controller or a 4331 Display Printer Adapter, without an external protocol converter. No behavior modification is required for them to work with PCs, either—both printers have parallel interfaces.

And no matter how you split their workload, these printers work like crazy. The CX3180 gives you draft text at 180 cps. The multimode CX3220 printer produces near-letter-quality text at 45 cps, and DP output at 220 cps. Both printers also generate high-resolution, dot-addressable graphics. And both are built for the kind of 100% duty cycle applications that make most printers crack under the strain.

So take advantage of your own split personality. Two heads may be better than one, but nothing beats Datasouth's single-minded dedication to high performance output. To find your nearest Datasouth distributor, call us at 1-800-222-4528.

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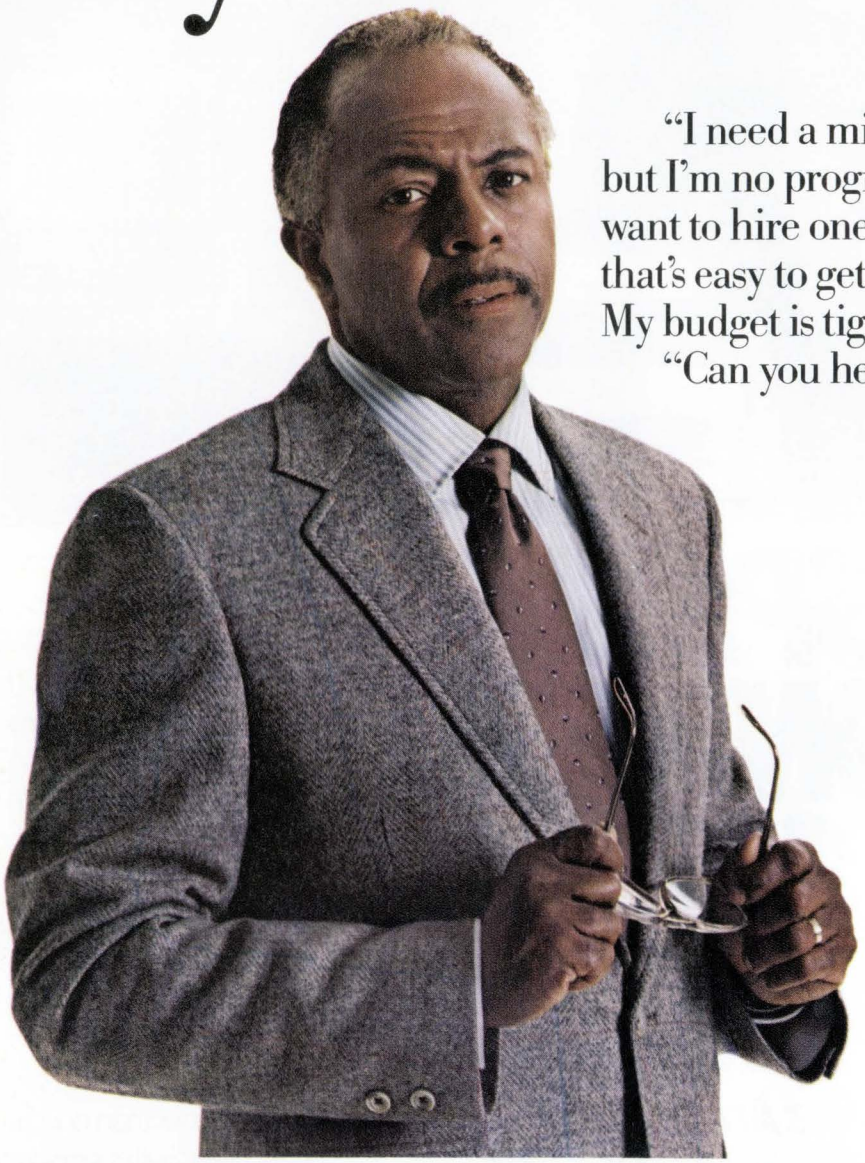
Circle 32 on Reader Card

Why IBM has a full



"I need a mid-size computer, but I'm no programmer and I don't want to hire one. I want software that's easy to get, install and learn. My budget is tight.
"Can you help me?"

Like the north and south poles, people who buy mid-range computers can be alike, yet opposite.

Their needs may be worlds apart, but each asks, "Can you help me?" And IBM answers, "Yes."

The fact is, IBM can help more kinds of customers, more ways, than anybody. We offer an extraordinary range of computing power, and all of it is available to any of our mid-range customers.

But there's one thing we don't have, and neither does anybody else: a "one-size-fits-all" design that can satisfy everyone without compromise. The needs of a small law firm, a retail chain and a multi-national corporation, for example, are too diverse for one architecture to serve each equally well.

So IBM offers a choice of mid-range systems, System/3X and System/370. Neither is "better" than the other, they're just better suited for different kinds of jobs. You may even want both.

And since we give you a choice, we'll help you make the right one. Together, we'll analyze your needs for software, connectivity and training. We'll look ahead to future growth, and we'll work to protect your previous investments.

We'll fit our system to your needs, not vice versa.

Power to start with, and grow with.

The System/3X family includes the System/36 and System/38.

The IBM System/36 is our most affordable and easiest-to-learn system. With over 4,000 programs available, it's ideal as a small company's first computer, with plenty of room for growth. It's also

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-range mid-range.

"I'm building a network of mid-range computers in 37 remote locations connecting with 12 mainframes in 5 other places. I'll be sending both data and mainframe applications. My growth ceiling is pretty much unlimited.

"Can you help me?"

extremely connectible. So a larger business can build a network of System/36s, or include them in existing networks with PCs and mainframes.

The IBM System/38 makes it easy to develop applications, is renowned for its versatile data base, and connects with PCs, hosts and System/36.

Mainframe architecture for smaller neighborhoods.

Our System/370 architecture brings large system computing to mid-size environments with the IBM 9370 Information System and the newly updated IBM 4381 Processor family.

The 9370s are surprisingly compact, yet they not only connect with IBM's biggest mainframes and other systems (through a variety of networks), they can run thousands of mainframe programs.

For sending mainframe power out to departments, or for communicating between departments, 9370s are a terrific choice.

IBM's new 4381s bring similar benefits, plus additional ones: added performance, added growth, and the ability to run MVS/XA, the most powerful IBM mainframe operating system.

The IBM system of choice.

But regardless of architecture, the most important considerations for any system are the people who'll be using it and the challenges they face.

And that's why IBM's full-range mid-range is the right idea. No matter where you fit into it, the fit feels good.

IBM®

Bread and Butter Users

Somewhat below the national norms for information systems intensity set by the top IS shops, food and beverage companies are more conventional users of computers, with annual expenditures of $1.7 billion. In addition to bread-and-butter applications, America's largest purveyors of edibles and quaffables use computers to analyze the sales patterns of their myriad brands, sometimes on a daily basis. They manage complex inventory problems, often involving perishable products. Many also provide inventory support and advice to their distributors and largest retailers, although they lag behind the leading pharmaceuticals suppliers in this emerging application.

While these companies expect some expansion of their computing requirements as they bring in new applications aimed at streamlining the exchange of information and increasing inventory turnover, much of the need for additional computing will come about as a by-product of normal business growth. The largest companies in this group are also involved in nonfood businesses; this affects the size and nature of their computing departments.

Philip Morris Inc. is more than half again as large as its nearest competitor in the field, Nabisco Brands Inc. Nabisco is half again as large as the number three company, PepsiCo Inc. PepsiCo, however, is the most intensive computer user in the group. This may be due to the company's financial orientation. In the past, PepsiCo has been deeply involved in leasing and related endeavors, and the company still has a whole division to manage pension funds. At the low end of this group's computer intensity scale is American Brands Inc. But today's low-intensity user may be a big player tomorrow, for food and beverage companies have exhibited big appetites for new acquisitions. The practice at these companies of buying and selling whole businesses shapes the role of their star computer jocks.

When food and beverage companies diversify, their computing requirements are inevitably shaped by the enterprises they acquire. These days, tobacco barons own insurers, soda pop's pashas control fast-food chains, cereal kings sell tires. It is clear that the more diverse these companies become, the more they will depend on information technology to compare the apples and oranges they sell and the more they will resemble the average large user.

Companies in this sector currently spend a relatively larger percentage of their budgets on software than the national average and a smaller amount of money on homegrown applications. These firms' proclivity for canned software, says one MIS executive, is a result of the frequency with which they buy and sell business units. Standardized inventory and financial software makes it easier to integrate a new subsidiary into the fold or, for that matter, to present its financial statements to a prospective buyer.

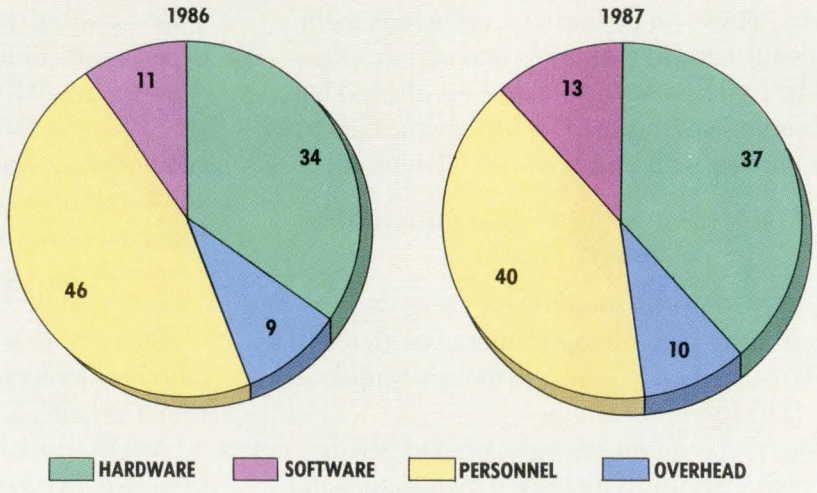
The Top 10

COMPANY	IS INTENSITY*	REVENUE ($ MIL)	PROFIT ($ MIL)	FY END
Philip Morris Cos. Inc.	=	25,409	1,478	Dec. 31
RJR Nabisco Inc.	=	15,978	1,080	Dec. 31
PepsiCo Inc.	+	9,291	458	Dec. 28
Kraft Inc.	=	8,742	413	Dec. 27
Coca-Cola Co.	=	8,669	934	Dec. 31
American Brands Inc.	–	8,470	847	Dec. 31
Sara Lee Corp.	=	8,340	241	June 30
Anheuser-Busch Companies Inc.	=	7,677	518	Dec. 31
ConAgra Inc.	=	5,911	105	May 25
Pillsbury Co.	=	5,848	208	May 31

* = means company spends about the same percentage of its revenue on IS as the group mean; + means it spends a larger percentage; – means less.

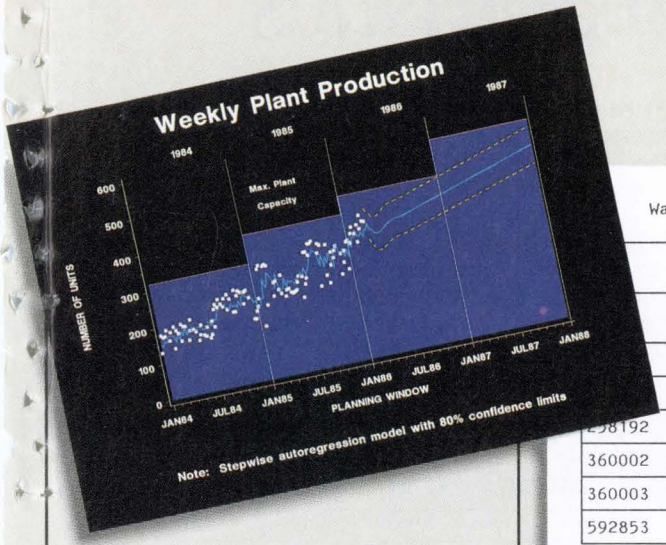
Distribution of IS Funds by Percent

A big piece of the food and beverage sector's software dollars go for packaged software, not homegrown applications.



The SAS® System

The Data Analysis Tool You Won't Outgrow.



Warehouse Inventory Report - 16JAN87

	Quantity on Hand	Quantity on Order	Projected Reorder Date
	123980	10000	THU, FEB 12, 87
	89450	5000	FRI, FEB 20, 87
258192	20110	1000	MON, MAR 30, 87
360002	8585	0	TUE, FEB 10, 87
360003	15985	500	TUE, FEB 10, 87
592853	469120	20000	WED, FEB 18, 87

If your job demands a powerful data analysis tool, the SAS® System is your solution. The SAS System gives you ready-to-use procedures for performing every kind of analysis—from simple descriptive statistics to advanced regression, analysis of variance, discriminant analysis, clustering, scoring, and more.

The SAS System reads data in any structure from any kind of file. You can create new variables, modify old ones, combine files, detect errors, and accumulate totals. Once your analysis is complete, you can report your results in lists, tables, charts, or plots.

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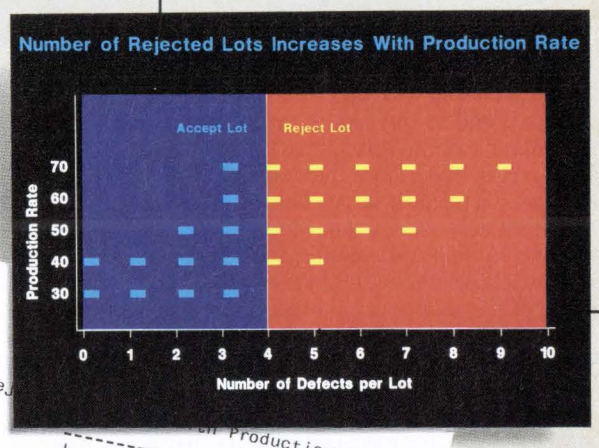

Lots Re... Production Rate

Rate	Lots Tested	Rejected Lot Statistics			
		Lowest	Highest	Mean	Percent
30	4	1	4	2.5	0
40	6	1	6	3.5	33
50	6	3	8	5.5	66
60	6	4	9	6.5	83
70	7	4	10	7.0	85

* Computer Intelligence, January 1986.

The SAS System runs on these minicomputers: Digital Equipment Corp. VAX™ 8xxx and 11/7xx series under VMS,™ and MicroVAX II™ under MicroVMS™; Prime Computer, Inc. Prime 50 series under PRIMOS®; and Data General Corp. ECLIPSE® MV series under AOS/VS. The SAS System also runs on IBM 370/30xx/43xx and compatible machines under OS, CMS, DOS/VSE, SSX, and ICCF; IBM XT/370 and AT/370 under VM/PC; and IBM PC XT and PC AT under PC DOS. Not all products are available for all operating systems.

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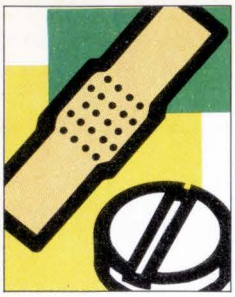


Tracking Vital Statistics

The MIS department has taken on new importance for this industry. To assist their customers and to foster loyalty, pharmaceutical makers have begun to provide inventory management services, putting terminals in drug stores and sending computer instructors out to visit pharmacists. For health care providers, record keeping assists in caring for patients and in the complex area of billing and government regulation.

Despite the importance of information processing technology in crucial aspects of this industry's daily work, the overall use of computers is relatively light. So large a part of these companies' budgets goes into research (in the case of the pharmaceuticals sector) and medical facilities operations (in the case of health care providers) that information systems costs are overshadowed. As a result, the reported expenditures on computers made by these companies are not necessarily a valid indicator of the overall importance of automation to their proper functioning.

In this sector, computers also figure in off-budget expenditures that are not easily fit into the mainstream. Computer systems help control the production, testing, and packaging of medicines; they also monitor in real time the vital signs of critically ill patients and assist technicians in the analysis of biological samples. Such applications of computer technology are not typical corporate IS.

Compared with other items in their budgets, and to the national average for personnel expenditures, pharmaceutical companies experience personnel costs that are particularly large. There are two apparent reasons for this variation. One is that the applications programs these organizations need are not always available off the shelf, even though they may be built around a core of standard database software. The stringent requirements for data integrity, audit trails, and security exceed similar requirements in other sectors, for this is an industry that not only may be subject to economic sanctions in the wake of a mishap, but legal sanctions as well.

A second source of this sector's unique budgeting pattern is the popularity of minicomputers in both pharmaceutical companies and health care facilities. In addition to the costs associated with the programming and operation of standalone minis, IS managers in this sector must also deal with the difficulties of interconnection.

A typical company in this group is McKesson Corp., San Francisco, whose computing patterns follow the trends in the industry, with one exception: the company's effort to speed applications development is reflected in an even more intense bias toward personnel and away from canned software. By contrast, health care provider National Medical Enterprises Inc., Los Angeles, spends a considerably larger portion of its budget on commercial software packages; industry-provided software is apparently easier to adapt to this company's record-keeping needs.

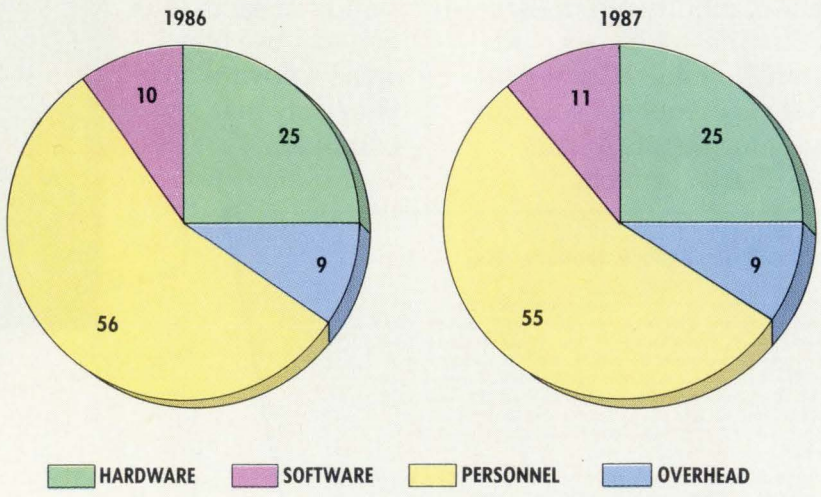
The Top 10

COMPANY	IS INTENSITY*	REVENUE ($ MIL)	PROFIT ($ MIL)	FY END
Johnson & Johnson	+	7,003	330	Dec. 29
McKesson Corp.	=	6,285	215	Mar. 31
Baxter Travenol Laboratories Inc.	=	5,543	444	Dec. 31
Hospital Corp. of America	=	4,931	175	Dec. 31
American Home Products Corp.	+	4,927	779	Dec. 31
Bristol-Meyers Co.	=	4,836	590	Dec. 31
Pfizer Inc.	=	4,476	660	Dec. 31
Merck & Co. Inc.	=	4,129	676	Dec. 31
National Medical Enterprises Inc.	=	3,595	118	May 31
Bergen Brunswig Corp.	=	3,066	58	Aug. 31

* = means company spends about the same percentage of its revenue on IS as the group mean; + means it spends a larger percentage; – means less.

Distribution of IS Funds by Percent

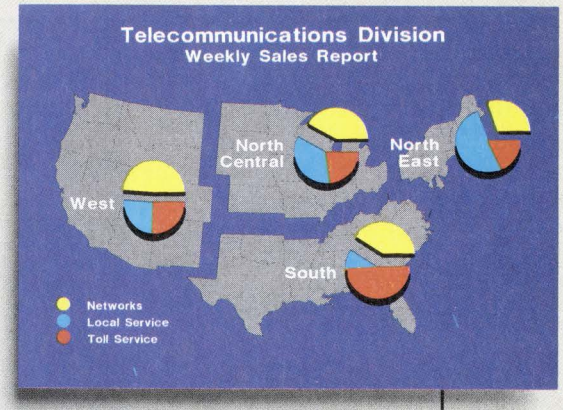
This sector spends a lot of its IS money on personnel, much of it due to custom-made applications programming.



The SAS® System

The Graphics Tool You Won't Outgrow.

When you've got to turn those numbers into a presentation, turn to the SAS® System. The SAS System includes easy-to-use procedures for charts, plots, maps, and three-dimensional displays. At a glance, you can grasp detailed statistics, spot relationships among items, and trace emerging trends. And when your manager wants more, the SAS System lets you customize your graphs and present multiple displays on the same page for easy comparison. You can produce your graphs on terminals, plotters, transparencies, or slides.



You can even use the SAS System to analyze your data before you present them. We've got tools for every kind of analysis—from simple descriptive statistics to advanced regression, analysis of variance, discriminant analysis, clustering, scoring, and more.

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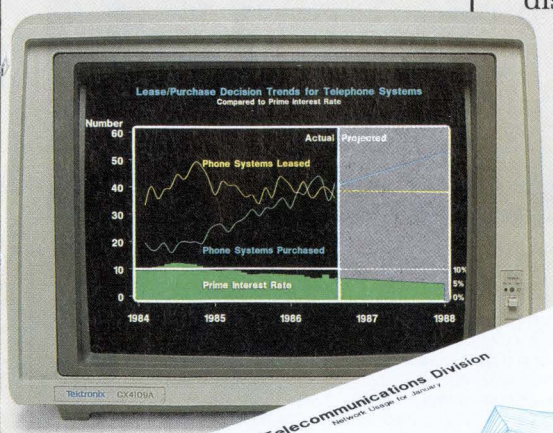

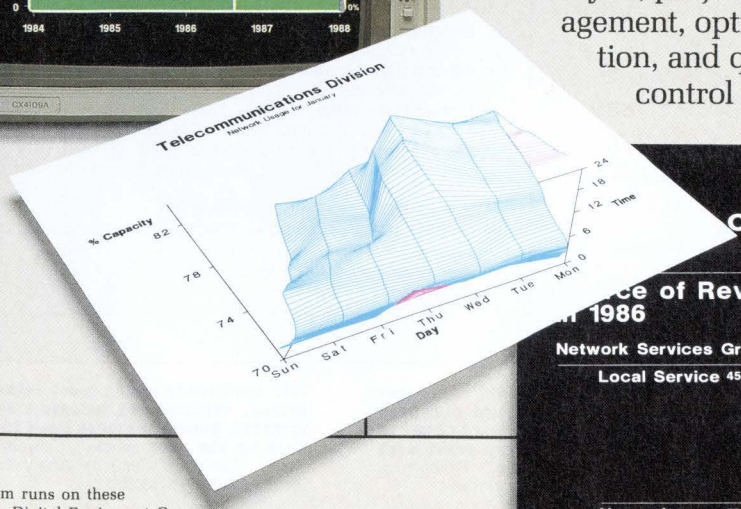

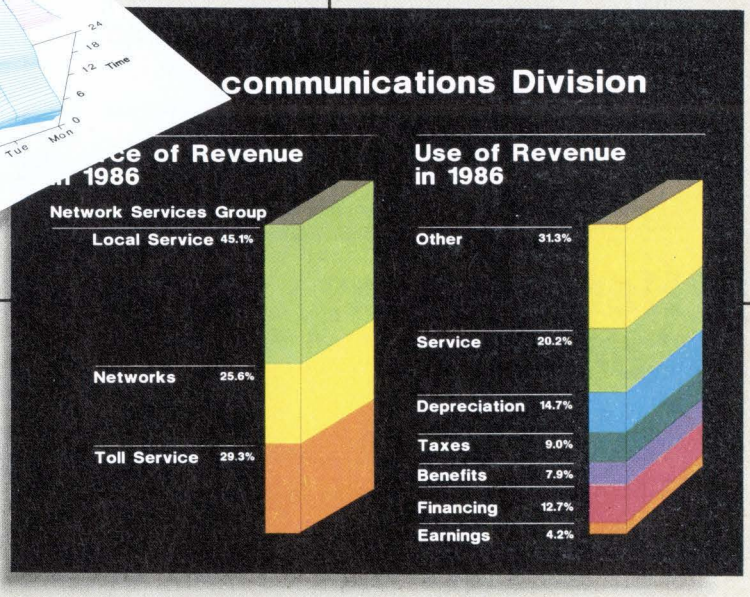

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The "Computer Security Event of the Year"

14th Annual Computer Security

GENERAL SESSIONS

Nine speakers will address a wide range of today's important security issues. Whatever aspect of computer security you're involved with day-to-day these sessions will broaden your professional perspective and help you do your job more effectively.

WORKSHOPS

60 workshops will be offered over the three-day conference. Participants can attend 6 of these 1 1/4 hour sessions. You'll find something useful no matter what you area of interest of level of experience. See the workshop selections listed below.

THE "GRADUATE PROGRAM"

A special 2-day program designed to meet the needs of the advanced computer security professional with at least 5 years experience. There is no extra cost for this program, but space is limited.

EXHIBITION

Don't miss the world's largest computer security show — the National Computer Security Exhibition. You'll see the latest in security products and services.

TOUR PROGRAM. . . This optional 2-day program gives family and friends a chance to see some of the highlights of Southern California . . . and it's made available at CSI's cost of $69.

Plus These Program Enhancements . . .

- **Security Software Tracks** — ACF2, RACF, CA-Top Secret will be covered in six workshops.
- **All activities "under one roof"** — i.e., all workshops, general sessions, the Graduate Program, and the Exhibition.
- **More hotel rooms** — 1,450 reserved at the Hilton.
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- **Hospitality Hour** on Sunday evening.
- **Individualized schedule** — Your personal agenda for the entire Conference.
- **Conference workbook** — "not for sale" and available only to attendees.

Here's What Conferees Say . . .

Excellent! Best computer security conference I've been to. If I had to choose to come to only one security event each year this would be the one." Graham J. DeGottal, DS Analyst, Chemical Bank

By far the most important source of security information & training in one place, in the industry. A must for the computer security professional." John T. Devall, Jr., Sr. Security Spec., Tenneco Oil Exploration/Production

This conference is the most information-packed, valuable and focused I have ever attended. Almost too much input to process! Keep up the good work." Claudia Deaton-Glover, Computer Security Analyst, General Services Administration

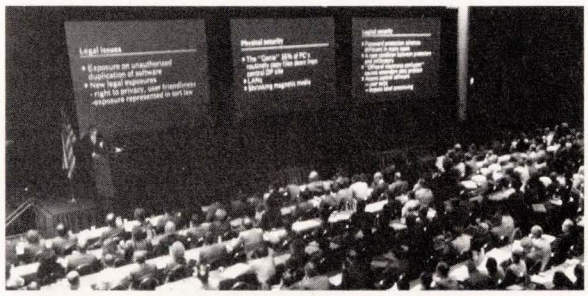
Fascinating. Stimulating. Without question a required event for anyone charged with information security responsibilities." G. Mark Hardy, Sr. Consultant, Booz Allen & Hamilton

Conference & Exhibition

November 9-11, 1987
Anaheim Hilton

WORKSHOP PROGRAM

1. Developing & Implementing a Successful Data Security Policy
2. New Security Strategies for Computers & Networks
3. Developing a Data Processing Security Manual
4. Tying Access Control into Overall DP Security
5. ACF2, Part I: An Introduction
6. Computers and Your Legal Liability
7. Principles of Secure Operating Systems
8. AT&T's Security Compliance Program
9. State-of-the-Art Facility Design
10. Planning the Organization's Recovery: Not Just DP
11. Information Classification
12. A"Single-Point Security Approach for the LAN
13. Administrative Policies and Standards for Access Control Systems
14. Building Security into the Application Development Process
15. RACF, Part I: An Introduction
16. VAX/VMS Security Techniques
17. Software Sabotage — Viruses, Trojan Horses, & Logic Bombs
18. Recent Developments in Database Security
19. Auditing Data Security — "Win-Win" for the Auditor & Auditee
20. End-User Responsibilities in a Recovery Operation
21. On Making Data Security a"Standard Operating Procedure
22. Communications Security in the Information Age
23. Managing Dial-Up Access
24. An Overview of Risk Management Tools
25. CA-Top Secret, Part I: An Introduction
26. Security and Audit Considerations in the DB2 Environment
27. MVS Systems Programming "Secrets": Loopholes and Safeguards
28. Security Standards for the Civil & Private Sectors
29. The Impact of International Terrorism on Information Security
30. How to Choose a Disaster Recovery Services Vendor
31. Career Planning for Information Systems Security Officers
32. PC Security: A Primer
33. Applying Policies and Procedures in a Small Systems Environment
34. Computer Crime Legislation
35. ACF2, Part II: Advanced Topics
36. Ethernet Security
37. The State-of-the-Art in Information Security Technology
38. Computer Security in the Academic Environment
39. A Case Study in Data Center Design & Relocation
40. Strategies for Negotiating a Disaster Recovery Backup Contract
41. Lessons Learned, and Other"Pearls, from a Veteran DSO
42. Security in Open Systems Interconnection (OSI) Networks
43. Decentralization of Computer Security Management
44. Implementing a Microcomputer Security Program
45. RACF, Part II: Advanced Topics
46. Wang System Security
47. Audit, Control, and Security of MVS System Software
48. Advanced Security Awareness Techniques
49. Personnel Security — Pre- & Post-Employment Safeguards
50. Planning and Executing a Mock Disaster Drill
51. A Comprehensive Information Protection Program
52. Securing the Micro-to-Mainframe Link
53. New Issues & Technologies in the Banking Industry
54. Passwords & Encryption — The Heart of Effective Security
55. CA-Top Secret, Part II: Advanced Topics
56. DECnet Security
57. AI: Using an Expert System for Data Security
58. Developing Awareness of Computer Ethics
59. New Audit Tools & Techniques
60. Conducting the Largest-Ever Disaster Recovery Test



OPTIONAL SEMINARS

You can attend one or two of the optional full-day seminars offered Sunday and Thursday, November 8th and 12th:

1. Introduction to Computer Security
2. Computer Security Basics for the Business Professional
3. How to Become a More Effective Data Security Officer
4. A Blueprint for Establishing Security Policies, Standards, & Guidelines
5. How to Conduct a Security Review of the DP Function
6. Introduction to Communications Security
7. Workstation Security
8. Computer Crime Investigation: A Practical Approach
9. Network Security in a Digital Environment
10. EDP Disaster Recovery Planning
11. Building Information Security Awareness
12. Computer Security for the Auditor

ABOUT COMPUTER SECURITY INSTITUTE

CSI, established in 1974, is a full-service membership organization dedicated to helping its more than 3,000 members safeguard their information assets. Services include the bimonthly newsletter *Computer Security*; the Annual *Computer Security Buyers Guide*; a "Hot Line" telephone referral service. CSI also sponsors the Summer IBM/DEC Users Computer Security Conference.

CSI publishes the semiannual *Computer Security Journal* and the 500+ page *Computer Security Handbook*. CSI offers in-house training courses as well as a full program of regional public seminars throughout the U.S. and Canada.

ACTION

For an immediate registration, call Dianne Monroe at (617) 393-2600, or write her at Computer Security Institute • 360 Church Street • Northborough, MA 01532.

One of the conferees indicated that this is the 'Cadillac' of security conferences. I would agree completely with that assessment." Richard F. Perry, Mgr. Internal Auditing, State Mutual Life Assurance Co.

A necessity for security professionals." John Miller, Security Admin., General Dynamics

Best forum on computer security I have attended." Bruce Goldstone, Mgr. Data Security, Databank Systems Limited

Conference format allows maximum interchange between attendees. I've never failed to bring home one or more ideas or solutions that more than covers the time/expense investment." Nicholas M. Saxonis, Fac. Services Off., New England Mutual Life Ins. Co.

You are providing a valuable service to the data security profession. So many conferences are narrow in scope. Yours is a truly global approach. Keep up the good work." William Faller, Systems Officer, City Trust

It's one of, if not the best conference that enables representatives from government, industry & education to gather & exchange ideas and goals." Leon Cooper, Computer Security Spec.,

Outstanding! Offered an excellent forum for both gathering and exchanging ideas. Well worth the trip. A must for anyone interested in data security." Vincent J. Spagnolo, EDP Audit Mgr., M/A-Com, Inc.

MIS in the Machine Age

The industrial and automotive sector is the most substantial group in this survey, both in terms of aggregate revenue and total IS expenditures. The combined sales for these companies in the last fiscal year were nearly $275 billion, while IS expenditures were nearly $7.5 billion. It's no wonder the computer industry caters to automakers and their industrial cousins.

Hardware purchases come to more than 40% of computing budgets for the heavy industry companies, $3 billion in round numbers. Software represents a slimmer slice of the pie than it does in the overall average, but nevertheless exceeds $500 million a year in purchases.

The vast sums spent by these companies today may look like small potatoes tomorrow as the big three automakers tie their dealers to central computing systems. Even though the dealership minicomputers will be paid for by the independent outlets that sell cars and trucks, the auto manufacturers will become larger and larger service bureaus for their clients, burning up MIPS like tires in a road race.

A big contributor to the heavy iron budgets in this sector is the increasing use of computers to anticipate manufacturing problems and reduce costs. Materials and production time saved during the design phase of a car can return phenomenal dividends when the model is released for production. Similarly, makers of aircraft and other heavy machinery have adopted automated design, simulation, and, to a lesser extent, fabrication technologies in an effort to improve quality and control costs. All these applications require huge algebraic processors, and in some cases have led to the purchase of supercomputers. These companies are also buying vector processing add-ons for their general purpose mainframes to offload work from design departments' overloaded superminis.

General Motors is the biggest user in this sector, with its huge divisional information systems centers at auto plants, its EDS subsidiary—itself one of the computer industry's biggest customers—and its Hughes Aircraft division. But GM is not necessarily the most computer-intensive company in the group. McDonnell Douglas Corp., said to run the largest privately owned computation center in the world, is also a contender.

MIS managers in this sector face unusual challenges because of the sheer size of the operations they supervise. They cannot always look elsewhere for examples of how to handle their heavy workloads, but instead must use their own initiative and break new ground. General Motors, for instance, is still struggling with the issues raised by its proposal for the MAP standard. By all indications, GM cannot realistically expect to link its diverse production systems with central computation facilities in the near future. This temporary setback has not reduced GM's clout: the company is said to have exerted substantial influence over IBM during the evolution of that company's engineering workstations.

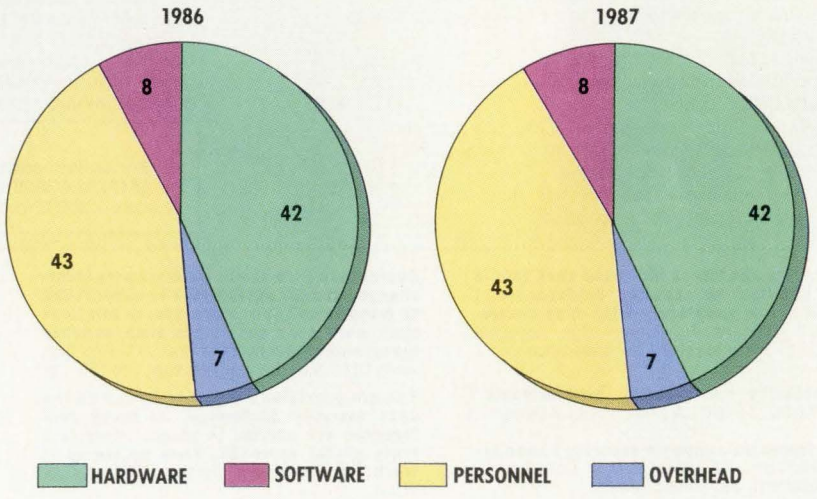
The Top 10

COMPANY	IS INTENSITY*	REVENUE ($ MIL)	PROFIT ($ MIL)	FY END
General Motors Corp.	=	102,814	2,945	Dec. 31
Ford Motor Co.	–	62,715	3,285	Dec. 31
Chrysler Corp.	–	22,586	1,404	Dec. 31
Boeing Co.	=	16,341	665	Dec. 31
United Technologies Corp.	=	15,879	73	Dec. 31
McDonnell Douglas Corp.	=	12,661	278	Dec. 31
Rockwell International Corp.	=	12,296	611	Sept. 30
Allied-Signal Inc.	=	11,794	605	Sept. 30
Lockheed Corp.	=	10,273	408	Dec. 28
TRW Inc.	=	6,036	218	Dec. 31

* = means company spends about the same percentage of its revenue on IS as the group mean; + means it spends a larger percentage; – means less.

Distribution of IS Funds by Percent

The hardware sector of American business is the biggest consumer of computer hardware, both in dollars and in percent of IS budget.



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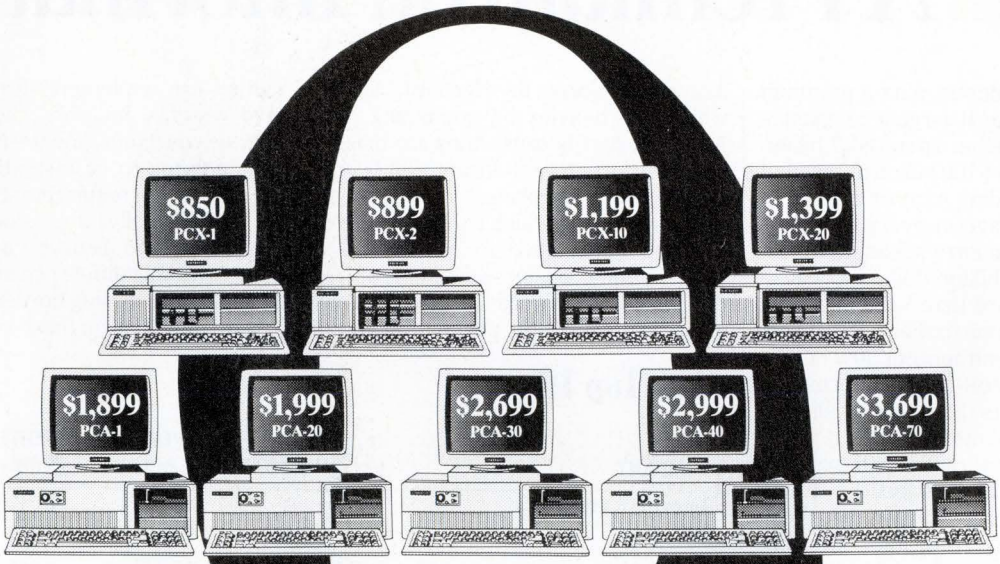

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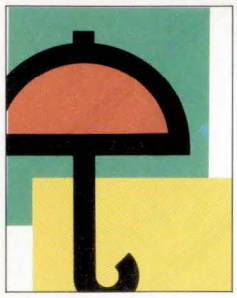


INSURANCE

A Premium on Information

The insurance industry puts a premium on computers. The 10 largest companies in this sector together spend $1.7 billion of their more than $100 billion in revenue on IS. Their spending pattern is close to the national average in every category. The insurance industry's leaders invest more than half a billion dollars a year in hardware and more than $150 million in software. In addition to their official budgets, insurers spend another 30% of allocated amounts for off-budget information systems. This puts them near or slightly above the national mean.

Because insurers' budgets seem to follow the national averages in certain areas, it is natural to assume that these large and wealthy companies are generally conservative about computing. Nothing could be farther from the truth. Insurers, with their enormous IS requirements—to say nothing of their desire to make the most of clients' premiums—have figured prominently in pioneering the application of computers to commercial accounting.

Two decades ago, when IBM's first 360 systems were under test at the headquarters of New York Life (a company not quite big enough to make our roster), just one floor below, an RCA Bizmac—a vacuum tube computer—was churning out production jobs. Insurers, then, not only got into computing early, but they have continued to use the know-how they developed over the years. These days, as the big central shops of the industry run gigabyte-sized sorts, their companies' sales forces visit corporate clients with laptop computers.

The largest of the insurers, Aetna, appears to be relatively light on technology compared with its peers, while ITT Corp. is more computer intensive. ITT's standing is owed more to its noninsurance divisions, which resemble other industrial manufacturing companies. But Aetna's situation is harder to interpret, and it may be evidence that the company uses computers somewhat differently from its smaller competitors. Aetna's spending on information systems is still substantial by any standards. Other large insurers, which are somewhat more computer intensive, spend even more on budgeted computing. More typical of the group are Cigna Corp. in Philadelphia and Travelers Corp. in Hartford, Conn., which are heavier on computing than Aetna, in part because they are making strong efforts to put automation behind their productivity plans.

One area in which computers are of growing importance to insurers is in their regional business centers, where the trend is toward installing minis. There is a substantial payoff for insurers if they can implement flexible, responsive systems. Insurers' clients are very service conscious, and the large ones expect policies to be instantly tailored to their changing requirements.

Additionally, the velocity at which funds flow into insurers' bank accounts can make a big difference in profitability. Premium processing bottlenecks impose severe penalties on these companies.

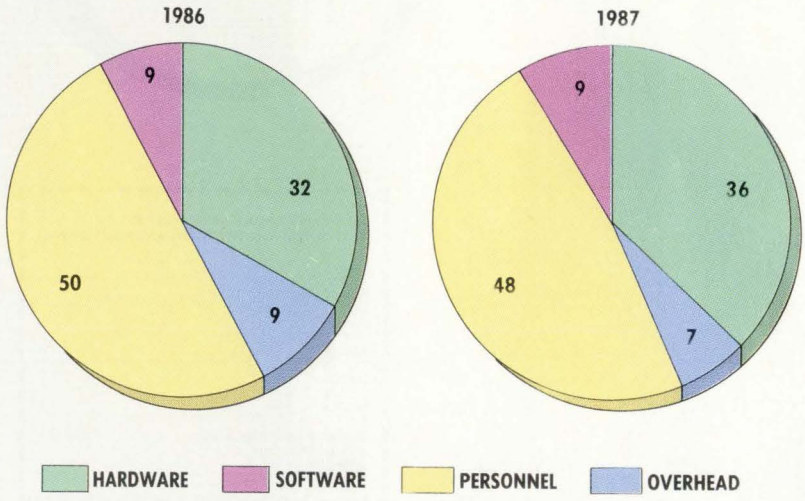
The Top 10

COMPANY	IS INTENSITY*	REVENUE ($ MIL)	PROFIT ($ MIL)	FY END
Aetna Life & Casualty Co.	–	20,483	1,043	Dec. 31
Cigna Corp.	=	17,064	817	Dec. 31
Travelers Corp.	=	16,047	444	Dec. 31
American International Group Inc.	=	8,876	657	Dec. 31
Loews Corp.	=	8,626	546	Dec. 31
ITT Corp.	+	7,600	494	Dec. 31
American General Corp.	=	6,160	538	Dec. 31
Transamerica Insurance Co.	=	6,076	268	Dec. 31
Continental Corp.	=	6,002	223	Dec. 31
St. Paul Cos. Inc.	=	3,182	154	Dec. 31

* = means company spends about the same percentage of its revenue on IS as the group mean; + means it spends a larger percentage; – means less.

Distribution of IS Funds by Percent

The insurance industry leaders invest more than half a billion dollars a year in computer hardware.



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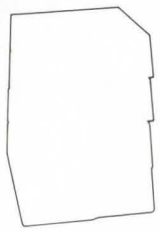

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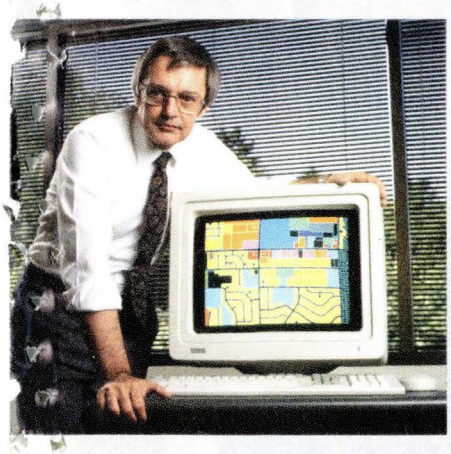

"Digital's networking is improving the quality of service in Bellevue and that's improving our quality of life."

city on electronic maps, allowing us to pinpoint problems instantly," continues Parks. "Whether it's fixing a broken main or dispatching emergency vehicles, we can respond faster and more cost-effectively. Plus, we've dramatically reduced the number of human errors."

Mr. Parks sums up what Digital is helping Bellevue accomplish. "We're using technology to touch the lives of 82,000 people every day." To find out what you can accomplish, write: Digital Equipment Corporation, 200 Baker Ave., West Concord, MA 01742. Or call your local Digital sales office.

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Heavy Metal, Light Users

Companies that produce heavy metal goods are much lighter IS users than other industrial companies. Because of the sector's declining health over the past several years, the group's computing needs have not grown along with those of other top shops. But the metals business is still a very big one, and its 10 largest participants pump about $500 million a year of their more than $45 billion in revenue into information systems. As the companies in this group iron out their problems, diversifying operations and selling off unneeded assets, IS managers say their computing facilities will grow anew.

This group's big users spend less of their budgets on hardware and more on personnel than the national average. The contrast is even greater when these companies are compared to other industrial organizations. IS budgets in the metals trade, however, do not encompass the computer-based systems employed to control smelting processes, annealing furnaces, and rolling mills. Ironically, some of the personnel involved with these off-budget systems may well be on the staffing line included in the IS manager's list of expenditures. The actual practices, however, vary from company to company within the industry.

Another factor that makes for significant reported variance (in both budgets and the allocations within them) is the recent trend toward diversification. This change is evident at, and reflected in the new name of, the industry's largest company, USX. USX is a big player in the oil business, running Marathon among other units. It also operates chemical companies and even runs a sizable shipping business used to ferry raw materials across the Great Lakes. None of its non-steel interests, however, are computer intensive. Bethlehem Corp. is one of the most IS-intensive companies in the group, but differs in corporate IS philosophy from its colleagues. "Bessie," as the big steel company is called, is a heavy buyer and developer of software, compared with the group's mean, while Alcoa, more typical of the metals companies, has a relatively larger hardware budget.

Off-budget expenses vary quite a bit across this industry sector. Armco, characteristic of its group in many respects, has been particularly successful at controlling off-budget IS expenditures. Bethlehem Steel, a more intense user of computing than Armco, has even more stringent control of off-budget computer spending. Bessie has gotten unbudgeted computing costs down to a bare minimum, keeping such expenditures flat from 1986 to 1987.

Among the metals group's most important applications is inventory management. With supply lines stretching around the globe and facilities that must run evenly in order to remain efficient, the metals companies need planning and control. The best efforts of their MIS departments, however, cannot always offset the vicissitudes of the world's metals markets.

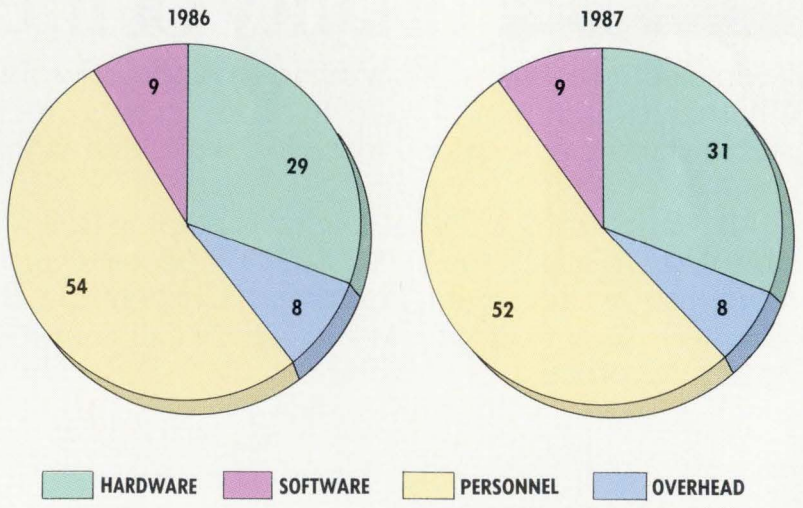
The Top 10

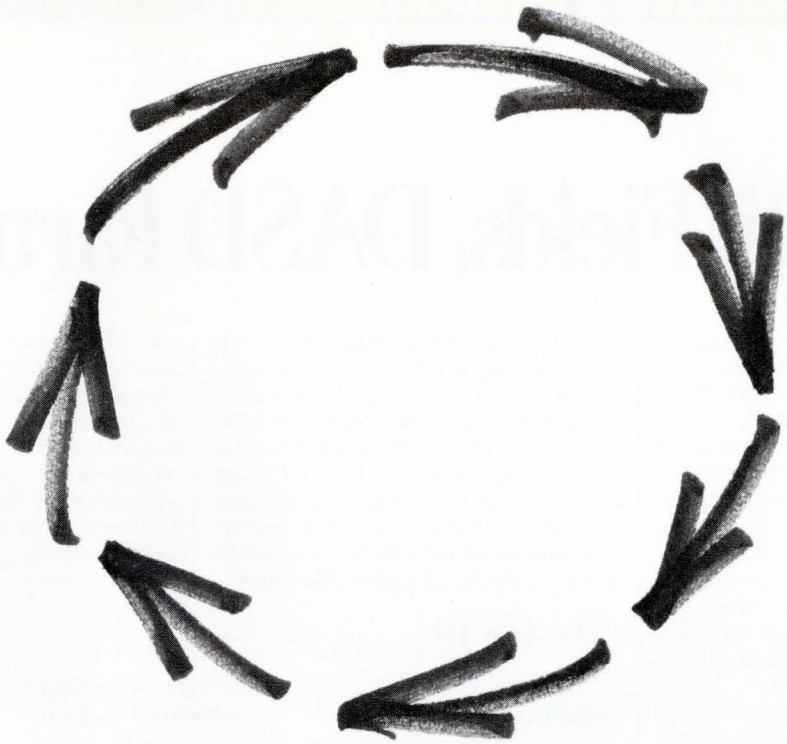
COMPANY	IS INTENSITY*	REVENUE ($ MIL)	PROFIT ($ MIL)	FY END
USX Corp.	–	14,938	1,833	Dec. 31
LTV Corp.	=	7,271	–3,252	Dec. 31
Aluminum Company of America	=	4,667	264	Dec. 31
Bethlehem Steel Corp.	+	4,333	–153	Dec. 31
Reynolds Metals Co.	=	3,639	192	Dec. 31
Inland Steel Industries Inc.	=	3,173	19	Dec. 31
Armco Inc.	=	2,641	–472	Dec. 31
Kaiser Aluminum & Chemical Corp.	=	2,222	–33	Dec. 31
AMAX Inc.	+	1,307	14	Dec. 31
Commercial Metals Co.	–	893	14	Dec. 31

* = means company spends about the same percentage of its revenue on IS as the group mean; + means it spends a larger percentage; – means less.

Distribution of IS Funds by Percent

One of the metals group's most important applications is inventory management.





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Oil Fields, DASD Farms

All may not be well in the oil patch, but life is good enough among its largest 10 companies to justify well over $3 billion a year in information systems expenditures. Because other costs remain so high, the petroleum industry devotes proportionately less than other industries to the computing budget. Leaders in this sector divide their IS monies in proportions that are close to the national mean. The IS shops in these companies say they spend a little less on hardware and a little more on overhead than their counterparts in other sectors.

One budget item is larger than in most other nongovernmental areas: storage of data in vast archives. Many of the oil producers have invested heavily in seismic data collection and analysis. They are big warehousers of magnetic tape. At some of these companies, the seismic image processing jobs are so enormous that supercomputers have been brought in to handle the mathematical transformation of raw exploration data. Others in the industry, however, send this work out to service bureaus.

Another application honed to a fine edge by these companies (as it has been by the process industries) is linear programming. Getting the right mix of octane, kerosene, and bunker (a heavy residual oil) from the refinery is a job that cannot be done without computers.

Other optimization programs are used to help manage the movement of raw and finished products flowing through networks of pipelines and carried by fleets of tankers. The oil companies also use computers or outside computer service bureaus to perform a key function that involves large numbers of equations: econometric analysis and forecasting. It is the financial planning done with the aid of computers that sets the pace of exploration, well drilling, and long-term oil contracts.

The largest companies in this group are also relatively light users of computing power, but Exxon and Mobil have such vast empires that their information systems expenses may simply be diluted in a pool of other costs. Nevertheless, there are significant similarities in the budget breakdowns of all the petroleum companies in terms of hardware and software purchases. One area that can increase the hardware budget of a petroleum company is a credit card operation, though this is the case at only a few of the companies in this group. Amoco is more representative of computer users in the oil business, and differs from the group norms only in minor ways: its software and services budget runs on higher octane, compared with its rivals, while its hardware allocation runs a little leaner.

The major participants have a healthy appetite for mainframes, and they seem to have good control over off-budget expenses, which are less than the national norm. The apparent efficiency of oil companies' computing shops may be a by-product of their corporate cultures. Business procedures in oil companies have a tradition of near military precision in their organizational scheme.

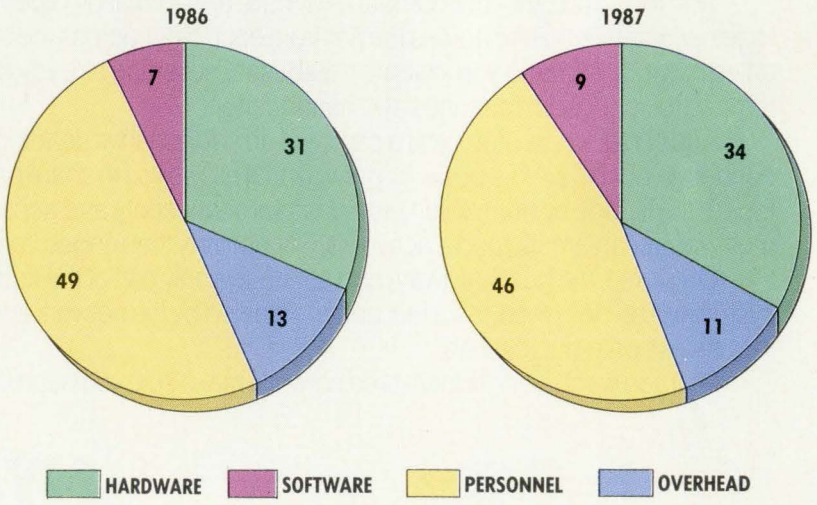
The Top 10

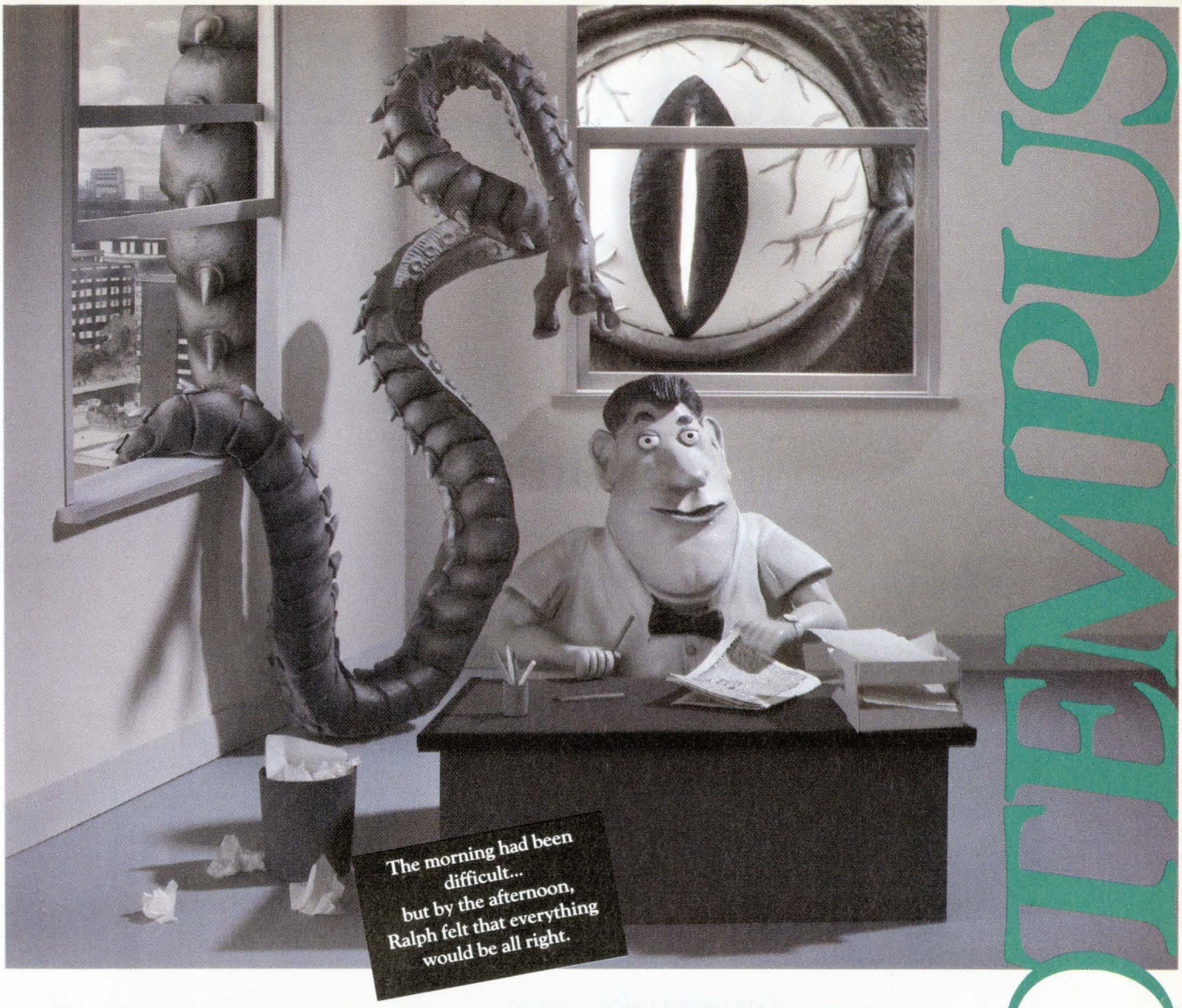
COMPANY	IS INTENSITY*	REVENUE ($ MIL)	PROFIT ($ MIL)	FY END
Exxon Corp.	–	71,557	5,360	Dec. 31
Mobil Corp.	–	49,865	1,407	Dec. 31
Texaco Inc.	=	32,600	725	Dec. 31
Chevron Corp.	=	24,351	715	Dec. 31
Amoco Corp.	=	18,281	747	Dec. 31
Occidental Petroleum Corp.	=	15,344	181	Dec. 31
Atlantic Richfield Corp.	=	14,993	615	Dec. 31
Tenneco Inc.	=	14,529	–39	Dec. 31
Sun Company Inc.	=	10,440	385	Dec. 31
Phillips Petroleum Co.	=	10,015	228	Dec. 31

* = means company spends about the same percentage of its revenue on IS as the group mean; + means it spends a larger percentage; – means less.

Distribution of IS Funds by Percent

A big expense for oil patch IS operations is data storage, raising overhead's bite of this sector's IS dollar.





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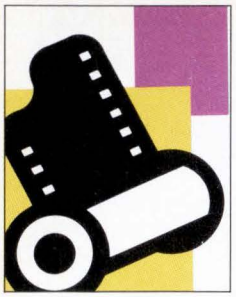


Continuous Computing

Computing in the process industries evokes images of real-time control centers with Christmas tree-like displays of indicator lights and color graphics. As accurate as this picture may be, those systems represent only a fraction of the computing costs at the largest providers of chemicals, paper, and other continuous production goods.

Corporate computing in this sector is a big business in itself. Aggregate expenditures by the 10 largest revenue gainers is in excess of $1.5 billion. These leading process companies are putting big muscle behind efforts to consolidate data from scattered plants. The result is likely to be significant growth in both raw MIPS and the number of networks among these companies, as well as the consolidation of many off-budget systems under central management.

Process companies are big purchasers of standard software and specialty packages developed by third parties, every year either acquiring outright or licensing program products worth about $200 million. These companies spend, as a result, less of their budgets on homegrown programming. Like their peers in the petroleum business, process industry IS managers have to support extensive libraries of process optimization programs and databases, which are the feedstocks for these packages.

In addition to all the computing required to make the most of their facilities, process companies must keep track of an enormous variety of raw materials and end products. Companies such as Du Pont and Procter & Gamble—also the largest entities in this sector—deal in thousands of different products in hundreds of classifications, with differing packaging, stability, distribution mechanisms, and production constraints.

Many of the process companies are involved in consumer products, though none as completely as Procter & Gamble. Consumer products involve enormous advertising expenditures, but generate profits that more than compensate. The result is that a smaller percentage of the budget goes to production and management functions, including information systems. It is not surprising, then, that P&G is not as big a spender, proportionately, on computers as is, for example, Kodak or Monsanto. (Weyerhaeuser's IS intensity rating may be slighty misleading as the company is well known for conducting a substantial part of its computing at the divisional level.)

As this sector increasingly shifts to on-line order entry and customer support and delivers these services to regional offices and key outside distributors, MIS budgets will rise. The evolution of their IS capabilities will enable the companies in this group to turn over inventories more frequently and to reduce what for some of them amounts to a king's ransom in storage costs. Those companies with experience in real-time process control are likely to have the easiest time coping with the communications aspects of improving their order-shipping-billing cycles.

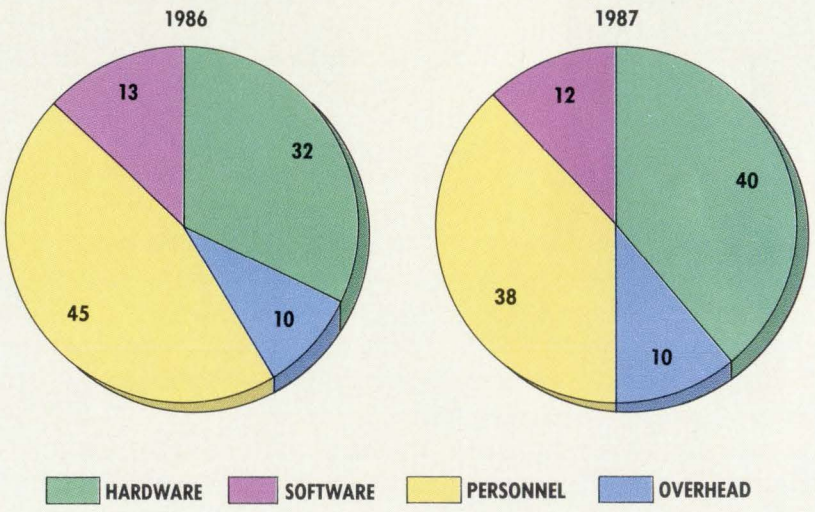
The Top 10

COMPANY	IS INTENSITY*	REVENUE ($ MIL)	PROFIT ($ MIL)	FY END
Du Pont	=	27,148	1,538	Dec. 31
Procter & Gamble Co.	–	15,566	709	June 30
Eastman Kodak Co.	=	11,550	374	Dec. 31
Dow Chemical Co.	=	11,113	741	Dec. 31
Georgia-Pacific Corp.	–	7,223	296	Dec. 31
Monsanto Co.	=	6,879	433	Dec. 31
Union Carbide Corp.	=	6,343	496	Dec. 31
Weyerhaeuser Co.	–	5,652	277	Dec. 28
American Cyanamid Co.	=	3,816	203	Dec. 31
Boise Cascade Corp.	=	3,740	102	Dec. 31

* = means company spends about the same percentage of its revenue on IS as the group mean; + means it spends a larger percentage; – means less.

Distribution of IS Funds by Percent

Aggregate IS expenditures by the 10 largest revenue gainers is in excess of $1.5 billion.



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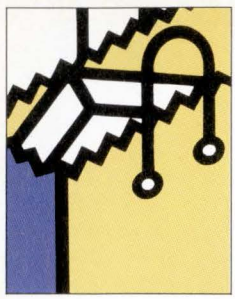


RETAIL

The World in the Store

By the measure of information systems intensity used by DATAMATION to gauge companies' computer use, retailers are barely in the computer age. The nation's 10 largest retailers, with total sales of over $167 billion, may spend a small fraction of this sum on computers, but their IS budgets come to nearly $350 million a year, with more than $125 million of it going for hardware and another $30 million for software.

In addition, several of the large retailers have significant off-budget expenses for computing, sums that may rival budgeted amounts in magnitude. This is because of the way retailers are organized and, in particular, the way they delegate information processing responsibilities. Not one of the companies in this group could manage the logistical aspects of its enterprise without substantial and sophisticated IS shops. These companies can track every penny of a small sale starting at the cash register and following through to the corporate asset management group that maximizes the return on assets. But much of the computing done at chain stores—whether food or nonfood—is done at the individual site or at the regional level. Corporate IS's big jobs are consolidation and the provision of industrywide services, such as customer account management.

The department store chains in this group, like JC Penney, Federated Department Stores Inc., and Dayton-Hudson Corp., usually spend more of their revenue on computing than the supermarket operators, such as Lucky Stores Inc. While K Mart Corp., a department store chain, falls in the midrange when it comes to IS budgets, its philosophy of getting the attention of shoppers apparently was picked up by its own computer professionals, who are adding hardware at a pace more typical of the sector's intensive users.

Department stores, which have a lower rate of inventory turnover than supermarkets, generally provide their customers with more computer-supported services. In addition to credit card processing, the department store chains support telephone ordering services and mail order processing. They also require more information systems for personnel and payroll functions, while supermarkets cater to self-service shoppers.

All of these services, with the associated record-keeping, force retailers to put a larger part of their MIS budgets into hardware than the national average. In addition, the increasingly sophisticated communications links, which enable chain stores to consolidate earnings and inventory information, add to the budgets for iron. Managers of the largest computing operations in the retail sector say that their software budgets—currently below the national average—will rise considerably, although not quite enough to catch up with the mean. This change reflects a move to the use of more standardized packages, a requirement of companies that enter new businesses via acquisitions.

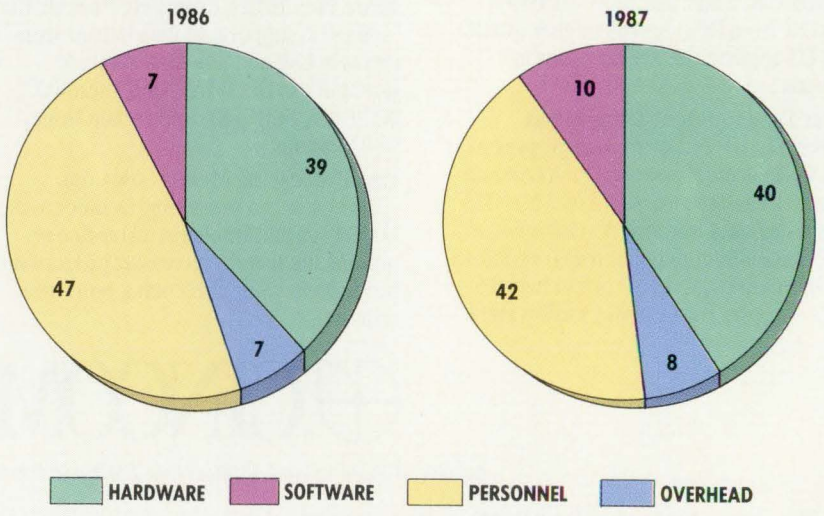
The Top 10

COMPANY	IS INTENSITY*	REVENUE ($ MIL)	PROFIT ($ MIL)	FY END
Supermarkets General Corp.	–	44,281	1,351	Dec. 31
K Mart Corp.	=	23,812	570	Jan. 27
The Kroger Co.	–	17,123	56	Jan. 31
Lucky Stores Inc.	=	17,100	138	Jan. 31
J.C. Penney Company Inc.	+	14,740	478	Jan. 31
American Stores Co.	–	14,021	145	Jan. 31
Federated Department Stores Inc.	+	10,512	302	Feb. 1
The May Department Stores Inc.	=	10,328	381	Jan. 31
Dayton Hudson Corp.	+	8,793	284	Feb. 1
F.W. Woolworth Co.	–	6,501	214	Jan. 31

* = means company spends about the same percentage of its revenue on IS as the group mean; + means it spends a larger percentage; – means less.

Distribution of IS Funds by Percent

The retail sector of the economy is the lowest-intensity computer user in the survey.



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we never stop asking

Soup

Canned Soup Council

Mr. J. C. Ryan, President
Flossmoor Soup Company
Flossmoor, Illinois 60422

August 1, 1987

Dear Mr. Ryan:

In an effort to help you *stay competitive*, we are publishing 5-year sales projections for two soup categories: canned and dry. Please keep these projections handy as they will aid you in your product planning over the coming years. Of special interest to you are the dry soup projections.

	CANNED	DRY
1987	$6,700,000	$1,100,000
1988	$7,300,000	$2,100,000
1989	$8,400,000	$2,600,000
1990	$9,300,000	$4,800,000
1991	$9,900,000	$7,300,000

As you can see, industry experts project that the gap between dry and canned soups will begin to close by 1990. They also believe mergers will follow.

Noodle Price Hike

Bad news this month comes from TNG (The Noodle Group). By year's end, they project the price of noodles to double – up to eighteen cents a barrel. How will this price hike affect you? A two-cent per can increase on all noodle soups you sell.

Recommended Reading–"*Cup or Bowl*"

This in-depth study discusses the habits of the American soup eater. Call and I'll send you a copy.

Sincerely,

Mr. R. Welke
Director, Canned Soup Council

NUTS

Deluxe Assortment — **Spring 1987**

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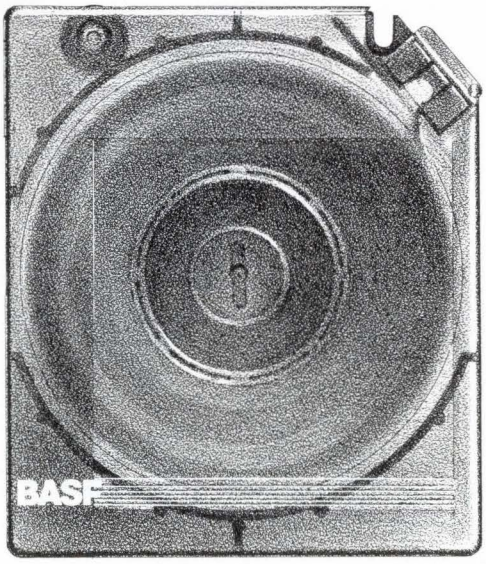

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TRANSPORTATION

On-Line, On Track, In Air

Retailers must track market conditions quickly. The challenge faced by transportation companies is even greater; for them, quick isn't fast enough. Their customers want to know where things (and people) are instantly. Many companies in the transportation business not only use computers to tell their customers where things are, but also where they last were, where they will soon be, and, in the case of airlines hoping to fill empty seats, where they are not yet.

The dependence on interactive systems by the top companies in this sector has added to the hardware section of their budgets. In addition, the need to develop unique software has raised the costs of personnel. Thus, transportation companies spend less than the national average on packaged software and overhead.

The percentage of corporate revenue that goes for computing among these concerns is somewhat less than the national average. This is not an indication that transportation companies have somehow gotten their interactive databases up and running on the cheap. The relatively light IS budgets reflect the very high cost of running fleets of vehicles and the enormous network of personnel that these companies must support. All told, of their $55 billion in revenue, DATAMATION's 10 transportation companies together spend well over $700 million a year on their information systems.

The most intensive use of computers in this group can be found at Federal Express, which grosses much of its $3 billion annual take in units of $25 or less. Federal's package-tracking capability is the basis of its reputation for good service. Other heavy computer users can be found among the airlines, which can now not only track their own seat inventories, but can also keep tabs on some aspects of rivals' flights.

The IS managers of the travel providers' leading shops are recognized specialists in transaction processing and database maintenance. They are also very much attuned to issues affecting system reliability and availability. As one might well expect, the rail-based transportation companies are the least intensive users of computers in this sector, and the gap between the relative budgets of, say, a Union Pacific and that of an AMR, the parent company of American Airlines, is substantial.

The prospects for increased automation among these companies is bright. Airlines are extending their reservations systems into the offices of travel agents, and their support for other travel-related services is also expected to grow. In the future, airlines may develop profile databases for key customers, much the way car rental firms and some independent travel agents already have established customer "clubs." Ultimately, the airlines may extend their liaisons from the current base—travel industry firms and in-house travel departments at large companies—to smaller corporate users of their services.

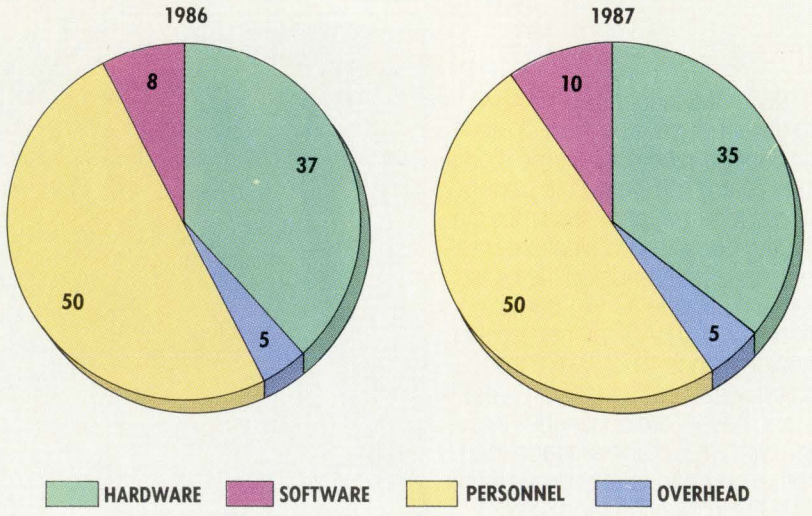
The Top 10

COMPANY	IS INTENSITY*	REVENUE ($ MIL)	PROFIT ($ MIL)	FY END
UAL Inc.	=	9,198	12	Dec. 31
Burlington Northern Inc.	–	6,941	–528	Dec. 31
Union Pacific Corp.	–	6,574	–414	Dec. 31
CSX Corp.	–	6,345	418	Dec. 31
AMR Corp.	+	6,018	279	Dec. 31
Santa Fe Southern Pacific Corp.	–	5,631	–269	Dec. 31
Delta Air Lines Inc.	+	4,460	47	June 30
Norfolk Southern Corp.	=	4,076	519	Dec. 31
Trans World Airlines Inc.	=	3,145	–106	Dec. 31
Federal Express Corp.	+	2,606	132	May 31

* = means company spends about the same percentage of its revenue on IS as the group mean; + means it spends a larger percentage; – means less.

Distribution of IS Funds by Percent

Personnel for software development at transportation companies consumes a larger than average chunk of IS money.



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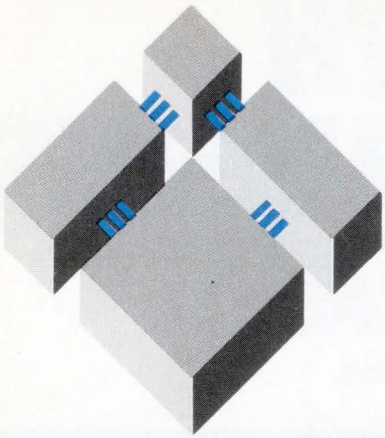

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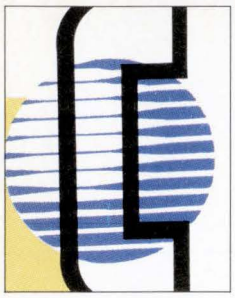


Dialing for Dollars

When compared with their corporate counterparts in other sectors of the economy, the 10 largest utilities are not power users. The utilities claim that only a small fraction of their more than $121 billion in revenue is spent on budgeted information systems each year—$1.2 billion—even though there is evidence from outside sources that these companies spend twice that amount. As much as a quarter of the total computer-related expenditures of this group are the outlays of just one company, AT&T, which has by far the most installed hardware in the industry.

In addition to spending somewhat more than the average amount on personnel, utilities are big spenders on software, buying outside packages at one-and-a-half times the national average. This makes the utilities group's aggregate hardware budget an undersized slice of a substantial pie. Telephone companies include some of their call data collection equipment in their switching systems budgets, however, and this distorts their accounting self-portraits. Once data are collected, the large utilities go at their billing and analysis in much the same way as other companies with many small transactions do: big mainframes with immense disk farms do the sorting, while banks of laser printers churn out the bills.

Most of the big companies in this group are only separate entities by virtue of the AT&T breakup. While some of these Baby Bells have gone their own way, many still hew to the operational procedures developed when they were part of AT&T. Examples of such companies include Nynex and BellSouth. A similar spending pattern occurs among the telephone-based rivals of AT&T, of which giant GTE qualifies as one of DATAMATION's top shops. This translates into dependence on IBM's mainframe operating environment for large jobs, and the extensive use of minicomputers from other vendors (including AT&T) for smaller ones.

Beyond next year, as the telephone utilities go through a period of laying off some of their employees—in a customer environment that just keeps dialing, piling up big-dollar utility revenues—their budgeting pictures will change. AT&T, for one big example, has already cut staff equivalent to the population of a small city, and is expected to remain trim. Hardware expenditures will grow, relative to those for personnel. Nevertheless, the capital expenditures these companies make for computers will always be tiny compared with the costs of staffing to maintain their networks and switching centers.

Other utilities have a similar need for large outlays that overshadow computer purchases. Southern California Edison, the top shop among electric utilities, puts a lot more of its revenue into power generators than into its computer rooms' power consumers. But its sophisticated billing operation shows that here, at least, IS doesn't hide its light under a bushel.

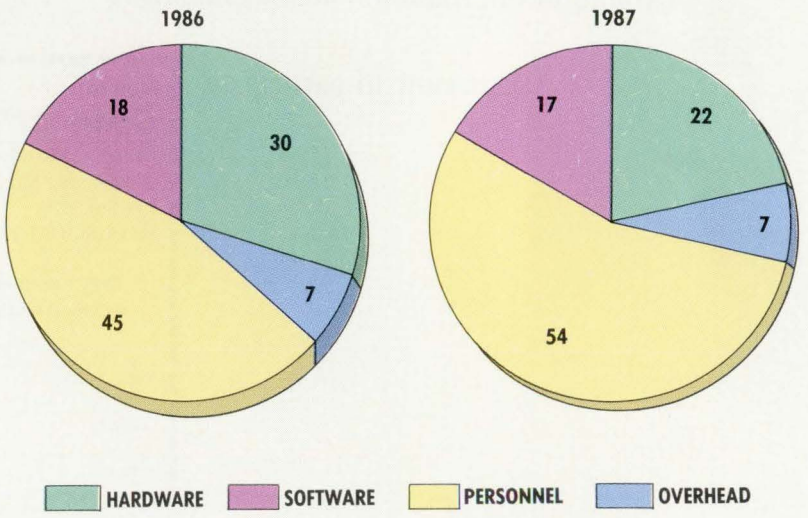
The Top 10

COMPANY	IS INTENSITY*	REVENUE ($ MIL)	PROFIT ($ MIL)	FY END
AT&T Co.	=	34,087	139	Dec. 31
GTE Corp.	=	15,112	1,184	Dec. 31
BellSouth Corp.	=	11,444	1,589	Dec. 31
Nynex Corp.	=	11,342	1,215	Dec. 31
Bell Atlantic Corp.	=	9,921	1,167	Dec. 31
American Information Technologies Corp.	=	9,362	1,138	Dec. 31
Pacific Telesis Group	=	8,897	1,079	Dec. 31
U.S. West Corp.	=	8,308	924	Dec. 31
Southwestern Bell Telephone Co.	=	7,902	1,023	Dec. 31
Southern California Edison Co.	=	5,312	714	Dec. 31

* = means company spends about the same percentage of its revenue on IS as the group mean; + means it spends a larger percentage; – means less.

Distribution of IS Funds by Percent

Utilities spend more of their computing dollars on software than do companies in any other business sector.



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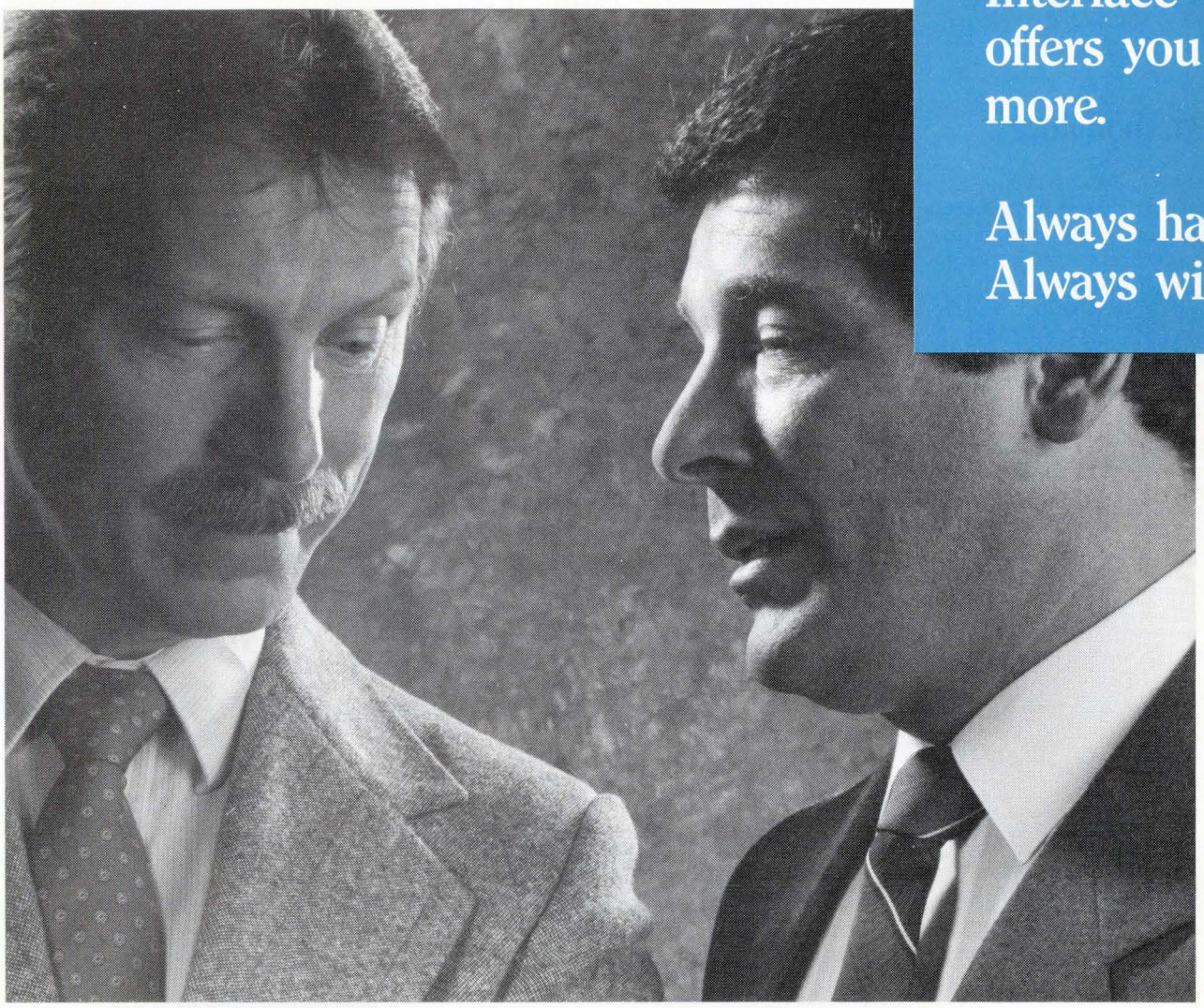

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Methodology

Based on 1986 revenue figures, DATAMATION selected the 15 largest U.S. companies in each of 12 predetermined industry groups. Two questionnaires requesting detailed information on 1986 and 1987 information systems budgets were mailed to each of the companies.

From the survey responses and other company information, DATAMATION identified the top 10 companies in each of the industry groups and then analyzed information systems expenditures within each industrial sector. Companies within each of those sectors have been ranked according to their 1986 revenues.

Each of the participants was asked to supply total IS budget figures, and total expenditures for functions associated with IS but not included in the IS budget. They were also asked to identify how that budget was allocated among hardware, software and services, personnel, and overhead.

The terms used were defined as follows:

Hardware comprises all computer gear on the IS budget, including data communications. Software and services pertains to all funds allocated for buying software or hiring outside software developers. Personnel encompasses all employee costs for the computing operation. Overhead includes charges associated with the physical plant, including utilities and rent.

Wherever possible, information included in DATAMATION's top shops report was obtained from the companies themselves. When a company did not provide information, or did not provide it in a form suitable for this survey, we have estimated figures, based on investigative reporting and an analysis of industry trends.

In the interest of discretion, and as a courtesy to those respondents who cooperated but who also asked that certain specific facts about their companies be kept confidential, we have not published specific budget line items. Instead, we have provided data on sector aggregates and comparative information on each sector's members. The comparative data are based on total budgeted expenditures and do not include off-budget estimates.

Every effort has been made to include the most significant computer users in each of the 12 categories. Owing to the size of such a comprehensive survey as this, however, some large IS shops inadvertently may have been omitted from our listings. It should also be noted that, because the size of businesses operating within each sector varies to a great degree from industry to industry, some of the companies that failed to make our roster may in fact be larger users than companies in other sectors that did qualify for inclusion in our listings.

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Living with the High Yen

Caught between a weak dollar and a rising yen, information systems suppliers in Japan had their profits squeezed in 1986, despite some healthy increases in local sales revenues. IBM Japan came off worse than most, ending the year with a drop in revenue that left the company in jeopardy of losing its number three position in the DATAMATION Japan 10. Japanese users, however, began to breathe cautious sighs of relief as their budgets again showed an increase after a flat year in 1985.

BY ROBERT POE

The yen rose 29% against the dollar, and Japan's leading information systems suppliers, including IBM, were unable to react quickly enough to protect their bottom lines in 1986.

Despite the economic pressures, the Japanese market for information systems (IS) achieved reasonable growth compared with other industrial sectors last year, registering an estimated 8.6% increase to ¥5,131 billion ($30.4 billion).

The tendency for a few giants to dominate the Japanese market showed little sign of changing. The combined revenues of those companies placing in DATAMATION's ranking of the top 10 information systems companies in Japan hit ¥4.338 trillion ($25.7 billion) in 1986, accounting for a hefty 84% of the total domestic IS market. The four biggest firms pulled in 58% of the business.

Fujitsu again dominated the DATAMATION Japan 10 table, followed by NEC at number two. IBM Japan just held on to third place, staving off the fast approaching Hitachi. NEC took the honor as the fastest growing company in the 1986 ranking (see Figure 1), although it was unable to push Fujitsu out of the top slot as Japan's biggest dp supplier worldwide (see Figure 2).

There were only minor changes in the actual rankings of the Japan 10, despite the economic uncertainty. Toshiba managed to take fifth place back from Matsushita, which entered the DATAMATION Japan 10 table in 1985. Matsushita is predominantly a consumer electronics company, and it suffered from a lack of any flagship IS products that could stop the company's overall revenue slide.

Toward the end of the year, all of the companies suffered to some degree from the contraction of business in the main manufacturing sector in Japan—living with the high yen had begun to take its toll on cash flows. Nevertheless, there was much growth in the nation's finance sector and also among smaller Japanese companies, many of which began to take automation seriously for the first time.

Growth in these sectors helped account for a general easing of Japanese users' data processing budgets, which increased by an average of 9% in 1986, according to figures published by the Japan Information Processing Development Center (JIPDEC).

The JIPDEC survey shows that the Japanese market is emerging from the slump of 1985, when budgets inched up only 1.9%. Even though the 9% increase in 1986 was an improvement over the previous year, the market has not recovered entirely, and there are still questions about the effect that the high yen will have on budgets over the next few years.

Japanese users seemed to prefer trying to squeeze more work out of their old machines than buying new ones in 1986. Although total hardware expenditures were up last year to ¥24.2 million ($143,000) per month, money spent on cpu payments was actually down by 7% to ¥3.45 million ($20,484), and cpu depreciation costs were up 4% to ¥709,000 ($4,200). I/O device expenditures, on the other hand, were up 41% to ¥2.72 million ($16,100), with storage devices down 17% to ¥1.05 million ($6,210). On-line terminals were up 4% to ¥6.3 million ($37,200).

Illustration by Colos

DATAMATION's Japan 10

1986 RANK	1985 RANK	COMPANY	OWNER-SHIP	1986 JAPAN DP REV ($ MIL)	% CHG ($ U.S.)	% CHG (YEN)	1986 TOTAL DP REV ($ MIL)
1	1	Fujitsu Ltd.	Japan	5,457.8	54.7	9.5	6,575.7
2	2	NEC Corp.	Japan	5,122.9	72.8	22.3	6,324.6
3	3	IBM Japan Ltd.	U.S.	3,821.1	38.1	–2.2	49,591.0*
4	4	Hitachi Ltd.	Japan	3,806.7	62.2	14.8	4,728.8
5	6	Toshiba Corp.	Japan	1,979.8	53.8	8.9	2,605.0
6	5	Matsushita Electric Industry Co.	Japan	1,632.9	41.5	0.2	1,944.0
7	7	Nippon Telegraph & Telephone	Japan	1,160.5	51.9	7.5	1,160.5
8	8	Mitsubishi Electric Corp.	Japan	1,102.9	45.8	3.3	1,345.0
9	10	Nippon Univac Kaisha Corp.	Japan/U.S.	985.9	55.6	10.1	985.9
10	9	Oki Electric Industry Co. Ltd.	Japan	668.5	7.3	–24.0	879.6

*Includes parent company revenues

Expenditures for staff, software, and services rose faster than those for hardware. Much of the increase in the "other" category resulted from money spent on communications lines, which at ¥2.22 million ($13,200) amounted to 4.3% of the monthly total.

While the top 10 companies were pulling in the ¥4.338 trillion ($25.7 billion) from their home market, they made another ¥984 billion ($5.8 billion) from exports and sales by their foreign subsidiaries—19% of their combined total dp revenues. Exports, however, played a mixed role in the 1986 results.

On the one hand, Japanese Ministry of Finance statistics show that exports of general purpose computers and peripherals rose 10.3% to ¥1,217 billion ($7.2 billion) in 1986, despite the strong yen. The previous year's increase was a mere 1.7%. This export growth is not as good as it sounds, however. Three companies—NEC, Hitachi, and Toshiba—had higher growth rates in the Japanese market (see Figure 1), which means that they were unable to follow the traditional Japanese manufacturing strategy of growth through exports. Moreover, the 10.3% export hike is a far cry from the heady days of the early 1980s when computer exports grew at rates ranging between 59% and 99% a year.

In a year of a falling dollar, those exports to the U.S. didn't come cheap either. To keep dollar prices the same between 1985 and 1986, a Japanese company had to accept an average of 29% less in yen for the same piece of equipment. This overseas sacrifice battered the bottom line, where profit drops in the 50% range were not uncommon.

So, with growth in the U.S. market stifled because of the shifts in exchange rates, Japanese manufacturers had to fight that much harder over their domestic market. How hard they fought is illustrated by an overall drop in the level of imports into Japan despite the cheap dollar, which made U.S. goods more attractive. Ministry of Finance figures show that computer and peripheral imports actually declined by 21.3% in 1986 to ¥192 billion ($1.14 billion).

IBM Japan's Total Revenues Are Down

Ironically, one of the companies most hurt by export dependence was IBM Japan, which shipped almost 27% of its output to IBM subsidiaries in other countries. Total revenues were off 3.9%, with exports down 8.3%.

Oki Electric, the other big dp exporter, which gets 24% of its business from abroad, did far worse. In addition to depending too much on the export trade, Oki relied heavily for its sales on commodity peripherals—products that are among the most sensitive to price and currency fluctuations.

Oki had a terrible year, and its 24% nosedive in Japanese dp revenues for 1986 pushed it into the bottom position, giving Nippon Univac (NUK) the ninth slot. In fact, Oki barely held on to its place in the table above NCR Japan, which just failed to make the grade.

The most significant slide in revenue, however, hit IBM Japan, which recorded a local sales downturn of 2.2%, leaving its third place standing very vulnerable to Hitachi, which posted a healthy 14.8% increase.

Revenue problems aside, IBM once again seemed to be the center around which the Japanese dp industry revolved in 1986. According to some estimates, by the middle of 1986 IBM's share of the installed base of large mainframes had increased by more than 4% to over 32%, while its 5550 micro had taken second place in business pc sales. The fourth quarter turned sour for the company, however, as the Japanese manufacturing sector, which accounts for some 40% of IBM's sales, cut back drastically on capital expenditures in response to problems stemming from the weak dollar.

Although its sales performance was less than impressive, IBM showed its power in other ways, mostly by flexing its operating systems muscle. In the fall, Hitachi came to a relatively amicable settlement of its OS copyright dispute with IBM. This involved a cross-licensing deal, which, so far, seems to be working well.

Strain On IBM–Fujitsu Relations

Fujitsu's relations with IBM, meanwhile, worsened perceptibly when a copyright agreement dating back to 1983 came into dispute again. That led to further negotiations between the two companies at the American Arbitration Association. Though Fujitsu is coy about the details of the case, the word among industry observers in Tokyo is that the company is now stuck with payments to IBM of around ¥1 billion ($6 million) a month until 2002.

As a result, 1986 saw possibly the most significant differentiation to date between the strategic positions of the world's two leading pcms on the OS front. In most eyes, Fujitsu came out looking far worse than Hitachi, a disadvantage

% CHG ($ U.S.)	1986 TOTAL REVENUE ($ MIL)	JAPAN DP REV AS % OF TOT DP REV	DP REV AS % OF TOT REV	NET INCOME ($ MIL)	1986 JAPAN EMPL	1986 TOTAL EMPL	FISCAL YEAR END
52.6	10,384.5	83.0	63.3	155.7	84,000	89,000	March
68.1	15,034.8	81.0	42.0	200.5	93,346	101,227	March
2.1	51,250.0*	7.7	96.7	4,789.0	20,447	20,447	Dec.
63.9	28,984.4	80.5	16.3	739.1	131,000	161,000	March
61.9	20,135.5	76.0	12.9	230.6	117,600	121,000	March
34.3	29,615.4	84.0	6.5	1,003.4	120,749	135,749	Nov.
51.9	31,265.4	100.0	3.7	928.2	299,600	300,000	March
44.1	12,250.7	82.0	10.9	113.6	62,331	71,479	March
55.6	985.9	100.0	100.0	16.6	4,121	4,121	March
–1.2	2,229.1	76.0	39.4	–14.8	13,991	18,686	March

multiplied by the fact that an estimated 40% of Fujitsu's revenues come from mainframes and related products, as opposed to less than 10% for Hitachi.

The bad news soon reached Europe, where West Germany's Siemens dumped the Fujitsu operating system and began supplying Fujitsu hardware only with its own non-IBM-compatible BS2000 system. Furthermore, the new West German pcm company, Comparex Information Systems, formed by merging the pcm interests of Siemens and BASF, decided that it would concentrate on Hitachi hardware and wean users off of Fujitsu.

While Fujitsu repeatedly insisted it would continue offering IBM-compatibility "to the extent there is customer demand for specific functions," and announced a new operating system that was said to be 95%-compatible, it also tried to disown the pcm label by claiming that it, "does not intend to feature every function provided by IBM as a plug-compatible supplier would."

Operating system jitters were also said to be behind the half-year delay in the first shipment of the M-780, Fujitsu's answer to the Sierra, which had been announced in November 1985.

Comparatively oblivious to these IBM disputes, NEC continued to speed along with its strategy of incompatibility. Last year, NEC made one of its most strategic corporate moves ever in the international dp arena. Together with Honeywell of the U.S. and Compagnie des Machines Bull of France, it helped form a new company based on Honeywell's Information Systems division. NEC took only 15% of the new joint venture, which was less than expected. While NEC says it wasn't interested in a larger stake at the time, the modest investment was probably to avoid any controversy similar to the proposed Fujitsu purchase of Fairchild Semiconductor. The situation wasn't helped by the revelation that a Honeywell DPS 90 sold earlier to the U.S. Air Force Military Airlift Command was in reality an NEC machine using Honeywell software and peripherals. Despite its low-key involvement in the new entity, NEC is expected to be in the driver's seat as the main hardware supplier and eventually to increase its stake to a more substantial figure.

Mainframes Running Unix Are Unveiled

The long-rumored possibility that Japanese companies would finally turn to Unix as a way out of the compatibility dilemma was spotlighted in 1986 when all of the big three—NEC, Fujitsu, and Hitachi—introduced mainframes running Unix in either native or guest mode.

Unix also figured prominently in another attempt to bolster Japanese software independence: the Sigma project. The five-year, ¥25 billion ($148 million) program, sponsored by the government, is aimed at producing on-line systems tools to assist in sophisticated software development. It is supposed to do for Japanese software what earlier projects did for semiconductors and supercomputers—make it internationally competitive by combining the R&D efforts of the government with those of the major companies in the field.

Unix was chosen as the basic operating system around which the various software and hardware tools are being designed. Its first full year of operation was 1986, and significant progress was made toward developing the specifications of the workstations and software productivity tools that will form the backbone of the system.

Some observers suspect that Sigma is more about workstations than about software. According to the Tokyo office of the securities firm Morgan Stanley, U.S. companies now have around 85% of the Japanese workstation market—an enticing target for the local firms. During the year, an impressive number of manufacturers brought out Unix-based workstations, including relatively minor dp players, such as Casio, Ricoh, Sharp, and Sony. As the first commercial versions of the Sigma workstation are introduced—sometime around the end of this year—intense competition is expected to drive prices down over a short period. The result may be low-cost Japanese hardware that will be a prime candidate for export to the U.S., probably running U.S.-developed software.

Even what had been billed as the first all-Japanese operating system, and the powerful 32-bit microprocessor it was to run on—jointly known as TRON (The Real-time Operating Nucleus)—turned out to have a Unix workstation angle. The machines developed for sale in Japan were expected to run one of the TRON operating systems; however, Hitachi and Fujitsu are also working on a version of Unix that will run on the same chip, primarily for machines for export.

NEC Sells Supercomputer in U.S.

At the top end of the product spectrum, supercomputers were at the cen-

ter of a major trade controversy. NEC became the first Japanese company to sell one of the powerful machines in the U.S. when—amidst charges of huge discounts—it placed an SX-2 with the Houston Area Research Consortium. There was no uproar, however, when the company formed a joint sales company with Honeywell, called NEC-Honeywell Supercomputers Inc. So far, the new company has been handling maintenance and service on the original Houston machine, but has made no further sales.

On the home front, the failure of government agencies and universities to buy anything except Japanese-made supercomputers, accompanied by reported discounts of as much as 80% by Japanese makers, became a full-fledged trade dispute by the end of the year. The aggressive overseas and domestic sales tactics of Japanese manufacturers, combined with the government's actions, brought accusations that Japan was targeting yet another U.S. industry for eventual domination.

Trade friction did not hinder developments in the low end of the IS market very much though. Japan made its first major inroads into the U.S. pc business with the successful Toshiba laptops. Most popular was the T3100, which featured advanced plasma display technology that low-cost Asian clone makers couldn't hope to match. The less expensive T1100-Plus supertwist LCD model also did well. These IBM-compatible machines were introduced in January 1986, and by the end of the year some 25,000 per month were being exported, mostly to the U.S. Typically, the Japanese version was not introduced until last December.

NEC also continued to dominate the domestic pc market with an estimated 50% share, led by its 16-bit PC-9801. Its network of 10,000 consumer electronics shops and 200 specialized microcomputer retail stores contributed markedly to its sales success. Fujitsu takes only third place in pcs in Japan, following consumer electronics maker Sharp.

Bright Markets for Domestic Sales

Though the woes of the manufacturing sector put a heavy damper on domestic dp sales, some bright spots remained in the market in 1986.

One sector that showed a strong demand for IS products was the financial industry, which was preparing to meet the challenges of deregulation in the world's financial markets. Not only were Japanese securities firms setting up global information networks as they went international, there was also an explosion of foreign firms setting up or expanding in Tokyo. Fujitsu and IBM in particular benefited from this trend.

The growing demand for networking systems helped the market for telecommunications equipment continue to expand last year. The role of the nominally privatized telecom giant Nippon Telegraph and Telephone (NTT) however, was tempered by political pressures for high-profile procurements of foreign equipment. The digitalization of NTT's networks gets most of the credit for an 80% increase in the sales of digital switching equipment in 1986, according to securities firm Vickers da Costa. The increase for 1987 is estimated to be 85%. NEC, NTT's traditional supplier, is the telecom leader, with Fujitsu in second place.

There was an increased demand from small companies too, especially the suppliers of the major manufacturers, which are traditionally the first to feel the squeeze when Japanese exports get tight. Ironically, this segment became a more promising growth area than the larger manufacturers in 1986, as automation became an absolute necessity for survival.

The small company trend is of benefit to NEC in particular, as the leading supplier of smaller business computers. The trend also helps Toshiba, which does not manufacture mainframes, but has concentrated on midsize distributed processors. This growth in demand is reflected in Japanese user budgets during 1986.

These user budgets are expected to increase again in 1987, but it is not yet clear just how much of a debilitating effect the high yen will have on the flow of cash from the corporate coffers to the IS departments in Japan.

One of the most significant effects of the drastic increase in the value of the yen in 1986 may have been to upset some long held notions about the superiority of Japanese manufacturing in general. The huge drop in corporate profitability resulting from lower overseas revenues suggests that a large part of Japan's competitive edge in the past may have stemmed from macroeconomic structural advantages. As such advantages began to disappear, Japanese manufacturers reacted much as their American competitors had years earlier, cutting costs at home and moving as much production as possible overseas.

Methodology

The 1986 Japan 10 survey was compiled exclusively by DATAMATION from information culled from our in-house database, which tracks the results of over 200 companies worldwide. All revenue and earnings figures have been adjusted to calendar year calculations and converted to U.S. dollars using the OECD average exchange rate for the year.

For a specific definition of data processing-related revenue, see "The DATAMATION 100" methodology, June 15, p. 37. ■

FIGURE 1 Fastest Growers

JAPAN 10 RANK	COMPANY	% CHG (YEN)	JAPAN DP REV ($ MIL)
2	NEC Corp.	22.3	5,122.9
4	Hitachi Ltd.	14.8	3,806.7
9	Nippon Univac Kaisha	10.1	985.9
1	Fujitsu Ltd.	9.5	5,457.8

FIGURE 2 Leading Japanese Dp Companies

	COMPANY	WORLDWIDE DP REV ($ MIL)	% CHG ($ U.S.)	% CHG (YEN)
1	Fujitsu Ltd.	6,575.7	52.6	8.0
2	NEC Corp.	6,324.6	68.1	19.0
3	Hitachi Ltd.	4,728.8	63.9	16.0
4	Toshiba Corp.	2,605.0	61.9	14.6
5	Matsushita Elec. Indus. Co.	1,944.0	34.3	–4.9
6	Mitsubishi Elec. Corp.	1,345.0	44.1	2.0
7	Nippon Telegraph & Telephone	1,160.5	51.9	7.5
8	Seiko Epson Corp.	1,035.7	91.2	35.2
9	Nippon Univac Kaisha Corp.	985.9	55.6	10.1
10	Ricoh Company Ltd.	933.8	26.6	4.1

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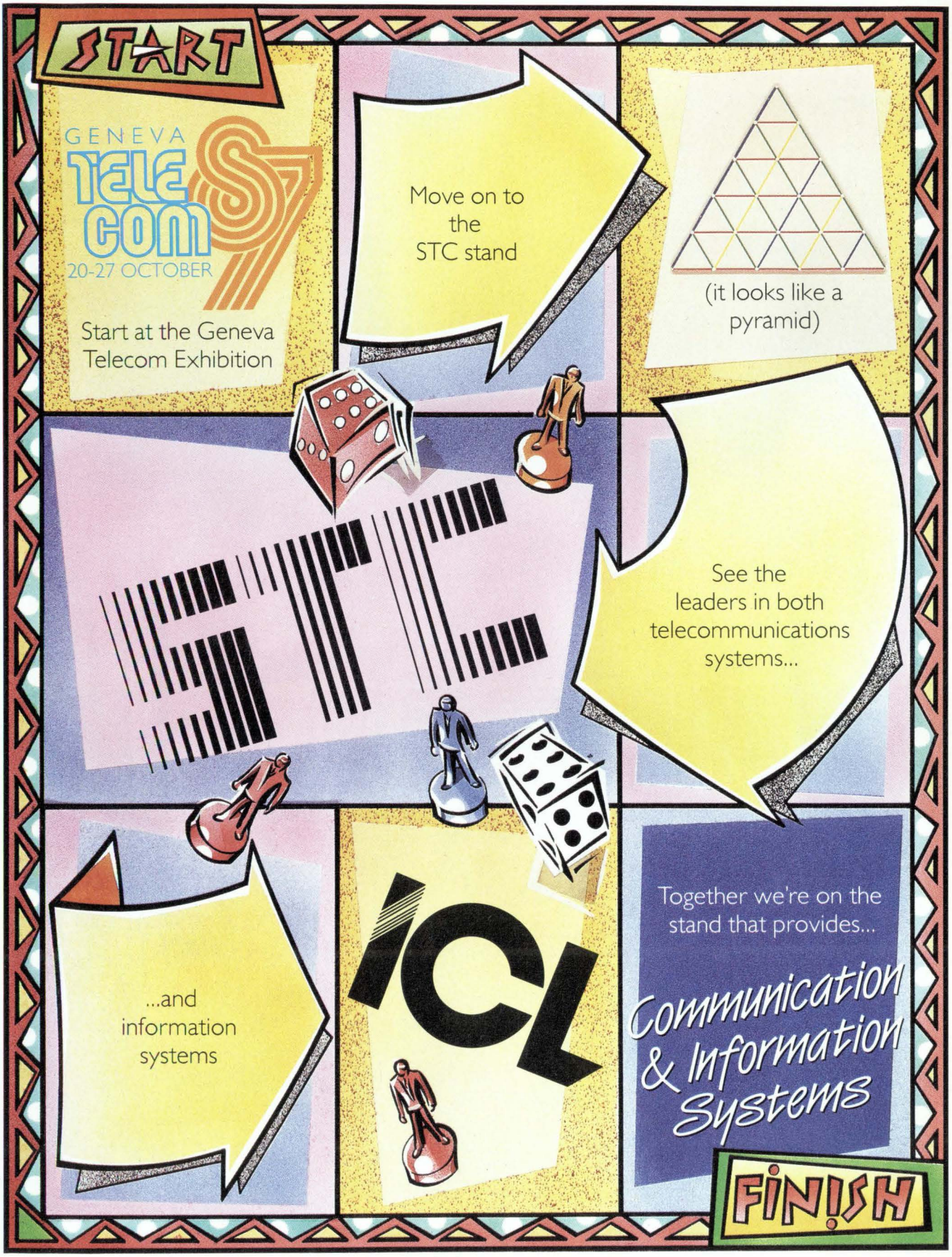

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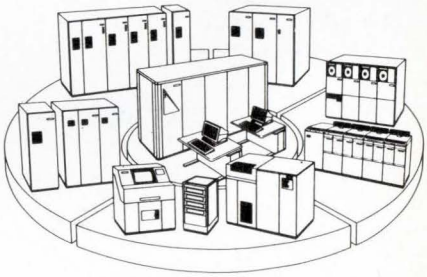

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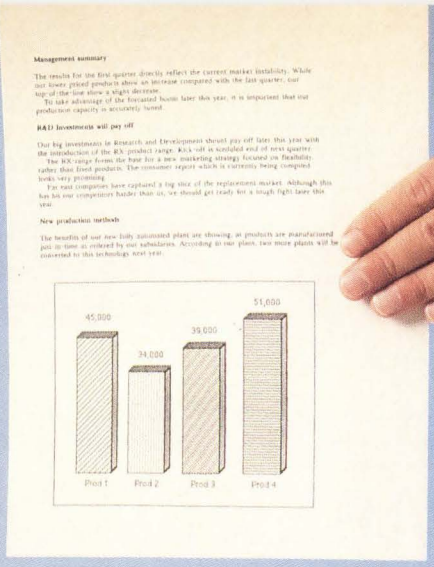

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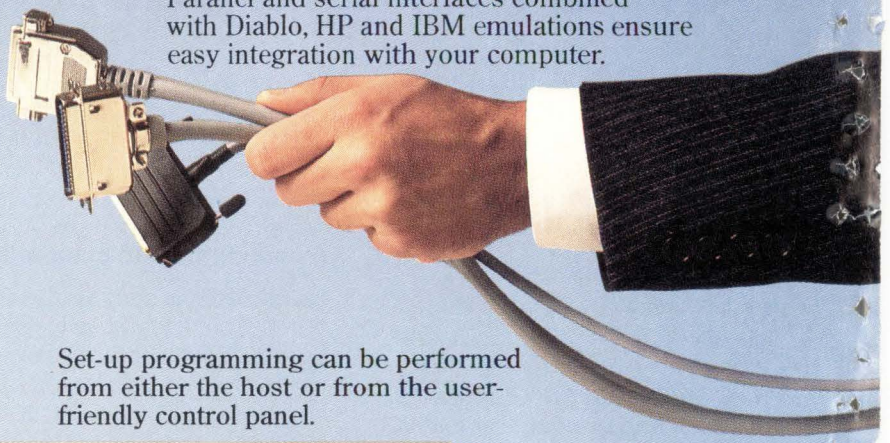

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India aims to be one of the world's largest software and services houses. But some Indian software executives are concerned that the government's software promotion policy is becoming restrictive. Though there are moves to improve the country's domestic and international datacom links, India still doesn't have the right hardware to develop the best software.

India's Soft Hopes

BY ROBERT POE

If India's Prime Minister Rajiv Gandhi gets his way, some of the software you will be using in your machines in the next few years will have been developed and produced in India.

Unlike Asia's other ambitious industrializing countries, such as South Korea and Taiwan, India has rejected the idea of mimicking Japan's success in producing low-cost hardware as a means of entry to the world technology industry. India is taking the soft route, although so far the country is finding that route hard going.

The total value of Indian-produced software last year was less than $60 million, of which $38 million was exported. In an international market where sales of a single pc package can reach a billion dollars or more, such numbers are not impressive. Even the government's national software promotion policy, which aims to increase software exports to $300 million by 1990, is far from awesome despite the almost tenfold increase it represents. What's more, that plan is being tempered by restrictions on the use of foreign exchange (foreign money reserves held by the government) to purchase the right development hardware.

Government and industry officials are convinced, however, that India can become a massive software and services house serving the needs of the world's user companies and the international information industry.

In one sense it already is, claim advocates of the software policy. The additional secretary of India's Department of Electronics, N. Seshagiri, who is essentially the person in charge of the country's computer policy, reports that government surveys show "Indians outside India developed $7 billion in software in 1986." He adds that there are currently almost 50,000 nonresident Indians creating software for foreign companies.

Tapping into that software potential at home is what Seshagiri hopes to do, and he believes that foreign firms, whether they are user companies looking for custom-built systems or technology companies shopping for products, will begin tapping into it too.

THE OBVIOUS ADVANTAGE INDIA OFFERS IS LOW-COST LABOR.

Some of them already have. For example, Citicorp in the U.S. and Citibank Savings in the U.K. have both had applications software developed by Tata Consultancy Services of Bombay. Tata is India's largest software exporter, having earned $12 million in overseas business in 1986. Among Tata's other clients are American Express, Unisys, National Westminster Bank in the U.K., the European Container Terminus in the Netherlands, Australian Iron and Steel, the New Zealand Post Office, and the Kuwait Ports Authority.

But one of Tata's most ambitious contracts is just getting under way with the Fireman's Fund Insurance Corp. (FFIC) in San Rafael, Calif. This deal is to help the Fund's Systems Enterprises subsidiary rewrite the FFIC's entire accounts receivable system.

Tony Chalmers, vice president of the subsidiary, explains, "It's a very complex job and involves integrating over 20 different systems. The total project represents about 200 years of effort and will require close to 2 million new lines of code. Tata was chosen as a joint developer because we have always been impressed by their professional approach and the quality of their work. We can also benefit from the lower manpower costs when we use their development center in Madras for some of the work."

The Fund's confidence is based to some extent on a project just completed in which Tata helped to develop a data dictionary for FFIC based on the IBM DB2 product. It is called Addict. "We believe it's the only one anywhere near completion in the world," says Chalmers, "and we intend to start selling it on the open market in the next few months."

For FFIC, Citicorp, and other Western firms, one of the most obvious advantages India offers is low labor costs. While capital-intensive hardware manufacturing is handicapped in India by severe foreign exchange and industrial infrastructure problems, the country's software industry apparently benefits from these adverse economic conditions. "India has a surplus of unemployed or underemployed scientific and technical manpower," says the Department of Electronics' Seshagiri.

That manpower comes cheap. "The average monthly salary of a university graduate with specialized electronics training is 3,000 rupees [$240]," reveals J.N. Renjan, joint secretary of the Ministry of Commerce.

Seshagiri adds, "Software is labor intensive, so we have a cost-cutting advantage." Seshagiri estimates that software can be developed in India for

India's Soft Hopes

one-tenth what it would cost elsewhere.

Indian computer executives also argue that they have other points in their favor, including the use of English as the standard language in business and government sectors and a level of technical education that is higher than in many developing nations. "We have a wealth of engineers and professionals available. Other countries with so-called inexpensive labor don't have our technical expertise," claims Manohar L. Tandon, chairman of the Bombay-based Tandon Group and brother of the founder of Tandon Corp., Chatsworth, Calif.

India is determined to continue improving that level of expertise by expanding computer education in India. The Department of Electronics is setting up four Indian Institutes of Informatics Technology, which will make use of the National Informatics Center network (NICnet). The existing four Indian Institutes of Technology are also expanding their computer training programs. Private institutes and industry are being encouraged to increase computer training.

The ready availability of educated, low-cost software personnel is a mainstay of India's software promotion policy, a government-backed initiative now in its first year of operation. This is the latest move in the country's five-year plan to improve the industrial and commercial structure of the country through the use of new technologies.

Opening the Gates

A central theme of the computer policy is Seshagiri's "flood in, flood out" concept. The first phase opens the gates to the unrestricted import of foreign software. Though products are still subject to a 60% import duty, it is still much better than the usual 140% levy applied to foreign technology wares being brought into the country.

On the surface this appears to be the opposite of what India wants to achieve. How can making these Western products easier to import help increase exports of Indian software products and services? There is a plan.

The incoming flood of new software is expected to offer several benefits. Nandan Nilekani, deputy managing director of Bangalore software house Infosys, explains, "It's supposed to flood in, raise the level of expertise to international standards and the state of the art, then [Indian products] flood out again."

This goal is to be reached by several paths. First, the incoming flood should stimulate computer use and manufacturing and increase the size of the domestic software market in general. Subsequently, the plan forecasts that "import substitution" will occur with local developers creating products that are cheaper than the imported packages. If they can't, there will still be an advantage: "The imported software means we need not reinvent the wheel," explains V.K. Harindon, director of PSI Data Systems of Bangalore, a manufacturer of microprocessor-based computers and systems.

Although import substitution will not necessarily lead to exportable products, another approach might. "Instead of competing with foreign software, we

Signs of Success and Failure

The software exporting experiences of Wipro of Bangalore and of the software division of industrial conglomerate Thermax are at the extremes of the success spectrum in India.

Wipro is one of India's most ambitious microcomputer and software companies, and it looks set to be among the first firms successfully to break out of the Indian market.

The company claims it has 35% of the micro software business in India, based on its sales of a multiuser operating system for IBM XT- and AT-compatible machines and an eight-part modular accounting package running under MS/DOS.

Wipro's export problem was "to find a marketing model that would work," explains Ashok Narasimhan, the president and director. The approach adopted was to form partnerships with U.S. firms, which would be set up specifically to help work out the specifications for a single new product and sell it after it had been developed. Wipro would fund the product development, while the U.S. firm would finance marketing.

The result of the first deal with a U.S. partner was a product called Instaplan, combining project planning functions with an "idea generator," a spreadsheet, a word processor, and graphics. It went on sale in the U.S. in March of this year.

The U.S. marketing partner, Instaplan Corp. of Tiburon, Calif., was established by two expatriate Indians with $400,000 in backing from venture capitalists. That was far more than the Indian government's foreign exchange regulations would have let Wipro spend.

The retail price that was finally decided on illustrates the cost advantage of Indian software: Instaplan sells for $99, of which Wipro receives just 15%.

Narasimhan says Wipro has been approached by two more venture capital firms seeking similar tie-ups. If new products result, Wipro will be able to sink more of its own money into their marketing and will get a higher percentage of the retail sales dollar in the future.

If Instaplan is successful—and so far it appears to be—it will serve as a clear indication that despite the great distance from the market, software written in India can compete internationally, at least at the pc level.

But don't try telling that to Thermax's software division. Management there has seen the tough side of exporting software from India.

Since its parent corporation has an extensive worldwide sales network, an ambitious export strategy was adopted that took the emphasis away from its traditional custom-built software business: Thermax software sales now would be 100% packages for maximum recurring revenues, and 100% for export to tap into big-money markets like the U.S.

The strategy simply didn't work. "The experience has been nasty and unfavorable," admits division director Mansoor Shaikhali.

The company created several packages for micros, which required 20 to 30 man-years labor each, but "none of the packages delivered the promised millions," complains Shaikhali. "Before we could come out with our products, the competition was ahead of us." The company tried to tie up with U.S. venture capital groups, but "in spite of our best efforts, we couldn't figure out how venture capitalists funded projects. Sometimes they abandoned them halfway through."

Concludes Shaikhali, "Competition and technical change make package development in India, unless contracted, very difficult. Unless an Indian company has the capacity to make 10 to 15 packages, it cannot be successful."

Now, Thermax, succumbing to the pressure, is again accepting projects involving the contracting of its software personnel, and is planning to earn 50% of its software revenues domestically by next year.

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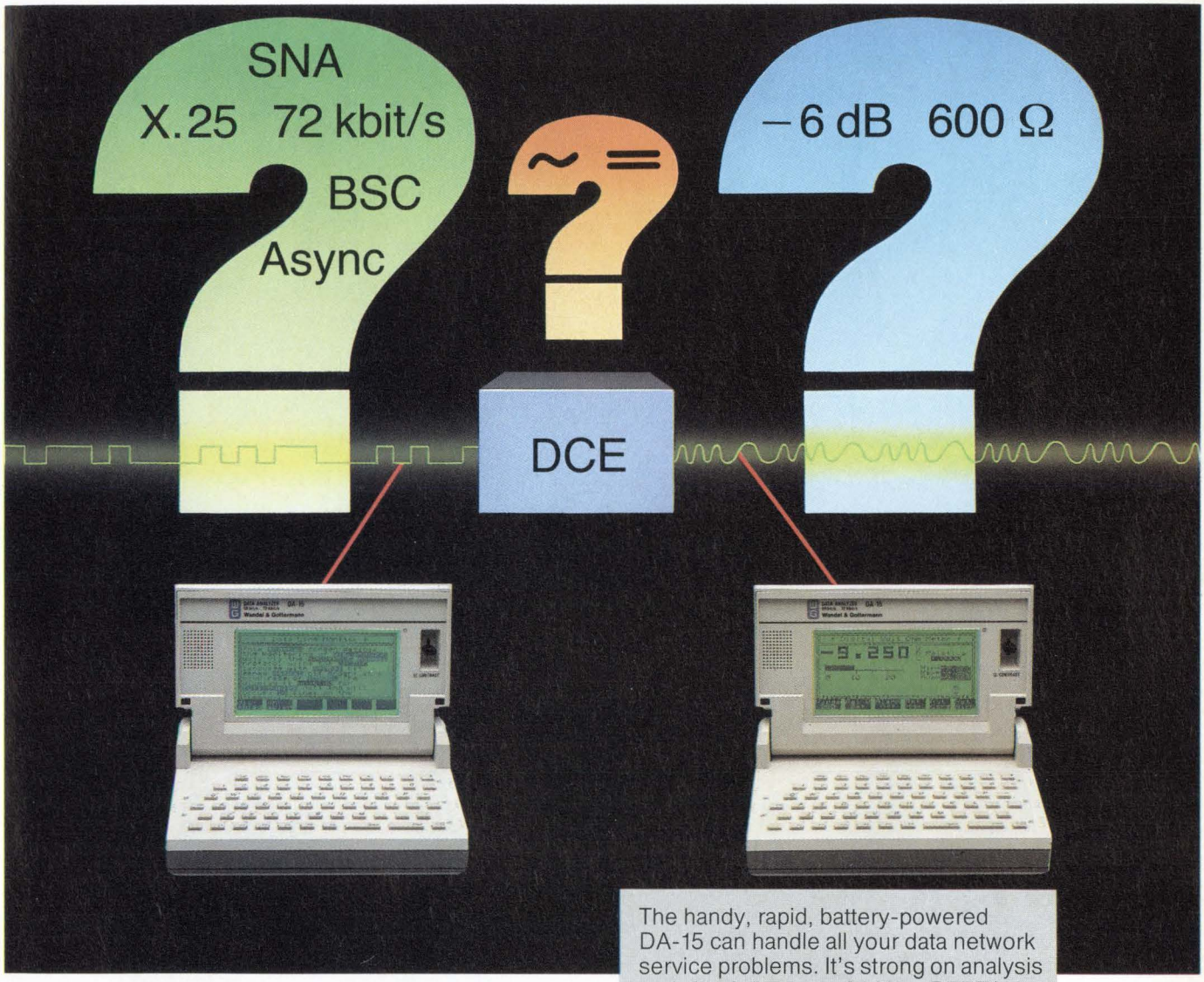

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NETWORKING

can produce add-on features sitting on top of the imported software that's available for development," ventures M.J. Shaikhali, director of the software division of industrial conglomerate Thermax Private Ltd. of Pune.

The improved level of expertise is also expected to attract contracts for custom-built software from major foreign companies. These contracts will all be channeled through the government-owned computer company, CMC. The company will then break the contracts down into manageable pieces, distribute the work among domestic companies, manage the project, and, finally, supply the results to the customer.

Winning specific project contracts is the traditional way that India has run its software export trade. Usually this involves sending developers and programmers to work with the clients, a practice often described as body shopping, body export, or "fleshware" export.

Hardware Choices Have Been Limited

Until recently, one of the main reasons for body shopping had been the country's lack of sophisticated hardware. Even when it was possible to get permission to spend scarce foreign exchange on modern equipment, import duties of 140% or more meant that the hardware choices were limited.

The result of this limitation was that "people were good in the theoretical aspects, but had very little hands-on experience due to the scarcity of hardware," remarks Tandon Group's Tandon. In short, the only way to give employees the necessary experience was to send them overseas.

Body export has disadvantages, however. Sarup Krishna, senior vp of the computer consultancy division of Tata Unisys, Bombay, explains, "With body shopping, your revenues can only grow in direct proportion to the number of employees." Nilekani of Infosys agrees: "To reach [the export goal of] $300 million, recurring revenues from package software will be necessary."

Employee loss is also a serious problem. Says Krishna, "We lose 5% to 10% of the people we send to the U.S., because of the lure of the life-style and the ease with which they can get green cards as skilled professionals. Sometimes even our customers pinch them." Still, the software policy expresses high hopes for this type of consultancy business, whether or not the software package industry takes off internationally.

It may not, especially in the U.S. "Software package export is the dream," confesses Pravin Gandhi, executive director of Hinditron, a local software house that represents Digital Equipment Corp. and Tektronix Inc. in India. But, he adds cautiously, "The ball game in the U.S. is a bloody game. I can't see a lot of product development in India in the near- to medium-term future."

What's more, though the software policy is less than a year old, many people are already having second thoughts about it. The flood in, for example, may not be as much of a free flow as expected. "What is happening is that there's a growing fear the flood in will cause lots of foreign exchange problems, so they put restrictions on," explains Nilekani.

Even if the Western supplier does manage to get approval from its government to export advanced systems into India—not always an easy task as India is regarded as having worrying connections with the Soviet bloc—the Indian buyer is faced with internal restrictions on the import of the necessary development hardware. This is especially true of the latest models of large systems, which are scarce in the country. Though the new policy permits the import, also at 60% duty, of the more expensive equipment needed to develop upscale software products, export commitments must be given in return.

For machines or systems with bundled software that are purchased using foreign exchange obtained directly from the government, the developer must, within four years, export software worth 250% of the foreign exchange used. For foreign exchange obtained elsewhere, the export obligation is 150%. Similar

Bypassing the Network, But Not the Bureaucracy

New communications technologies are being used to overcome India's lack of access to the right machines and the right markets, which are needed to make its software drive a success. With dependable international data links, "the lack of hardware no longer remains a major constraint," states Mansoor Shaikhali, the director of the software division of industrial conglomerate Thermax. "We can have access to any machine in the world."

Establishing those data links is not easy, however, mostly because of India's notoriously poor phone system.

The solution is to bypass the phone network. A national project called Indonet, put together by the government-owned computer maintenance and manufacturing company, CMC, is attempting to do just that by using the country's Insat C-band communications satellite. By the end of 1988, 35 cities in India will be able to send and receive data at 64Kbps through rooftop earth stations using three-meter dishes. The New Delhi hub of the network will have an 11-meter dish.

Intracity communication will also bypass phone lines by using digital packet switched radio, originally developed by the University of Hawaii for communication among remote islands. Three-meter towers will send and receive VHF transmissions carrying 9,600bps of data in the Ethernet protocol. Dial-up access will be provided for infrequent users. The key feature for software exporters, however, will be an international gateway, which will provide access to any overseas network through the Indonet node in Bombay.

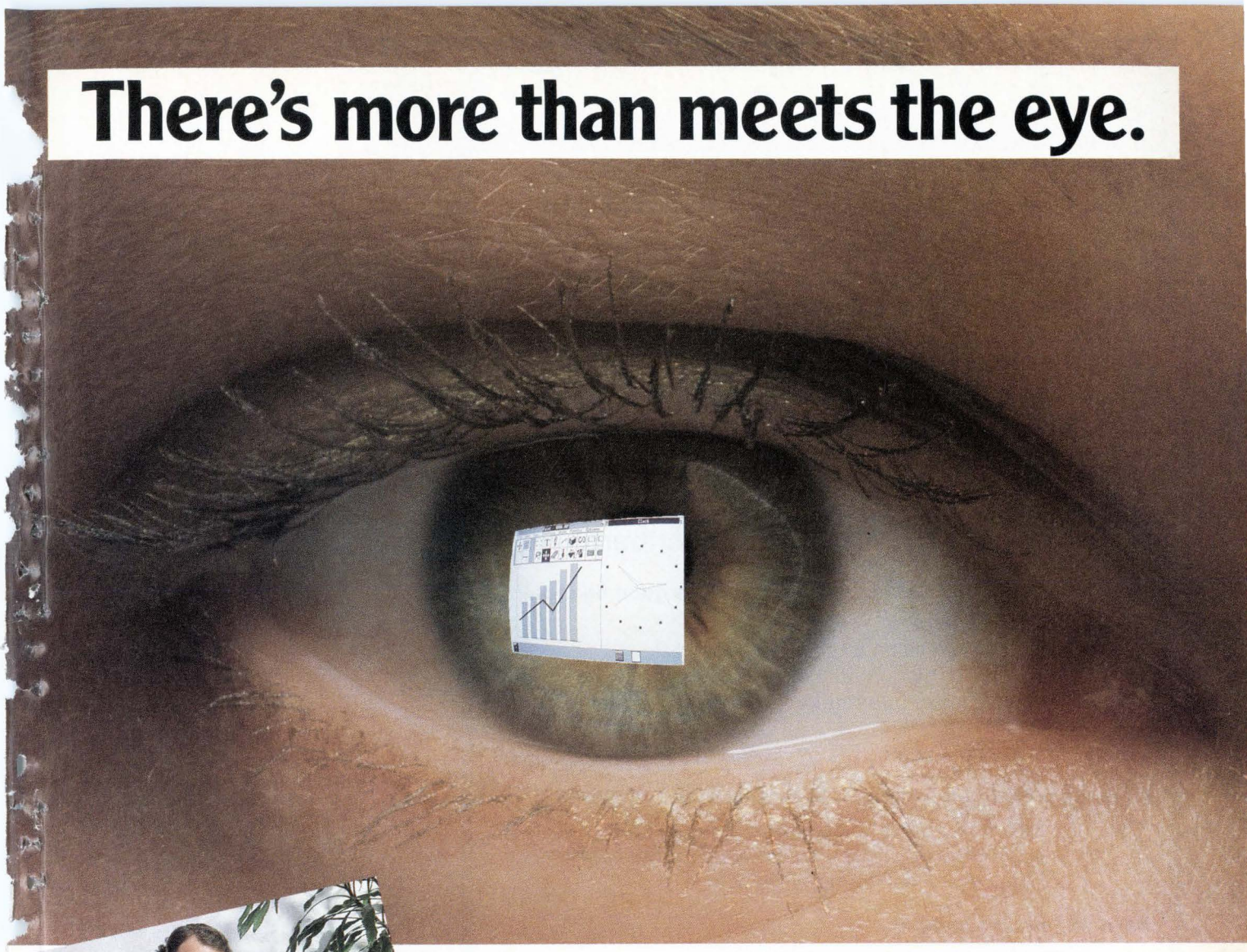
The government has also introduced a data link deal for companies in the country's duty-free export zones. India has two such zones and is setting up four more. Businesses operating in the zones are allowed to import—without any duty—materials and equipment used to manufacture products purely for export, and they are exempt from the usual 40% limit on foreign equity participation.

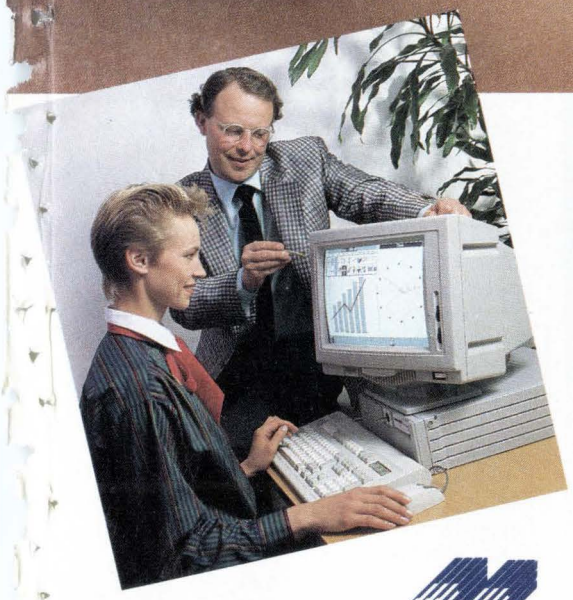
The new deal takes the concept a couple of steps further. Single facilities or groups of facilities can be declared Software Export Technology Parks. Not only will these parks be granted the usual duty-free privileges, they will also be allowed to install a private satellite earth station and use Insat for overseas data communications.

While the Indian authorities may find it easy to bypass their country's phone network, it's more difficult to bypass their own bureaucracy.

The first taker was Texas Instruments, which in 1984 began setting up an LSI design center in Bangalore. Being a pioneer wasn't easy. Although India's Department of Electronics took the lead, several other government agencies were involved, and as many as 27 regulations had to be changed to permit the new arrangement. It was more than two years before TI could send its first transmission via the satellite, and there is still more red tape waiting to be cut.

There's more than meets the eye.





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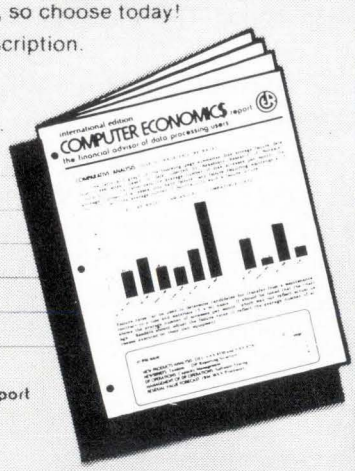

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The lack of access to the right hardware may not be too large an obstacle in the future as India develops international communications links that allow remote development (see "Bypassing the Network, But Not the Bureaucracy").

There are other problems developing, however. Although users can import software, recent announcements appear to indicate that "if you're only a software retailer, you cannot import for stock and sale," says Nilekani.

And What About the Side Effects?

More surprises may be in store. "There are still notifications coming out," Nilekani adds. "We're still waiting and seeing." These uncertainties about the likely side effects of the Indian software policy on the country's local industry don't improve the confidence of Indian executives as they peddle their services overseas. But peddle them they will, and with increasing vigor.

Hinditron's outlook sums up the way most Indian software companies see their futures. Says Pravin Gandhi, "We're looking for more project contracts and recurring revenues through royalties."

Liberalized software and hardware imports will make some difference to the level of quality and appropriateness of Indian products, but there is still one inescapable problem: the geographical distance from major markets, especially the U.S. This will continue to hinder development of both pc packages and large-scale projects.

For pc software, the main problem that distance presents is the inability to keep up with a fast-moving market. For larger projects, the problem is access to the environment in which the product will have to function. For this reason, even companies with relatively modern hardware, such as Infosys with its in-house Data General equipment and its timesharing access to DEC and IBM machines, are often forced to export people rather than do the entire project at home.

Unless this isolation from the main target markets is overcome, users in the U.S., Europe, and other parts of Asia may not feel confident that they will get what they need from Indian developers. Furthermore, it may mean that a major part of the national policy, and the "flood in, flood out" approach in particular, will be in danger of amounting to little more than a drop in the Indian software ocean. ■

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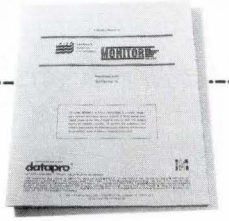

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Making the connection is the domain of datacom, keeping it is the network manager's job. The lack of a standard is just one problem users with mixed shops face. IBM offers NetView, but the real solution is OSI.

BY BILL MUSGRAVE

In a world where making and keeping the connection are vitally important to a company's operation, the network management function is serious business. The good news is that today, virtually every piece of a datacom network can be monitored by using add-on measurement tools or features found in sundry hardware and software products. With such an array of options to choose from, network management should be a snap. The bad news is that it isn't. The ironic and overriding reason is communications, in the form of common standards, common carriers, and the common problems that have yet to be surmounted by today's network user.

Confronting the user are some basic incompatibility issues that begin at the equipment level. In the typical situation, the equipment provided by Vendor A doesn't understand the management protocol used by Vendor B. Neither company reports operational or status information in the same way, which of course makes it difficult to correlate the opera-

As Network Options Grow, So Does the Management Challenge

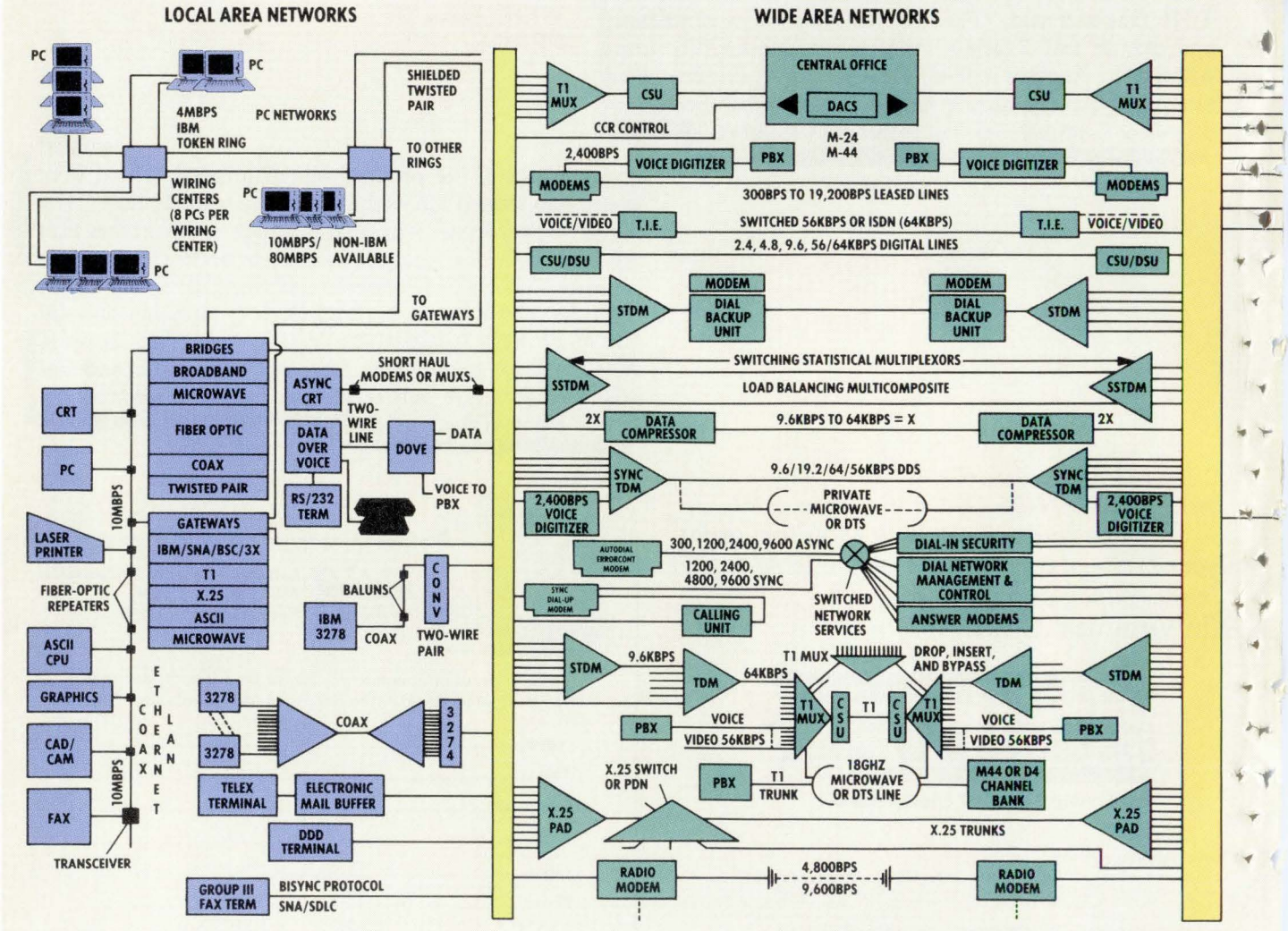


Chart by Paul Goodfriend

Keeping the Connection

tions of various parts of a multivendor network.

While some vendors will offer management capabilities across their product line or provide software to tie it all together, users can not always take the single-source route. Some users are also troubled by the nagging thought that equipment provided by only one supplier may have a blind spot that could then adversely affect network operations.

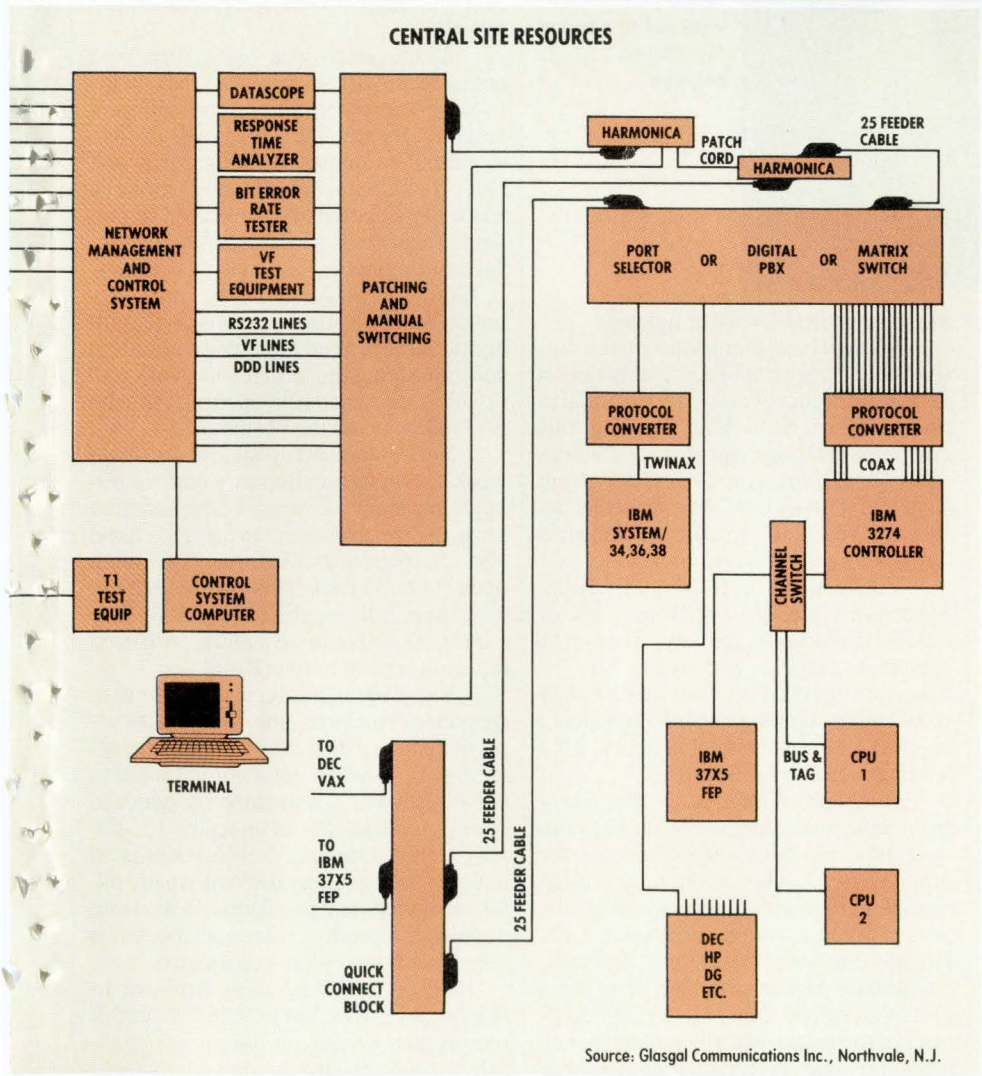
Dealing with the common carriers can give the user even more communications headaches. While the postdivesti-

ture world provides customers with a greater freedom of choice, that choice also creates confusion. Instead of the one-stop shopping provided by Ma Bell, customers now have to do business with multiple parties for everything from ordering service to servicing orders. The independent carriers also do not register high marks when it comes to their intercommunication to coordinate a customer's service.

Charles Anderson, supervising systems programmer for Kern County, Calif., is in the unenviable position of having to deal with two local telcos, Continental and Pacific Bell. That position, which hasn't always been an easy one, led him to install IBM 5865 diagnostic modems that measure analog-line parameters. Now, when he calls the phone companies with a problem, Anderson can speak their language.

Communications standards have been another sore spot for users. Helping clear up that spot is OSI, which continues to gain momentum throughout the communications world. Meanwhile, IBM is creating another de facto standard with its NetView family of programs (see "IBM NetView Enhancements Stir Interest of MIS Shops, Aug. 1, p. 19).

Users who couldn't wait for standards to stabilize the datacom environment developed their own unique tools to integrate network control and reporting. More recently, a selection of services and products that attempt to draw it all together have made their way onto the market.



Source: Glasgal Communications Inc., Northvale, N.J.

Coordinated Efforts Are Needed

Network management requires good communication between staff, users, and nontechnical management. The staff needs to coordinate its efforts, particularly on problems that span sites and shifts, and it must monitor its own activities and those of suppliers to make sure that repairs are made.

Users and management both need to see their problems solved and have understandable measures of network effectiveness. Those measures are mandatory if management is to make well-informed decisions in regard to the organization's communications.

Richard Eimers, who manages the telecommunications applications laboratory at Hughes Aircraft in Long Beach, Calif., believes that effective network management combines people, philosophy, and technology.

At Hughes, monthly operations reviews include network availability reports. This labor-intensive effort, Eimers explains, has improved morale because the reports have shown that four of the company's major networks have provided better than 99.9% availability for nearly the entire first half of this year.

Vendor-specific management systems can provide a partial solution in a mixed vendor setting. Robert McCrory, director of telecommunications services at Samaritan Health Services in Phoenix, likes the soft configuration and control capabilities of the T1 networking gear that his organization got from General DataComm (GDC), Middlebury, Conn.

Samaritan's network, which carries voice and data traffic among four metropolitan Phoenix hospitals, comprises about 1,500 terminals (primarily 3270-class devices), 10,000 telephone sets, and 30 PBXs. The GDC equipment gives the health-care provider control of its interfacility trunks. Still, Samaritan relies on other tools, such as IBM's Network Communications Control Facility (NCCF), to manage end-to-end terminal traffic and it has developed its own pc-based system to manage its voice PBXs.

At Samaritan Health Services, Robert McCrory manages a network that carries voice and data among four Phoenix hospitals.

In the postdivestiture era, the lack of a single point of contact for problem solving is the capability missed the most. Stepping in to fill this role is Pac-Tel Spectrum Services, Walnut Creek, Calif. A deregulated business owned by Pacific Telesis, Pac-Tel Spectrum Services can provide service but it cannot sell equipment or transport data. It operates nationwide from three response centers, two in California and one in New Jersey.

Clients can dial a 24-hour, toll-free phone number to report trouble. Spectrum also monitors client networks for trends that may signal trouble. It isolates problems, reroutes traffic around failures, and then informs affected vendors and carriers. From a user's perspective, that coordinating function among the carriers and vendors is really the icing on the network management cake.

Customer sites get at least one remote test computer (RTC) that is designed and owned by Spectrum. The RTC is downloaded to configure it for each user. RTCs consist of a minicomputer, a matrix switch, and both analog and digital test gear. User-specific software is downloaded through the switched network. The RTC monitors the net and collects information that is periodically forwarded to the response center via dial-up polling. The RTC initiates a call if it senses a catastrophe.

VAXs in the response centers support databases on client networks. The data include an inventory of equipment, its location, and operating characteristics such as protocols and data rates. Also in that customer database are contacts for service for all equipment and links. The VAXs maintain an inventory of the customer's network and its configuration; test engineers control the RTCs from terminals connected to the VAX, downloading diagnostic software as needed.

When a new client signs on the dotted line, a Spectrum test engineer does a detailed site survey, which is essential to Spectrum service. After building this customer database, Spectrum installs its RTC and modem wrap boxes. Spectrum says that it takes only several weeks before it's ready to support a company's day-to-day communications.

Lucky Stores in Dublin, Calif., uses Spectrum coverage on its network of ATM card machines that are installed at checkout stands in 600 stores. Since it was a new installation, Lucky didn't want the time-consuming job of developing support staff for the new network. That led Lucky to choose Spectrum.

Hughes's Eimers says that Spectrum isn't cost-effective for his datacom operation, but he sees its benefits for other users. The economics might change if Hughes's networks were dispersed over a wider geographic area. Hughes operates IBM, DECnet, Ethernet, and private packet switching nets. Most of its datacom is concentrated in Southern California, so when something needs attention, one of Eimer's staffers can drive to the site to fix the problem. Eimer's approximately 70-person communications support team operates the network, takes care of problems, and reports on operations.

In the past year, several established datacom vendors have entered this service sector. Paradyne, Largo, Fla., now offers NetCare network operations services, which can provide on-site coverage or remote support from its central facilities (see Updates, p. 119). Codex, based in Mansfield, Mass., also doles out network management services under its OnLine service offering.

Another vendor, Avant-Garde Computing, Mount Laurel, N.J., has been developing its Net/Command product for more than three years. Net/Command, originally unveiled at the Interface show in March 1986, functions in place of dedicated terminals attached to either hardware or software networking tools. The first customer orders were shipped last month.

Avant-Garde was one of the first companies with a product that helps manage control facilities from different vendors. By emulating terminals used to monitor and control various parts of a net, Net/Command actually replaces those devices that are connected to network tools such as NCCF, modem management systems, and matrix switches. It filters messages arriving asynchronously from its attached tools, highlighting those that need immediate attention and identifying the affected network tool or subsystem, and it keeps track of who is to follow up on the problem.

Net/Command enables a single workstation to function as a control terminal on many devices. Using function keys, users can connect to the device and issue it commands as if they were on a dedicated terminal. This means that users have full capabilities, but it also means they have to be familiar with each different type of network tool.

Net/Command does not automate responses to alerts, nor does it actively participate in diagnosing a problem or affecting a repair. Helping out in that area is Net/Adviser, a companion product to Net/Command that is designed to simplify troubleshooting. Net/Adviser is an AI effort to help users deal with many different devices and problems. As its name implies, the product offers advice, but it doesn't solve problems on its own.

Net/Command looks attractive to Hughes's Eimers, but he's still unsure of the product because it has yet to establish a track record in the commercial

Photograph by Don Stevenson/Black Star

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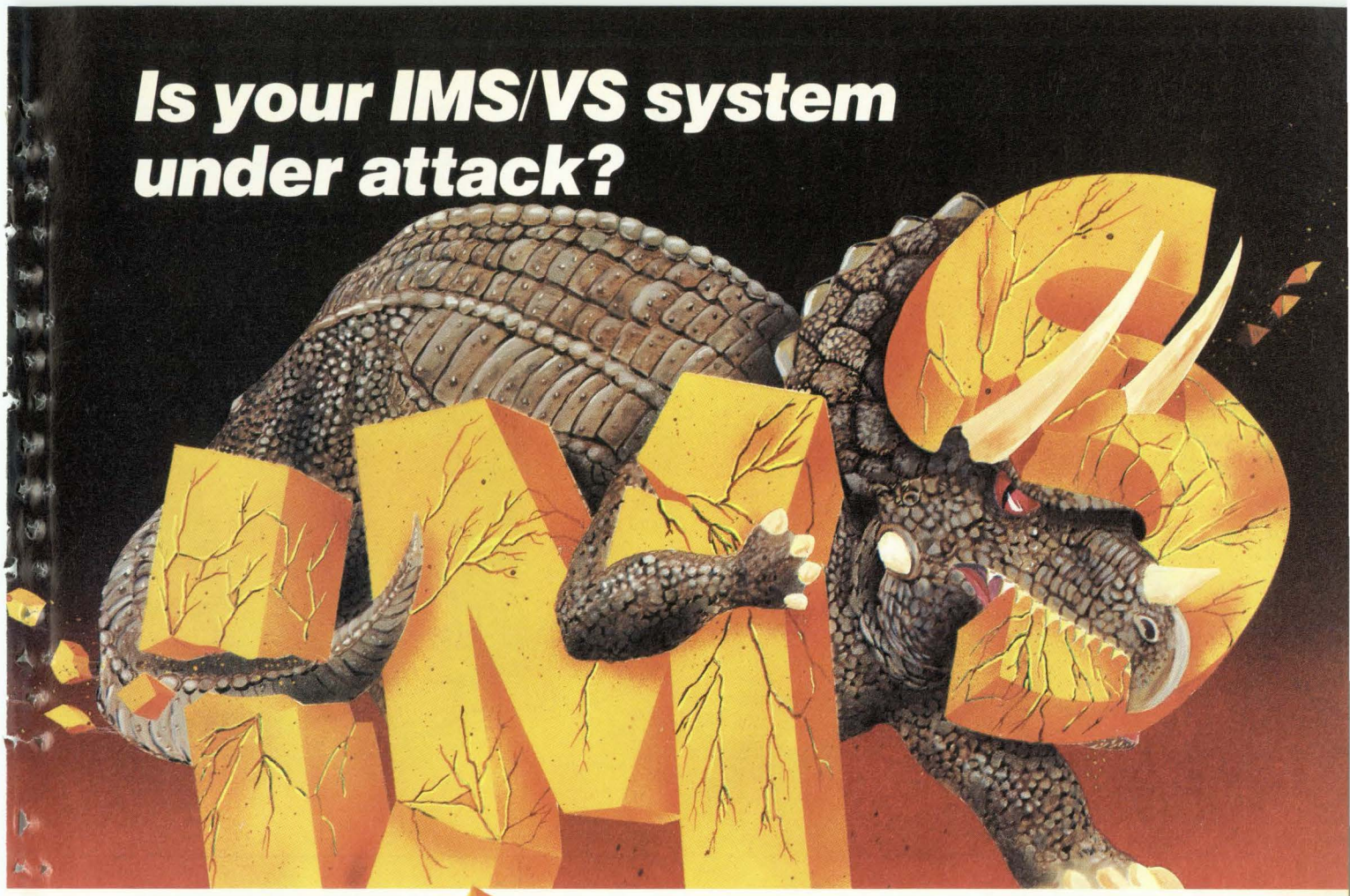

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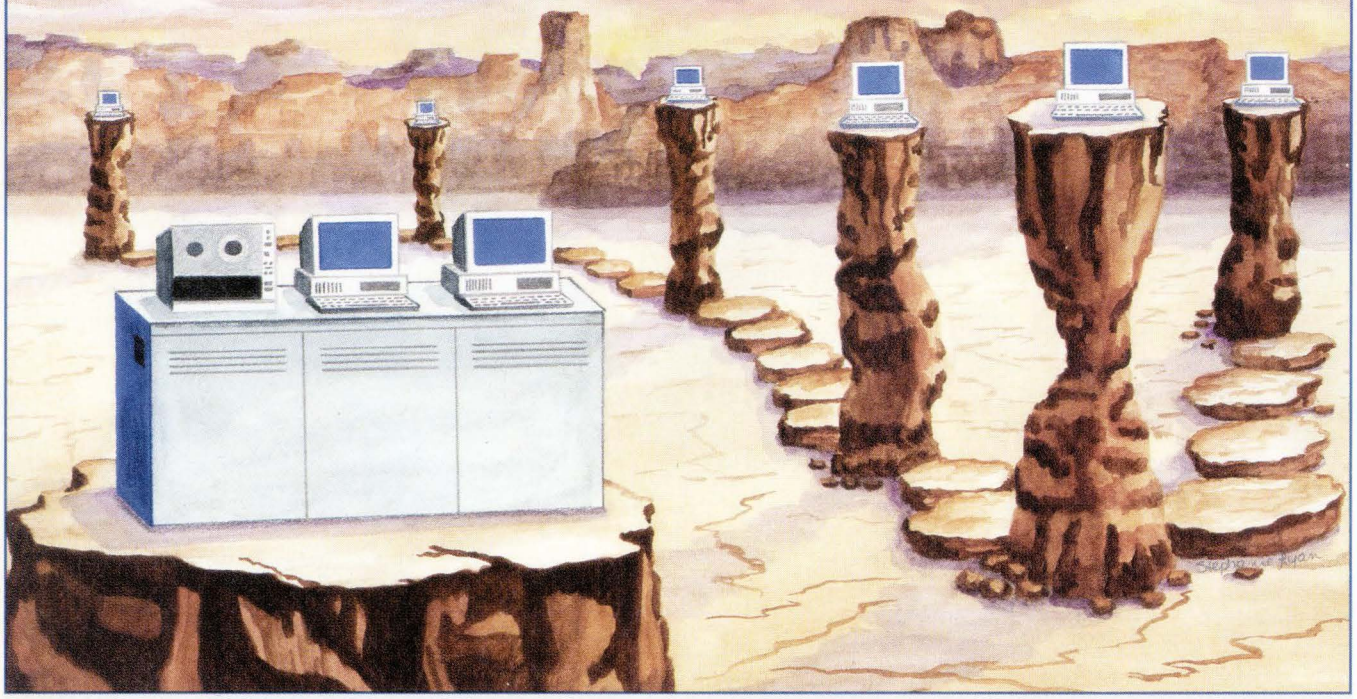

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world. Eimers is also cautious about NetView. "We're interested in NetView, but we're still waiting to see what IBM and others will do with it," says Eimers.

NetView made its debut as a network management tool in the spring of 1986. It pulled together the NCCF, the Network Logical Data Manager (NLDM), and the Network Problem Determination Application (NPDA) with a common interface that IBM claimed would not mask the identities of the then current communications products.

In the first release, NetView ran only under MVS and VM systems with VTAM. DOS/VSE users were left with existing NCCF, NPDA, and NLDM tools—tools that IBM said it had no plans to enhance. Instead, IBM rechanneled its network management efforts into NetView, which can use data collected by the older tools, but not necessarily vice versa.

Two Views of NetView

One company in no hurry to migrate from NCCF to NetView is Tosco Corp., a petroleum refining company based in Bakersfield, Calif. Tosco is relying primarily on NCCF to manage its network of bisync and SDLC lines while it makes the transition to an SNA environment. To Carl Peterson, supervisor of computer operations at Tosco, NetView looks like "a repackaging of the existing products." Peterson says that reporting is a weak point and he also complains that it's not easy to prepare reports that are meaningful and understandable for nontechnical colleagues—a criticism other users have leveled at products from IBM and other network management vendors.

Kern County's Anderson has a different view of NetView. His operation, which currently uses NCCF, is considering NetView. It would consolidate his software tools and provide additional hardware support for his 5865 modems and Link Problem Determination Application-2. (NCCF and NPDA support LPDA-1.) Without LPDA-2 support, detailed line measurements must be performed manually from a keypad/display panel.

When it was originally announced, IBM claimed that NetView was greater than the sum of its parts. It had the ability to monitor and control more types of equipment and it also offered LPDA-2 support for diagnostic modems. This feature allowed NetView to configure the datasets remotely, to initiate dial backup around a failed leased line, and to provide analysis of new lines and transmit/receive tests. In addition, it could invoke command lists (CLIST) to automate responses to messages it received, including those coming from VTAM, CICS, or IMS.

Hughes Aircraft's Richard Eimers doesn't believe Spectrum is cost-effective for his datacom operation.

Photograph by Bill Nation/Sygma

Another plus was that NetView added support for 3725 Network Control Program/Token Ring alerts and stats forwarded by an NCP.

In the flurry of announcements, IBM came out with release 2 of NetView and extended VTAM to DOS/VSE environments. NetView also became a subsystem under MVS, which gives it additional capabilities on its host, including the ability to start and stop VTAM. IBM also upgraded NetView/PC, giving it more muscle to control other vendors' telecom equipment.

In making the new moves with NetView, IBM basically repositioned the product, enhancing and highlighting its abilities to act as an operator's terminal on both its local host and, more significantly, on remote systems including 9370s. In fact, IBM is emphasizing Net-

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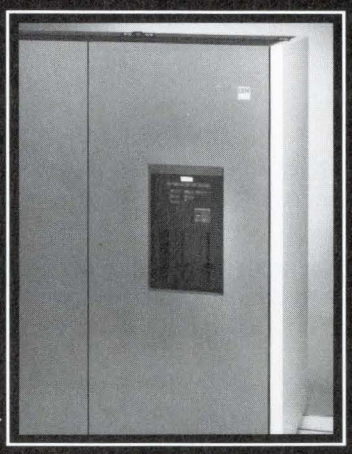

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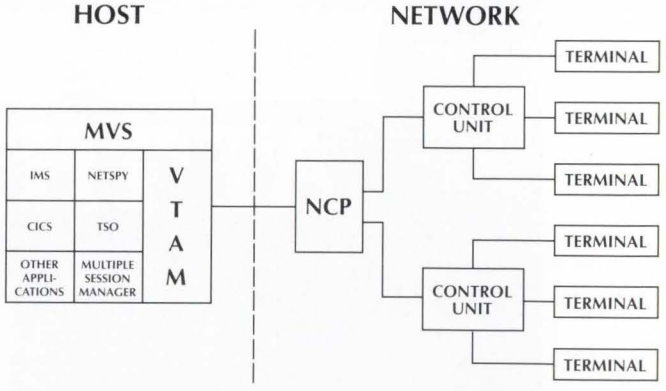

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View's operations automation capabilities, which automate responses to predictable situations.

CLISTs can automate system operations by responding to messages directed to the operator's console, either from the operating system or any other program. A new NetView adjunct, the Inter-System Control Facility (ISCF) supports remote, unattended operation of machines before VTAM communications are established. Once VTAM is up, NetView can be started up in the remote system, replacing the ISCF link.

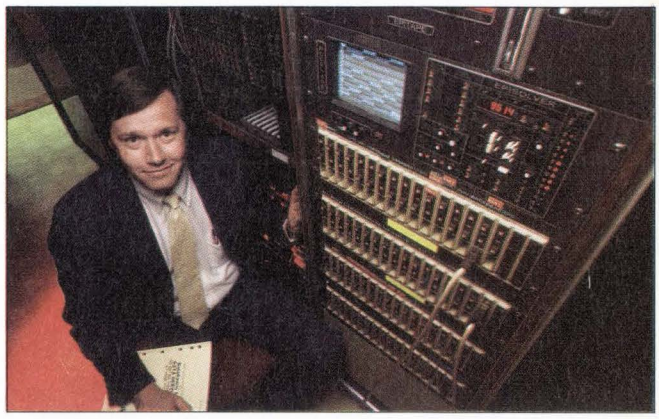
In addition, IBM announced in June that it would be marketing the Integrated Digital Network Exchange (IDNX) T1 network manager from Network Equipment Technologies. Under the deal, IBM also acquired the right to use the Redwood City, Calif.-based vendors's proprietary internodal protocol in future products. Both companies will work on integrating NetView into the IDNX product line.

Generic Message Format Is Defined

To bring non-IBM gear under NetView's umbrella, Big Blue defined a generic message format it uses to pass management and control information between a host NetView and a pc running NetView/PC. It's still unclear if this generic format will effectively homogenize the control facilities that datacom vendors develop to differentiate their products. The PC program is an operating environment that supports a device-specific software interface. Generally, the PC will be able to run only one device interface at a time, due to memory limitations. Nevertheless, each PC can control several similar devices.

Racal-Milgo, based in Fort Lauderdale, Fla., reports that it will ship a NetView-compatible product before the end of the year. Tom Tillman, who is the product manager on this project, says the new software will link Milgo's CMS Communications Management Series to a host NetView through the first release of NetView/PC. The Milgo software, which will enable users to transfer network management files and databases to an IBM host, will also allow an operator at a CMS console to access host-based NetView.

The Florida modem maker isn't the only communications company becoming enmeshed in the NetView net. General DataComm promises similar support, under the Megaview trade name, for its Netcon management system. Beginning next year, MCI will be supporting NetView alert reporting from its network to the host via a NetView/PC interface. Other NetView/PC interfaces will bring Rolm CBXs into the fold.



Tosco Corp.'s Carl Peterson thinks NetView is "a repackaging of the existing products."

Darel Eschbach, executive director of telecommunications services at Arizona State University in Tempe, sees the new NetView announcements as steps in the right direction, but he still has a wait-and-see attitude. Since Eschbach's shop isn't all blue, he says he won't have consolidated management unless other vendors accept IBM's framework.

While IBM has opened the door to multivendor communications management, not surprisingly it has not opened the door to mixed vendor computer systems. Since these foreign systems access SNA via emulation, usually 3274, that's exactly what NetView "sees." So with NetView, a user on an Ethernet accessing a mini, for example, will simply appear as an address on a 3270 controller.

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Still, if enough people jump on IBM's bandwagon, this could spur standards activity, particularly OSI efforts. During June, an OSI working group met in Tokyo to refine network management standards. One person very familiar with those standards is Trudy Reusser, a standards engineer in the information networks group at Hewlett-Packard. Reusser, who is the founder of the ANSI committee (X3T5.4) that addresses OSI management, is also a permanent member of the U.S. delegation for OSI Management (SC21 Working Group 4).

The OSI team is working on network management standards of all resources, including hosts, in a mixed vendor setting. The standards, explains Reusser, are hierarchical and developed top-down. The OSI Management Framework will specify how management information gets transported from its origin to its target.

OSI management is strictly concerned with the interconnection between systems that allows the exchange of management information between remote devices and the centralized operations staff. Under the framework, the new management standards deal with generic and vendor-specific issues. Specific Management pertains to five areas of management: configuration, fault handling, security, performance, and accounting.

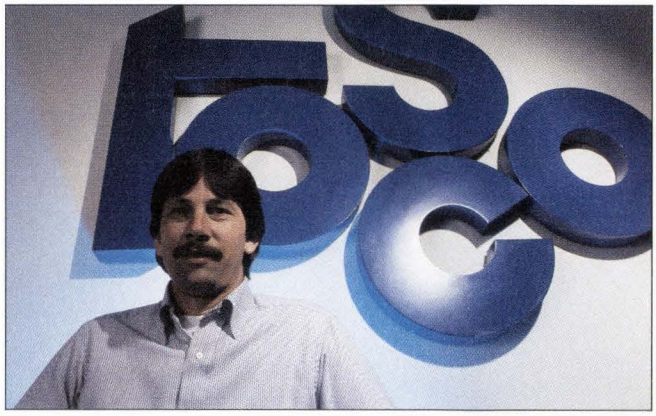
The management framework identifies operational parameters, defining their names and type, but it does not specify their implementation—that's left up to individual vendors. The framework spells out what needs to be done, so that compliant equipment will be able to pass management data streams without homogenizing their content.

"The major accomplishment at Tokyo," sums up Reusser, "was that the OSI Management Framework was accepted as a draft international standard (DIS). It will now go to a DIS ballot ahead of projected schedule. There is complete consensus between participating countries, which gives a lot more stability and credibility to the next two management standards, Common Management Information Services and Protocols and Specific Management Information Services And Protocols."

Progress on Common Management, however, has been a little slower. Reusser expects a three-month delay in getting the proposal ready for approval as a draft international standard. That vote is slated for January.

The OSI team is also working on development of a "model of management." HP backs the formal name "the model of the management of the networking environment," since it's meant to bridge the gap between abstract standards and the real world of customer needs. The standard would define the context for implementing the type of operations automation features IBM bundled into NetView. The big exception here, of course, is that OSI is vendor independent.

Users like that independence. In today's deregulated datacom world they have more choices than ever in managing their networks. But while new tools and services are evolving to help tie together the management of multivendor systems, you still can't buy it out of a box and plug it in today. ■



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A standards engineer at Hewlett-Packard, Trudy Reusser founded ANSI's OSI committee.

Bill Musgrave, a former associate editor of DATAMATION, is a California-based freelance writer specializing in computers and communications.

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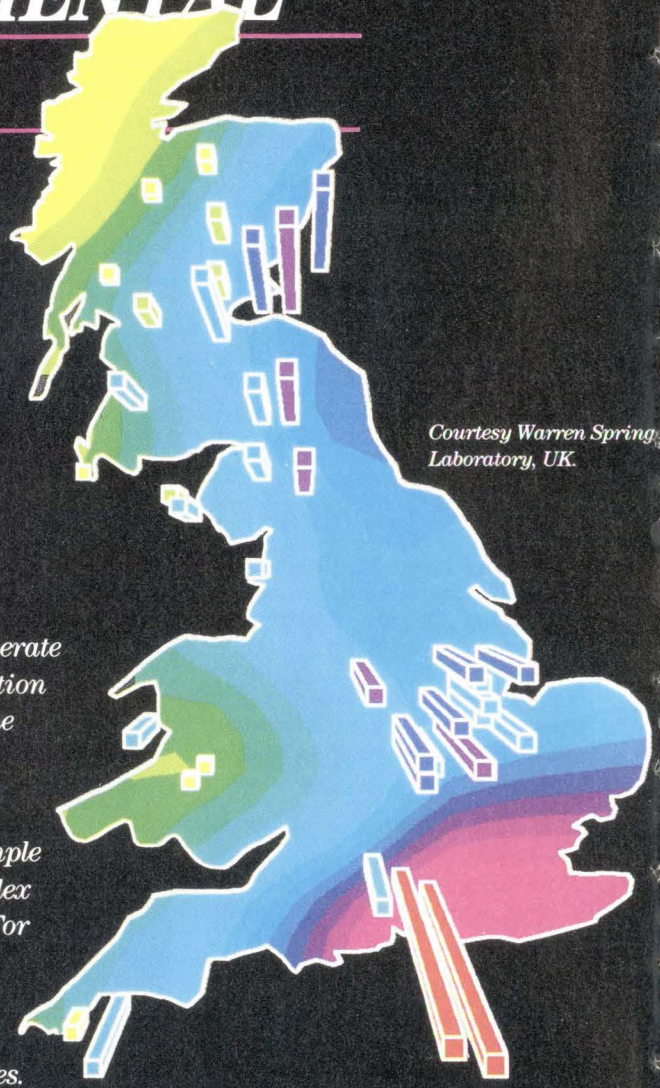

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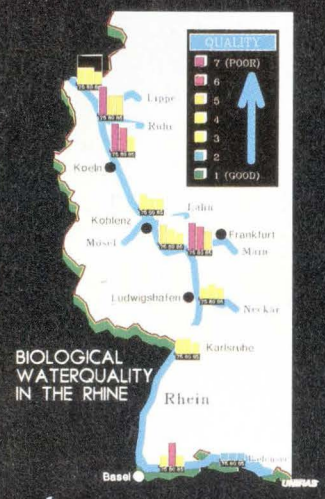

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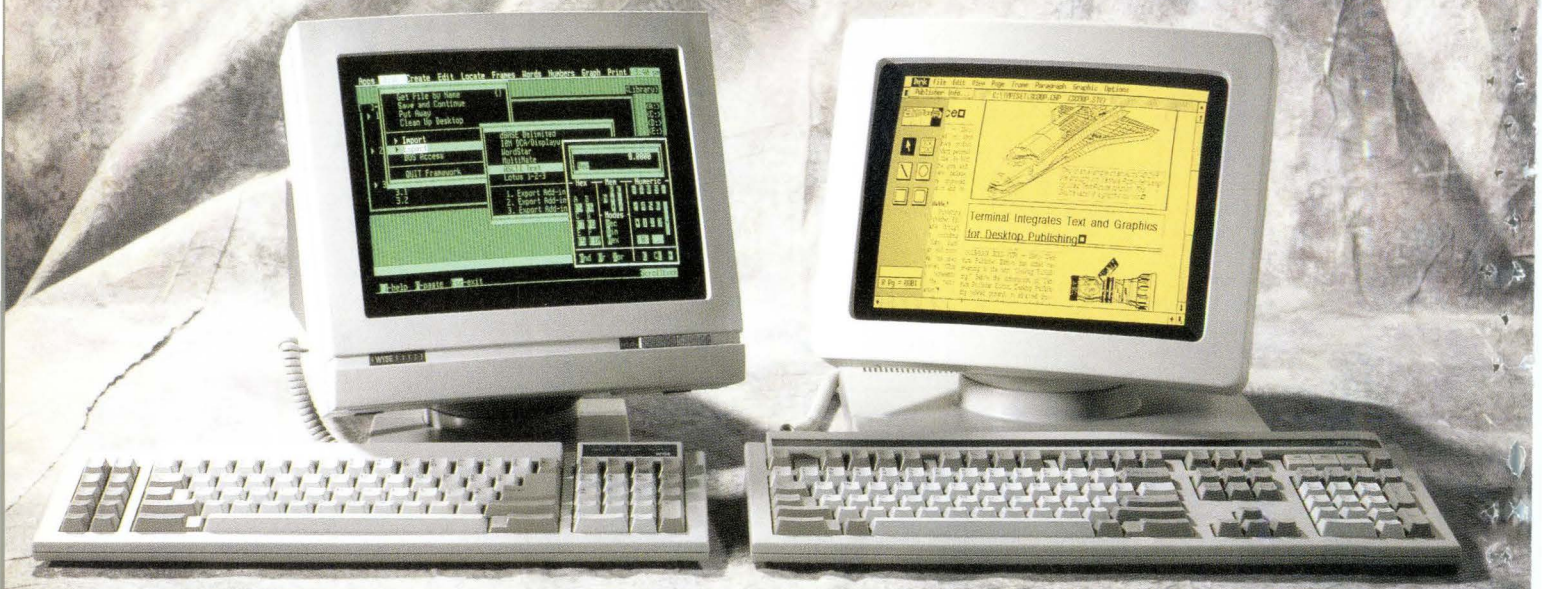
Before you choose between the best PC terminals, read this head-on comparison.



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Circle 58 on Reader Card

OFF-LINE

LARGE CORPORATIONS DISCOVERED some time ago the value of network management systems, hardware and software that monitors and maintains the functions of a computer network. Small- and medium-sized businesses have been slower to acquire such systems, but that's changing, says Computer Intelligence, the La Jolla, Calif.-based research firm, as networks become more important in computer installations of all sizes.

A growing number of small- and medium-sized companies—those with total computer systems valued at $5 million or less—are purchasing or planning to purchase network management systems, a recent CI study of 1,500 user sites shows. In fact, more small companies plan to install network management systems than large companies, according to the study.

Data from CI's Communications Special Interview Program show that 31% of large users (those with systems valued at $5 million or more) interviewed have already installed a network control system. Smaller users are not far behind, with 28% reporting that they have installed systems.

When it comes to planned installations, however, smaller users outdistance large users by a significant margin. Of small users interviewed, 38% said they were planning to install a system, compared with only 20% of the large users. This disparity may be attributable to market saturation for network management systems at large sites.

A number of vendors, including BBN Communications Corp., Cambridge, Mass., have been capitalizing on the surge of interest among smaller sites and have introduced network management systems for small networks. BBN's offering, the C/7 Network Operations Center, costs $125,000.

Of those sites planning to install network managers, CI says that there was an interest in standalone, hardware-based systems, such as those offered by Codex, Paradyne, and Racal-Milgo, and in software solutions, particularly IBM's NetView or NPDA.

Industries with the highest traditional reliance on networks, such as banking and transportation/utilities, have a higher proportion of installed systems than planned systems, while sites in such areas as medical/education, business services, and dp services have a higher percentage of planned systems than installed systems.

IBM's recent marketing emphasis on NetView as a strategic networking product and the introduction of communications products by major vendors have helped cultivate the growing interest in network management systems in general, CI says.

HARDWARE

Apollo's 4MIPS Domain Series 4000 Personal Super Workstation.

Two Vendors Introduce Super Workstations

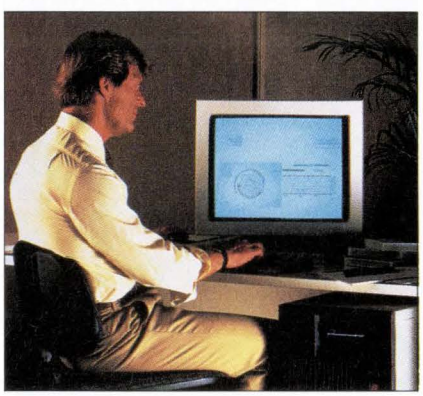
Apollo introduces 4MIPS personal machine and Sun adds high-end, 10MIPS version.

BY THERESA BARRY

Rushing to meet technical users' demands for more power and graphics capabilities, leading workstation vendors are offering minicomputer-level performance on desktop systems.

Apollo has introduced its 4MIPS Domain Series 4000 Personal Super Workstation in monochrome, color, and server versions. Apollo claims the Series 4000 more than doubles the performance of its previous high-end product, the Series 3000, which it shipped in early '85.

The Series 4000 features a 25MHz Motorola MC68020 cpu and includes a 25MHz Motorola MC68881 floating point coprocessor. The cpu includes a new 8KB virtual cache memory. Up to 32MB of main memory are provided through the use of 1Mb surface-mount DRAM integrated circuits. An AT-compatible graphics controller board provides eight planes of color, allowing for the simultaneous display of 256 colors from a palette of 16 million. The cpu is tightly integrated with an AT-compatible peripherals bus.



Sun's 4/260 "supercomputing workstation."

Series 4000 workstations support Apollo's Domain/PCC, an AT-compatible coprocessor board for running MS/DOS and Unix applications concurrently, and also support the Domain/PC Emulator software, which runs PC applications on any Domain workstation without additional hardware. The new workstations have seven AT-compatible expansion slots, one XT-compatible slot, and three RS232C I/O ports. Apollo says the Series 4000 runs all existing Domain application programs.

Prices for the monochrome version begin at $14,000; prices for the color version begin at $18,900. Server versions of Series 4000 workstations are priced at $12,400 for a 4MB diskless configuration and $29,400 for an 8MB model with a 348MB disk and cartridge tape. Apollo has lowered the prices on its Series 3000 workstations by up to 50% and has enhanced the line. APOLLO COMPUTER INC., Chelmsford, Mass. CIRCLE **269**

Another leading workstation vendor, Sun Microsystems, has introduced the Sun-4/260, the first member of a family the company is calling "supercomputing workstations," which use RISC technology and offer 10MIPS in performance.

Sun claims the new workstation offers the performance of a VAX 8800 for one-tenth the price. An entry-level diskless configuration, which includes 8MB of main memory and a monochrome monitor, is priced at $39,900. The Sun 4/260C includes 32MB of memory, a 1,152 by 900 pixel color monitor, a 560MB disk, and a 60MB ¼-inch cartridge tape system, at a price of $85,500.

Geared toward such applications as mechanical and electrical CAD, artificial intelligence development, and molecular modeling, the 4/260 is compatible with the Sun-3 and Sun-2 workstation families, and runs Unix 4.2 and Unix System V. The system uses a RISC microprocessor developed jointly by Sun and Fujitsu Microelectronics Inc. Sun licensed the chip technology to Fujitsu and other chip manufacturers to market to other computer makers.

The 4/260 features Sun's Network File System (NFS), the SunPro advanced programming environment, the Sun View window management system, and C language. FORTRAN and Pascal compilers are available as options.

Sun also introduced the Symbolic Programming Environment (SPE), a set of software tools in Lisp for artificial intelligence applications development. SPE, priced at $3,500, will be available first quarter of 1988. SUN MICROSYSTEMS INC., Mountain View, Calif. CIRCLE **270**

24-Pin Dot Matrix Printer

Okidata rolls out its Microline 393 for "workhorse" printing.

Okidata's first 24-pin dot matrix printer is the Microline 393. It offers four print speeds: 450 characters per second in high-speed draft, 180cps in near-letter quality, 120cps in letter quality, and 360cps in utility.

A front-panel display provides print speed, pitch, and font selection. A paper-park feature enables users to print a memo without removing continuous form paper already loaded in the printer. A hinged tear bar allows users to remove printed paper from the printer without waste.

A standard push tractor accepts forms with up to four parts and widths from a three-inch label to a 16-inch continuous form. Paper can be fed from the bottom, rear, or top. Paper handling options include a pull tractor and one- and two-bin cut sheet feeders with 170-sheet capacities. Centronics parallel and RS232C serial interfaces are standard. A personality module provides software compatibility and Epson LQ series emulation. Two resident letter-quality fonts are included, and optional font cartridges (including Courier, Prestige Elite, and Gothic) are available for $49 each. A 19KB character buffer, expandable to 30KB, is standard.

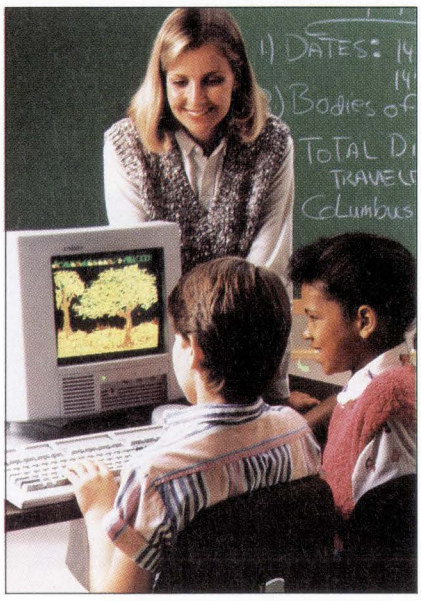
The Microline 393 is priced at $1,399 for a black print model and $1,499 for a color model. The one- and two-bin cut sheet feeders cost $399 and $699. OKIDATA, Mount Laurel, N.J. CIRCLE **271**

Educational Micro

Unisys offers Multiuser instructional micro for the classroom.

Unisys Corp. is now marketing in the U.S. an enhanced version of the Icon Series instructional microcomputer systems that have been marketed since 1984 in Canada, where 20,000 systems are installed. The systems are geared toward classroom instruction in grades K through 12.

The Icon Series is based on an Intel 80186 microprocessor with up to 1MB of memory, CGA color graphics, built-in speech synthesis, and a track-ball pointing device. Up to 32 workstations can be connected via a hard disk file server. Icon workstations use QNX, a proprietary operating system developed by Quantum Software Systems, Ottawa, Ont., which supports multilingual, curriculum-oriented languages such as BASIC, Pascal, C, FORTRAN, COBOL, APL, and Logo. Unisys claims that 150 courseware packages are available and 100 are currently under development. The company says its tests have shown that many MS/DOS-based packages run on the Icon Series. Multitasking features of the Icon allow students or teachers to run multiple tasks simultaneously.



Icon Series workstations are priced at $1,895 each. UNISYS CORP., Blue Bell, Pa. CIRCLE **272**

Superminicomputer

Edge offers systems for oems, systems integrators, and vars.

Edge Computer has introduced its Edge 1000 family of superminis targeted at value-added resellers and systems integrators using Motorola 68010 and 68020 microprocessors to develop systems for compute-intensive applications. A dual processor version, which can accommodate 512 users, offers 11MIPS of power and a single-processor version offers 6MIPS.

The Edge 1200 has 8MB of main memory, 337MB of hard disk storage, and the GSX Unix operating system (AT&T Unix V.2). The Edge 1000 accommodates 256 users. The systems are being offered by Edge at both the box level, which includes the operating system but no peripherals or skins, and the systems level, which also includes application software. The computers can also be custom engineered.

The 32-bit processor on both models is a CMOS VLSI implementation of a Harvard supercomputer architecture that Edge says simultaneously fetches instructions and operands over multiple 32-bit buses to achieve a bandwidth of 64 bits. The models offer 8MB to 64MB of eight-way 32-bit interleaved memory with error detection and correction. Industry standards supported by the Edge 1000 family are VMEbus and Multibus, SMD for eight-inch drives, AT&T Unix System V, Ethernet, TCP/IP, Sun NFS, and SNA. Languages supported are ANSI FORTRAN 77, C, COBOL, and ISO Pascal.

The Edge 1200 is priced at $128,000, and the Edge 1100 is priced at $104,000. EDGE COMPUTER, Scottsdale, Ariz. CIRCLE **274**

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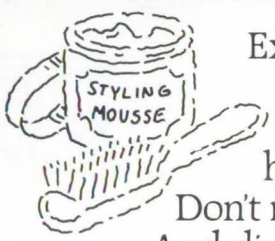

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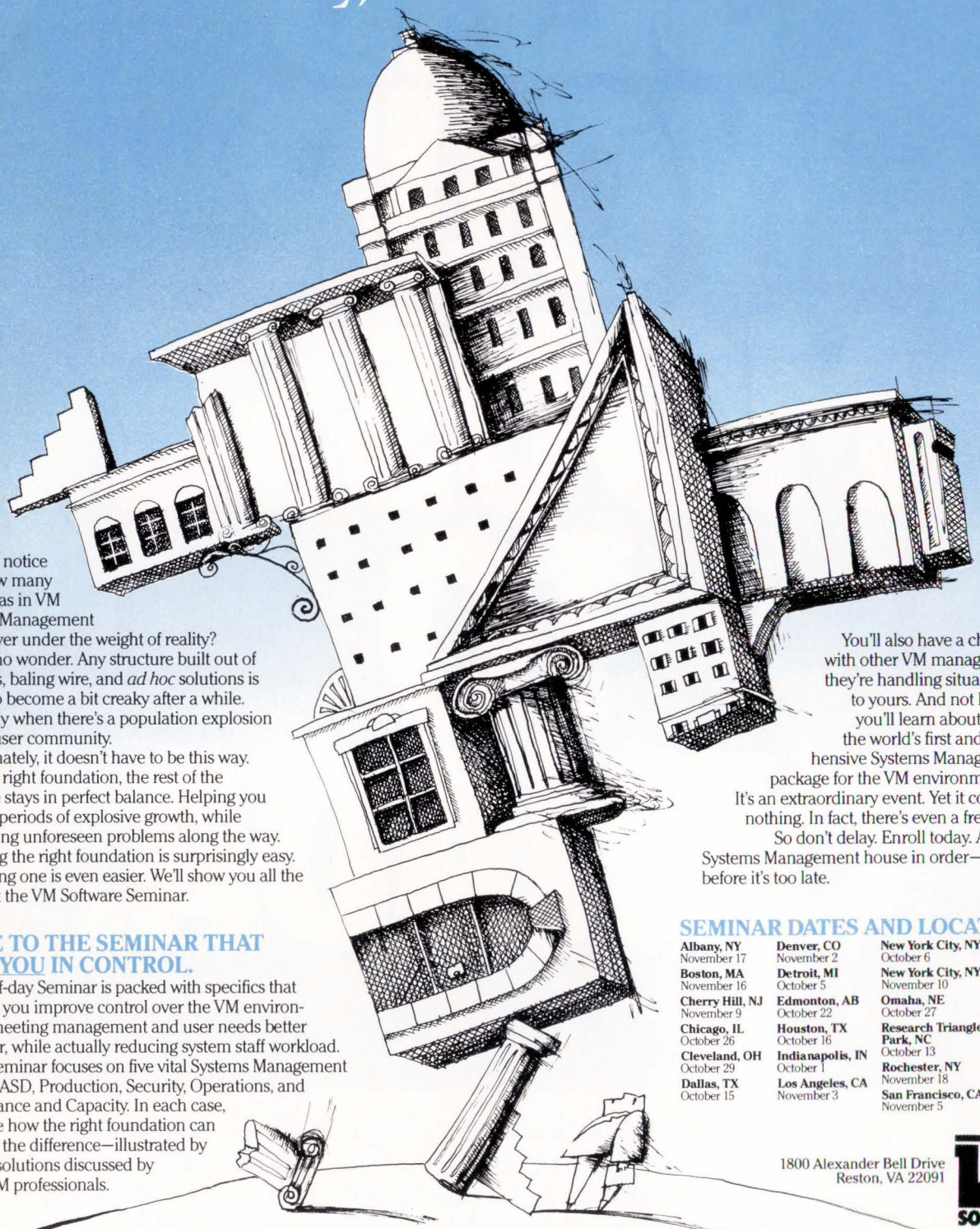

Ever notice how many great ideas in VM Systems Management topple over under the weight of reality?

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Chicago, IL October 26	**Houston, TX** October 16	**Research Triangle Park, NC** October 13	**Tampa, FL** October 14
Cleveland, OH October 29	**Indianapolis, IN** October 1	**Rochester, NY** November 18	**Toronto, ON** October 7
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UPDATES

NETWORKS ARE PLAYING a bigger role than ever in computer operations throughout corporate America, and in the same way that computer installations need to be maintained and serviced, so, too, do networks. Network vendors are beginning to offer network service programs that supplement a company's in-house network support staff and include everything from technical consulting and training to performance analysis.

Paradyne Corp., Largo, Fla., began offering its NetCare program last fall. The program offers temporary or long-term service for planning, implementation, and/or day-to-day care of networks. While NetCare customers must maintain their cpus and front-end processors themselves, NetCare specialists provided by Paradyne monitor the network, recommend preventive maintenance, report on network performance, and supervise any modifications to the network, based on performance analysis. The program also manages non-Paradyne equipment, makes recommendations for its maintenance, and verifies repairs.

NetCare is available both on-site and as a remote service. The remote program allows customers to dial into the service, which, claims Paradyne, is particularly popular with smaller sites because it requires little staffing and therefore less expenditure.

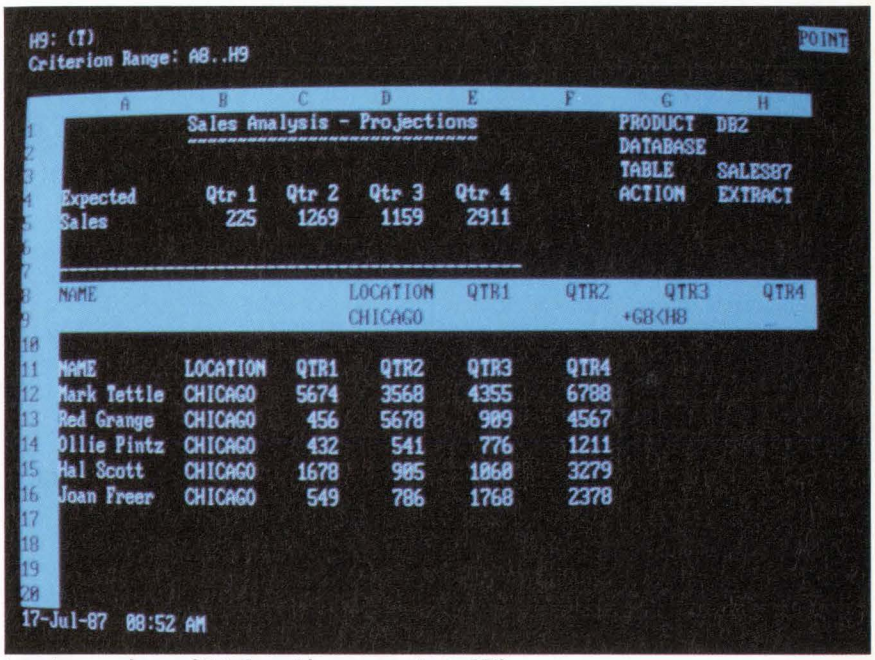
Ray Nix, NetCare marketing manager, says the price of the service varies from less than $1,000 per month to over $10,000 per month, depending on the services chosen and the size of the network.

BBN Communications Corp., Cambridge, Mass., which has been expanding its product line by offering low-end network management products, does not have an umbrella program such as NetCare. But BBN does offer customers a variety of services, including a network training center, which provides two- to three-week courses on controlling BBN networks. The company also offers a service that provides capacity and performance analysis using artificial intelligence techniques.

Pactel Spectrum Services, Walnut Creek, Calif., which is solely a network service company, offers a remote service for network implementation and maintenance. Prices range from $15,000 to $350,000 per year, depending on network size and the types of services purchased.

For more information on network management services, see "Network Management: Keeping the Connection," p. 98.

SOFTWARE



Lotus's new release of T-A-C provides a connection to DB2.

Lotus Upgrades Application Connection

New release of T-A-C includes connection to DB2 and expanded pc architecture.

BY THERESA BARRY

According to Lotus Development Corp., no module of The Application Connection, or T-A-C, was left untouched in this first, major upgrade of the mainframe/micro software connection product that was originally introduced last summer. Both the mainframe and pc modules of T-A-C have had functionality added.

T-A-C consists of mainframe and micro software connecting pc software applications data, micro-to-mainframe links, and mainframe business application programs. The product now provides a connection to IBM's mainframe DBMS, DB2. On the pc side, Lotus has expanded the architecture so that users can stay in the pc environment while accessing mainframe data. Thus, from within the context of Lotus's 1-2-3 or Symphony and Ashton-Tate's dBase programs, users can access mainframe data, manipulate it, and return the updated data to the mainframe. This means less time and money spent teaching pc users mainframe languages.

New control facilities will enable a systems manager to limit the number of records individual users can extract from mainframe databases.

T-A-C runs under both VM/CMS and MVS/TSO on IBM and compatible mainframes. Mainframe software programs now supported are DB2, Focus, Nomad2, RAMIS, SAS, and SQL/DS. The MVS version is available now for $13,000; the VM version is scheduled for availability in the fourth quarter and is priced at $10,000. Micro modules are priced from $100 to $200. LOTUS DEVELOPMENT CORP., Cambridge, Mass. CIRCLE **261**

Three Upgrades

New Generation Software fine-tunes three financial packages.

New Generation Software has come out with new releases of its Financial Reporting & Management, Accounts Payable, and Accounts Receivable software for the IBM System/38.

Financial Reporting & Management is a general ledger program enhanced to allow users to perform budget analysis, update the organizational reporting structure, and design custom reports. It can be installed as a standalone module or integrated with NGS's other modules. The license fee is $25,500.

NGS's Accounts Payable software for S/38, which features an integrated report and check-writing capability, has been enhanced to give users additional reporting, on-line inquiry, check processing, and 1099 vendor maintenance capabilities. The license fee is $15,000.

Accounts Receivable for S/38 features an integrated report-writing application. The new release provides users with additional reporting, improved aging functions, enhanced customer credit reporting, faster statement processing, and streamlined data entry. The license fee is $12,500. NEW GENERATION SOFTWARE, Sacramento, Calif. CIRCLE **262**

80386 Operating System

Santa Cruz Operation ships SCO Xenix 386 and development kit.

SCO Xenix 386 System V Operating System and the SCO Xenix 386 System V Development System for 80386-based, IBM AT-compatibles have been released for oems and vars of the Santa Cruz Operation (SCO). In addition to running on AT-class machines, they run on AT-compatibles with a 386 accelerator card.

SCO Xenix is an AT&T System V.3-licensed version of Xenix, which was developed cooperatively by Microsoft and SCO.

The development system is packaged with SCO CGI, a device-independent graphics development system that includes libraries and device drivers. SCO says it will soon include SCO MultiView, a combined multitasking windowing environment and interface for SCO Xenix System V, and SCO VP/ix, which permits multiple DOS and Xenix applications to be run in the development system concurrently, from the system console.

The OS and the development kit are priced at $695 each. SANTA CRUZ OPERATION, Santa Cruz, Calif. CIRCLE **263**

Sales/Marketing Management

Cincom releases database program for managing product sales data.

Cincom Systems' Omnitrac is a sales and marketing management system featuring a database for information on the sale and service of products.

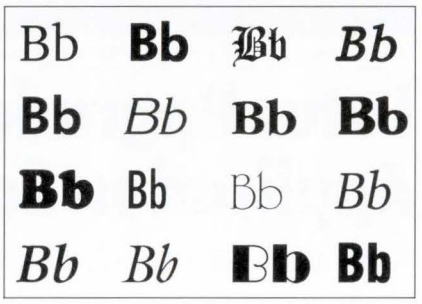
All client information is kept in a central database, which can be used for marketing analysis, direct mail and promotional campaigns, sales forecasting, and territory analysis, according to Cincom.

Omnitrac runs on the IBM XT, AT, and compatibles, on local area networks, and on the DEC VAX. It costs $495 for the pc version and $5,000 to $8,000 for the VAX version; LAN version prices depend on network size. CINCOM SYSTEMS, Cincinnati. CIRCLE **264**

Bitstream Fonts

Package to create fonts and library of fonts is introduced.

Bitstream has released Fontware, a program for creating fonts of any size for most popular printers and screen displays, and Fontware Library, a library of typefaces for microcomputer applications.



Fontware allows users to create any type size their device can produce in a variety of styles. Bitstream has 546 available characters in its international character set. Created fonts can be stored on the user's hard disk. Bitstream claims Fontware provides WYSIWYG capability. Fontware typeface packages can be used with Fontware installation programs and Fontware-equipped devices. Bitstream is offering an installation program for Ventura Publisher and Microsoft Windows applications, and has licensed Fontware technology to 15 hardware and software developers so they can incorporate Fontware into their products.

The Fontware Library will initially offer 80 professional typefaces, including Dutch and Swiss, Century Schoolbook, ITC Souvenir, ITC Galliard, some headline faces, and a newly designed typeface from Bitstream called Charter. Bitstream plans new typefaces for subsequent releases.

Each package includes four typefaces on a 5¼-inch floppy disk. The packages cost $195 each. BITSTREAM INC., Cambridge, Mass. CIRCLE **267**

VAX Command Scheduler

Park Software releases new version of Command File Scheduler.

Version 2.2 of Park Software's Command File Scheduler (CFS) provides control over the scheduling of VAX/VMS command files and is designed to provide a perpetual batch processing schedule. New features include the ability to load existing DCL command files into the CFS scheduler on a line-by-line basis. Departmental usage reports can be created, and now users can be notified via VMS mail when their programs are scheduled or completed. Substitution code that returns a date can, with the new release, accept a formula so that reports can be aged. Multiple database passwords that are based on menus provide additional security. Extended error trapping, microfiche tape creation, and enhanced report distribution are also featured. Prices range from $4,000 to $6,000. PARK SOFTWARE INC., Seattle. CIRCLE **266**

CAE Design System

CASE Technology introduces CAE program with windowing.

The Vanguard Stellar CAE Design System is CAE software that provides a windowed operating environment. According to CASE Technology, the system's graphical shell provides a complete CAE tool set around a common ASCII database, including schematic design system, symbol and layout editor, autorouter, design and electrical rule checker, analog and digital simulators, and a document editor.

On a Sun or DEC MicroVAX platform, the system runs in the existing window system and allows users to select CASE and non-CASE overlapping windows. CASE says Vanguard Stellar provides a shell capability, allowing users of the CASE macro language to configure scripts or command sequences to interface existing software on the Sun, VAX, or pc to the CASE tool.

Vanguard Stellar CAE Design System runs on IBM PS/2 models 50, 60, and 80, and Sun and DEC workstations. The price, depending on hardware configuration, is between $14,900 and $49,900. CASE TECHNOLOGY INC., Mountain View, Calif. CIRCLE **268**

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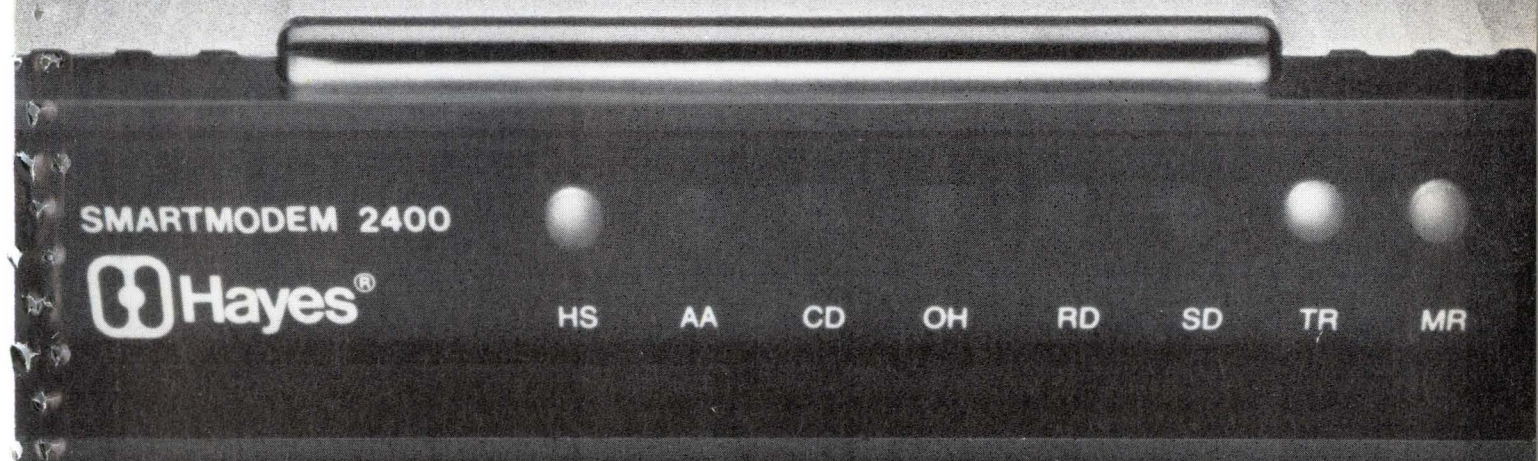

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*Based on estimated retail prices. **Requires external modem.

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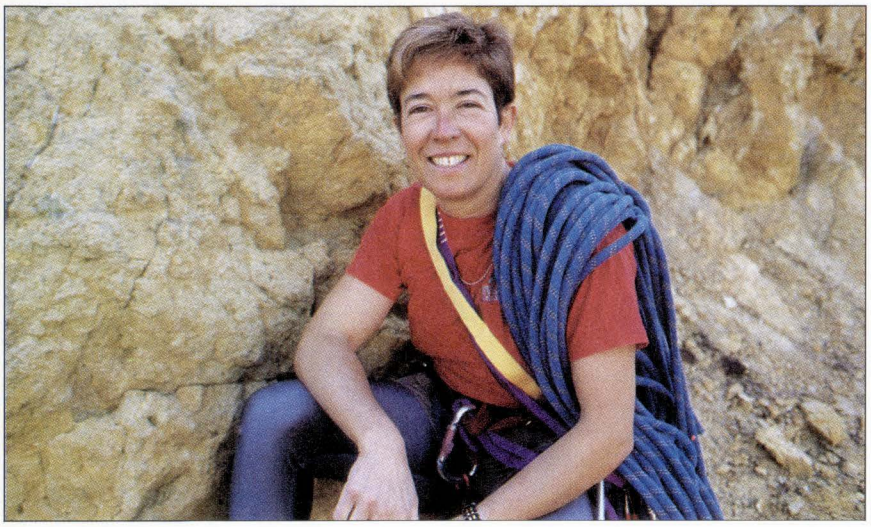
PEOPLE



LAPHAM: After climbing Mount Everest, "I know myself a lot better now."

Scaling Startups, Climbing Mountains

Which is harder, climbing Mount Everest or starting your own computer company? Ask Ellen Lapham, she's done both.

BY JEFF MOAD

Some people think joining a startup computer company is pretty risky business, but to Ellen Lapham it's a piece of cake.

The 44-year-old resident of Portola Valley, Calif., could be considered an expert on risk taking. She was there during the early years of Tandem Computers Inc., a Silicon Valley startup success story, where she experienced the rewards of taking risks. She has also founded two computer and software startup companies of her own.

When Ellen Lapham talks about big-time risk taking, however, she's talking about something other than high-tech startup success or failure. She's talking about climbing mountains. Big mountains. Last August, the diminutive, energetic Lapham became one of only a handful of American women to attempt to climb Tibet's Mount Everest as one of the principal organizers of a 15-person, $300,000 effort to scale the world's tallest mountain.

Lapham started climbing mountains in the early 1970s while an industrial designer for General Electric Co. in Syracuse, N.Y. By the mid-1970s, she says, she realized she had to choose between her career and "becoming a rock climbing bum."

Her career won out—but just barely. She moved to California in 1975 with plans to get involved in what was just then becoming known as Silicon Valley. Mountain climbing was put on hold while she got her MBA from the Stanford University Graduate School of Business. She joined Tandem in 1977 as manager of its internal corporate information systems. Two years later, she started a company of her own. She teamed up with some former Apple Computer Inc. engineers to form Syntauri Corp., and they developed an add-on board for the Apple II that, with software, formed a music composition and education system.

In 1984, Syntauri fell victim to the pc industry slowdown. "It seemed like a good time to go off and climb a mountain," Lapham remembers.

That's just what she did. After making a 20,000-foot climb up Island Peak in the Himalayas in 1985, Lapham eventually hooked up with a group of Bay Area climbers planning a Mount Everest ascent and in need of organizing and fund-raising help. Lapham accepted the challenge, put her startup business experience to work, and in one year helped line up corporate contributions from Tandem, General Electric, Sprint, Gillette, and others.

The difference between climbing a mountain and starting up a company, of course, is evident when the crunch comes. "In a startup project, if I run low on capital I can go out and raise more money," says Lapham. "But if I run out of food on Everest, there's not much I can do about it."

Lapham's group was on Everest for seven weeks. Most of that time, she says, was spent lugging equipment and provisions to ever higher base camps while fighting off the cold and gasping for breath in the thin air. Such conditions are hard on the body, of course, but even more difficult, says Lapham, is the mental challenge posed by the mountain and the by the weather conditions. "Every day, all the time, I was questioning myself, 'Can I do this?' " remembers Lapham.

The group failed to reach the peak when 150MPH winds forced them off the mountain. Lapham says her feelings about the climb have since evolved. Immediately afterward, her impression was "that it was hard work, and it wasn't much fun. It was serious business." Since then, however, Lapham says she has begun to appreciate the climb and the influence it had on her. "I feel I know myself a lot better now," she says, "and I'm willing to give hard feedback to others sooner. In a way, I'm much tougher on myself and others now."

Lapham has decided she would like to go back. But first she has some business to take care of. She recently started her second company, Showcase Systems Inc. in Palo Alto, which is developing what she calls an electronic drafting table. Lapham, who is president and chief operating officer of Showcase Systems, currently is looking for venture financing for the new company. Although more venture capital is available today than there was a couple of years ago, Lapham acknowledges it won't be easy to make her new company fly.

Nevertheless, she has proven that she is not averse to taking risks once in a while. "I don't mind being on the risk side of the continuum because that's where the greatest rewards are," she says. ■

Photograph by John Marriott/Black Star

CALENDAR

SEPTEMBER

Info '87 (14th Annual Information Management Exposition & Conference).
Sept. 29 - Oct. 2, New York. Contact Info '87, 999 Summer St., Stamford, CT 06905, (203) 964-0000.

OCTOBER

OOPSLA '87 (Object-Oriented Programming Systems, Languages, and Applications Conference).
Oct. 4-8, Kissimmee, Fla. Contact OOPSLA '87, P.O. Box 3845, Portland, OR 97208-3845, (213) 645-1082.

Third-Party Maintenance of Computers, Data Communications, and Office Automation Equipment Conference.
Oct. 5-6, San Francisco. Contact Frost & Sullivan Inc., 106 Fulton St., New York, NY 10038, (212) 233-1080.

Decision Support Technology Conference.
Oct. 5-7, Boston. Contact Decision Support Technology Inc., 51 Church St., Boston, MA 02116, (800) 843-3263 or (617) 482-3596.

AVIOS '87 (Voice Input/Output Systems Applications Conference).
Oct. 6-8, Alexandria, Va. Contact Leon Lerman, AVIOS, P.O. Box 60940, Palo Alto, CA 94306, (408) 742-2539.

Electronic Messaging '87.
Oct. 8-9, San Francisco. Contact Electronic Mail Association, 1919 Pennsylvania Ave. NW, Suite 300, Washington, DC 20006, (202) 293-7808.

Scan-Tech '87 (Automatic Identification Show).
Oct. 13-15, Kansas City. Contact AIM, 1326 Freeport Rd., Pittsburgh, PA 15238, (412) 963-8588.

CHEMCOM '87.
Oct. 13-16, New Orleans. Contact Devon Buckler, Synthetic Organic Chemical Manufacturers Association, 1330 Connecticut Ave. NW, Suite 300, Washington, DC 20036, (202) 659-0060.

Systems '87 (Computers, Peripherals, and Software Show).
Oct. 19-23, Munich. Contact Kallman Associates, 5 Maple Ct., Ridgewood, NJ 07450-4431, (201) 652-7070.

Looking Back

TWENTY YEARS AGO IN DATAMATION: "I anticipate that 1970 will be the beginning of the era of 'vertical markets' in the computer industry, when systems—computers, peripherals, communications, and software—are tailored to specific applications." (From "The DATAMATION Decade," by Lowell Amdahl, September 1967, p. 26.)

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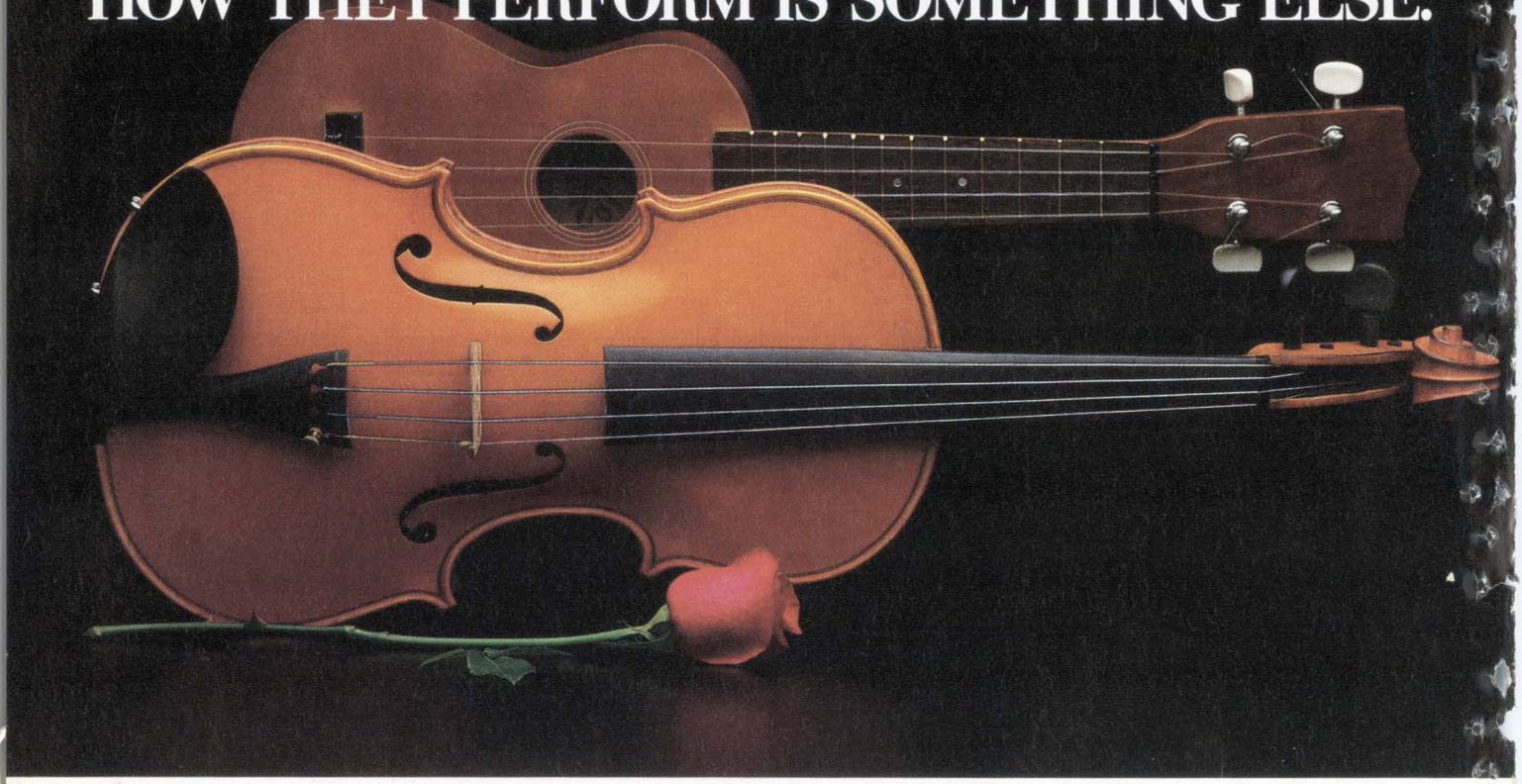
MOST DBMS PRODUCTS ARE BUILT ALONG THE SAME LINES. HOW THEY PERFORM IS SOMETHING ELSE.



When you first look at relational DBMS products, the similarities are obvious. They're all built around SQL. Most include 4GL tools. They all have an impressive range of features and functions. And they all claim to deliver performance.

But once you get your hands on these products, the differences are dramatic. It's the craftsmanship in designing, building, and assembling quality components that differentiates a master's instrument from a beginner's.

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