

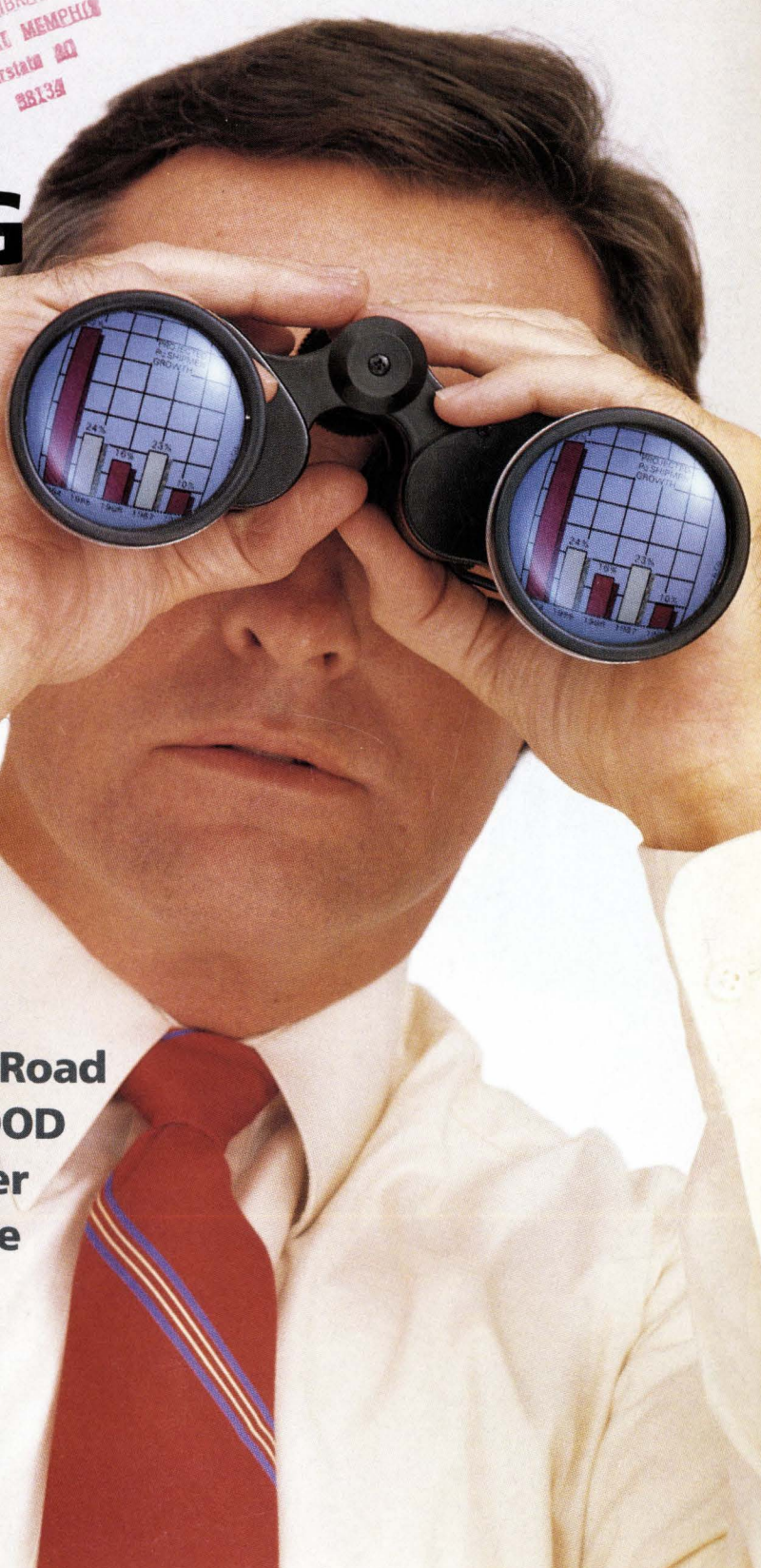
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THE PURCHASING OUTLOOK

**Future Seems Cloudy
for PCs, Bright for AS/400,
in Mini/Micro Survey**

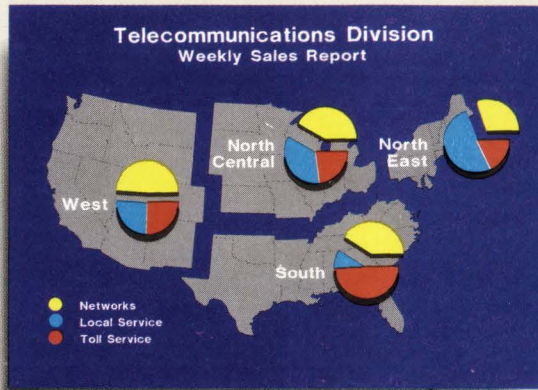


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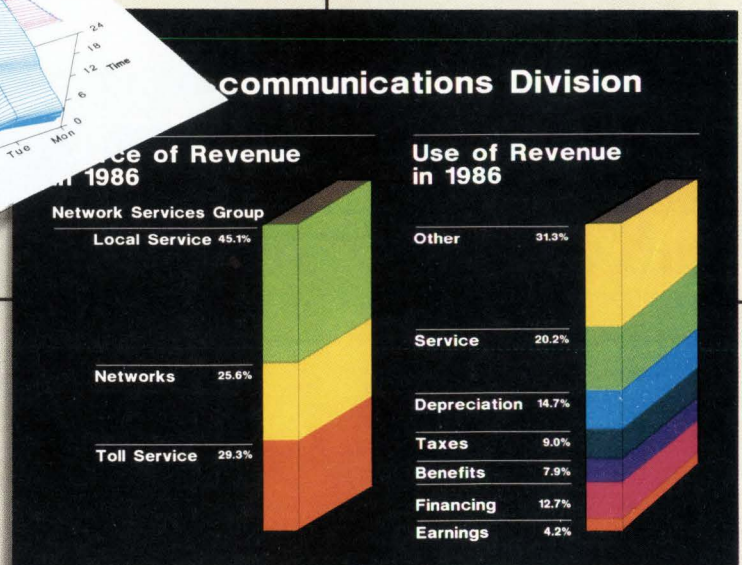
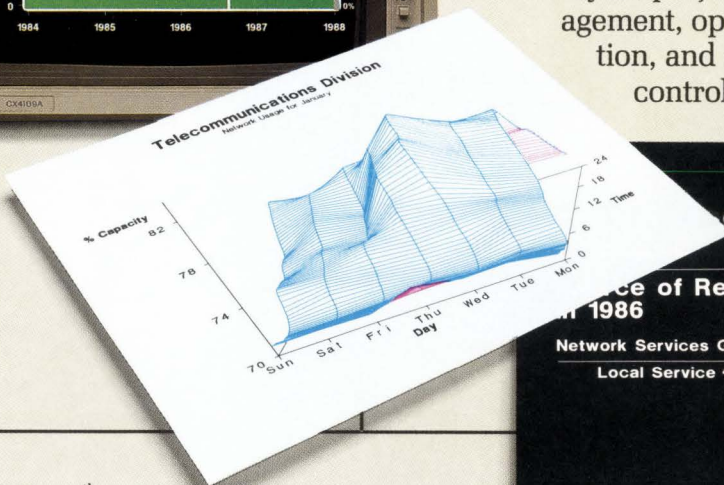
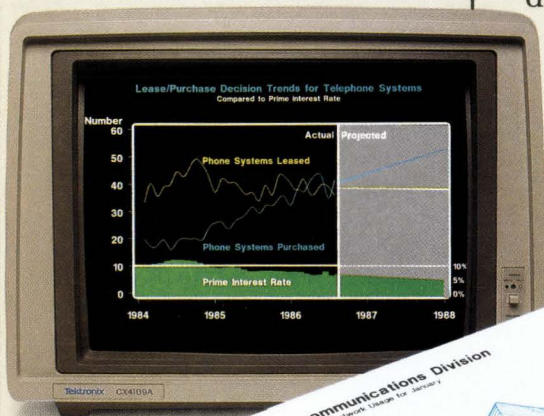
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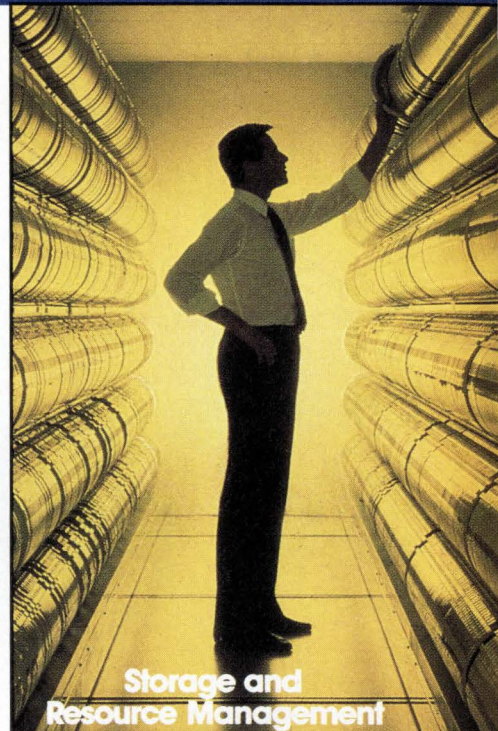


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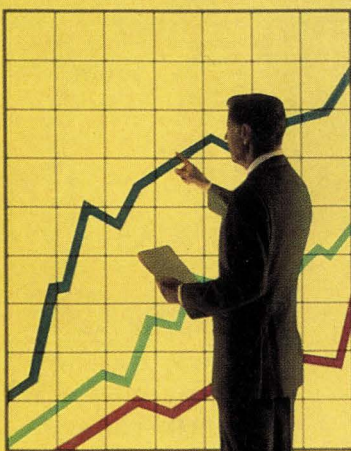
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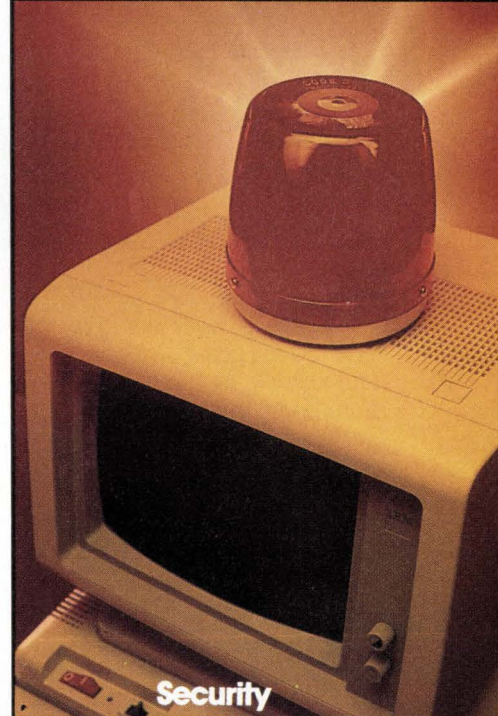


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IL Chicago	Oct 11, Nov 16, Dec 13
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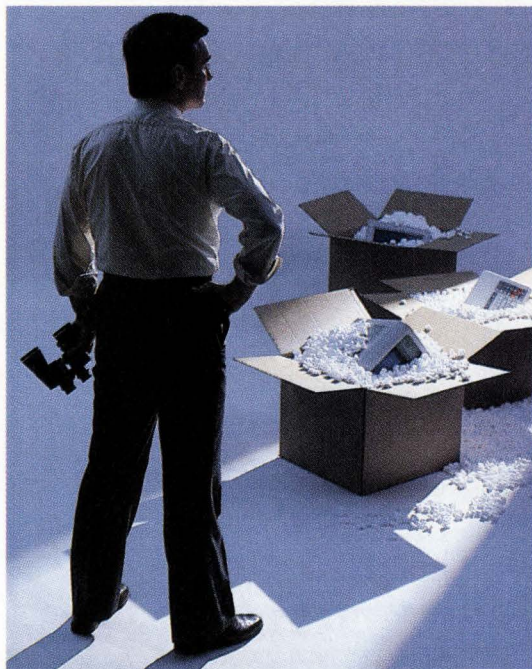
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COVER STORY



The Purchasing Outlook: The Annual Mini/Micro Survey 18

BY GARY McWILLIAMS The AS/400 bolsters the prospects for minicomputers, while the transition to the 386 is just one of the factors clouding the horizon for PCs. For the past seven years, the one certainty in the DATAMATION/Cowen & Co. annual survey of mini/microcomputer purchase plans was the yearly double-digit growth in PC spending and shipments. No more. PC purchases are falling. **A Surge for IBM Across the Board 20**
Survey Methodology 22

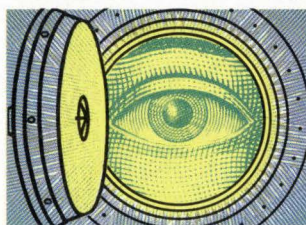
Cover Photography by Walter Wick

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BY JEFF MOAD So far IBM's CSP 4GL has not provided an efficient means of migrating applications between architectures. Big Blue is trying to change that.

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PCs

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BY MARK HALPER Portable computer sales are soaring. More than a million will be shipped in 1988. Meanwhile, the mighty midgets are remaking sales and accounting, and work is following executives to their homes and hideaways.

A Compendium of Top Portable Computing Vendors 57

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Top Drug Firms To Digitize Documentation 63

BY SCOTT C. McCREADY The biggest pharmaceutical firms have recognized the value of digital document processing systems in reducing their R&D cycles and FDA approval time. Could it speed new drugs into the hands of the sick?

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What's Ahead for IBM On-line Systems 69

BY JAN RYDAL Evidence is emerging that the major products found in the IBM on-line systems environment are converging toward a more uniform architecture in which each product plays the role it is best suited to play.

An Emerging Niche Market for the CICS Environment 70

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Banks, Network Providers Eye EDI 77

BY GARY McWILLIAMS Computer giants ADP, AT&T, DEC, and IBM are exploring new service offerings that will tie banking services to business networks.

STANDARDS

Document Interchange Reigns at DOD 81

BY SUSAN KERR The computer aided acquisition and logistic support program, known as CALS, promises to streamline the monolithic paper flow involved in government military equipment purchases.

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Shaping Up Your Data Center 89

BY MICHAEL FLEISCHER AND SAMEER PATEL This fourth in a series of articles from McKinsey & Co. shows companies how to run data centers that are both quality- and cost-conscious.

SECTORS

FINANCIAL SERVICES

Industry-Specific Advice, Solutions, Applications 100-1

EDITED BY LINDA RUNYAN The first of a series of special editions reporting on products, services, and methodologies for specific industrial sectors. This issue's *Sectors* is for IS and business unit managers in banks, brokerage firms, insurance companies, real estate firms, and other financial institutions. Later editions will serve managers in manufacturing, government, and the retail/wholesale trade. (Not included in all issues.)

SPECIAL SUPPLEMENT

BUDGETS

Industry-by-Industry IS Spending Survey

A DATAMATION REPORT This year, IS's cut has risen to 1.9% of revenues, and the total of the budgets for information systems at the top 120 companies in 12 industries will be \$32 billion (see accompanying supplement).

Good Minds Hard at Work

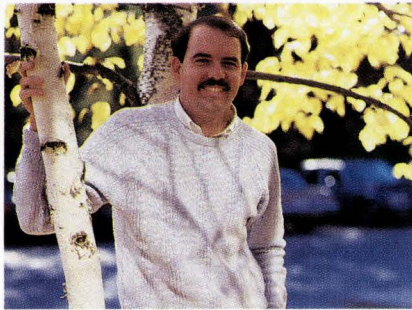
This issue, known annually as our mini/micro report, might be more properly named our Mini/Micro/McWilliams edition. In a period of three weeks, Boston Bureau Manager Gary McWilliams somehow managed to span the West Coast and East Coast for us, interviewing Oracle Corp. executives at their Belmont, Calif., headquarters one week, and sitting through an intense four days of CEO presentations at our annual mini/micro conference in Boston the next. Along the way, he found time to track down several of Oracle's customers and competitors as part of his profile, "Oracle's Olympian Challenge" (p. 31); analyzed a couple hundred pages of survey data from our poll of 5,000 PC, workstation, and minicomputer users before authoring our 1988 Mini/Micro report (p. 18); and touched bases with AT&T, ADP, DEC, and IBM and several of their customers about what they were doing in electronic data interchange for his "Banks, Network Providers Eye EDI," (p. 77).

Whew!

Not that McWilliams' colleagues were resting on their laurels, mind you. San Francisco Bureau Manager Jeff Moad, who's been following IBM's Systems Applications Architecture with the same fervor that Harvard's Ted Levitt approaches marketing issues, discovered that few users and third-party software developers are using CSP despite IBM's promise that applications developed with the language would someday be able to migrate easily among any of IBM's chosen hardware platforms—370 machines, the AS/400, or the PS/2 family. In "CSP: The Weak Link in SAA" (p. 49), one user even told Moad that CSP was far from being the industrial strength 4GL needed by his organization.

San Jose Bureau Manager Susan Kerr, meanwhile, crossed into Washington Bureau Manager Willie Schatz's territory in pursuit of a communications story on how the Department of Defense was using technology to reduce the amount of paperwork required to do business with DOD. That's right, a cutback at Defense without a politician's whimper! "Document Interchange Reigns at DOD" (p. 81) details the agency's efforts to implement its computer-aided acquisitions and logistics support (CALs) program—must reading for any government contractor or for any other manufacturer trying to streamline its communications with key suppliers. Schatz, by the way, was on a three-week pass from government duty, spending his time preparing a status report on computer-integrated manufacturing, the subject of an upcoming cover story.

Two additional stories that merit your attention came from external resources. Mark Halper, a well-known journalist in electronics circles lapped up all the information he could find on laptops, finding that the mighty midgets are remaking the sales and accounting professions in "Portables Get Raves on the Road" (p. 55). And Jan Rypdal, managing director of FD Software in Norway, cleared up what's going on in the CICS domain in "What's Ahead for IBM On-Line Systems," (p. 69).



MARATHON MAN MCWILLIAMS

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OS?

Regarding Brad Schultz's article "VM: The Crossroads of Operating Systems" (July 15, p. 79), I appreciated reading such a fine article on VM. I wonder, however, why you call VM itself an operating system, when it is, as you say, a hypervisor or virtual machine monitor. For example, CMS is a (single-use) operating system.

Further, I question whether PC/DOS or Macintosh OS simulation is a "virtualization" in the sense of Goldberg's notion of virtualization as described in the article "Formal Requirements for Virtualizable Third Generation Architectures" by Poppek and Goldberg in *Communications of the ACM* (vol. 17, pp. 412-421).

Herman J. Weegenaar

State University, Faculty of Economics
Groningen
The Netherlands

A Simple Approach

"Motivating IS Personnel" (Sept. 15, p. 59) was interesting reading, but it takes a rather complicated approach to an issue that can be dealt with in some simple ways, at least where I work. Help IS personnel get the job done. Don't lean on them to work in artificial ways, like dress and personality. I want to produce a quality systems, not win an image contest or political struggle.

Treat IS personnel like adults. Assume they are responsible.

I am in IS because systems development provides internal satisfaction. But it would help if the prevailing practice were not to say nothing if all goes well, but if something goes wrong, to pass out blame.

Motivating IS personnel does not need to be a complex science. Some common sense and respect for us as professionals would go a long way by itself.

John Duncan
Colton, Calif.

EDI and X.400

Thank you for publishing the article "EDI in Europe" by James Etheridge (Oct. 1, p. 44-15). Many of us who are active in implementing EDI are pleased to see that EDI is now sufficiently well known to merit articles in *DATAMATION*.

Your article did not mention the relation of EDI to the X.400 OSI standard. Many EDI experts in Europe believe that X.400 will become in the future the preferred method for transferring EDI data. The CCITT has just convened an interim working group that is chartered to propose extensions to the X.400 that will facilitate EDI.

The TEDIS program (Commission of the

European Communities—DG XIII) has recognized the potential of using X.400 for EDI exchanges, as have industry groups such as CEFIC and EDIFICE. In addition, several companies, including Hewlett-Packard, have initiated, or are about to initiate, EDI projects based on the use of X.400 to transfer messages. Many believe that the store-and-forward nature of X.400 makes it more suitable for EDI than OSIFTAM.

Richard Hill

EDI Program Manager—Europe
Hewlett-Packard
Geneva, Switzerland

Wrong!

Just to set the record straight, the chart of 25 top computer schools in "Behind the News: The New Maturity of Computer Science" (Sept. 15, p. 37) contains an error. As any standard directory of colleges and universities will indicate, Washington State University is in Pullman, Wash., not Seattle. The University of Washington is in Seattle.

Larry Olszewski

Reference Science Specialist
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First, thanks to Mr. Olszewski for correcting our mislocation. Others have telephoned or written regarding the chart "Twenty-five Top Computer Science Schools" suggesting it omitted some high-ranked schools. No question about it. The chart was deliberately not called "The Twenty-five Top Computer Science Schools." It should serve instead as a guide to some of the top schools of offering Computer Science degrees.—Ed.

ACCESS

There are several ways to use *DATAMATION* beyond just reading it. You can call on our experts—the editors who specialize in certain fields are eager to hear of your experiences in and thoughts on how to manage information technology resources. You can contribute articles to the magazine by supplying us with manuscripts for our review. You can learn how competitors and colleagues are using software and systems from our research department, which can provide details of both published and unpublished studies on various aspects of technology usage. And you can always voice your opinion by submitting a letter to the editor—electronically or by post.

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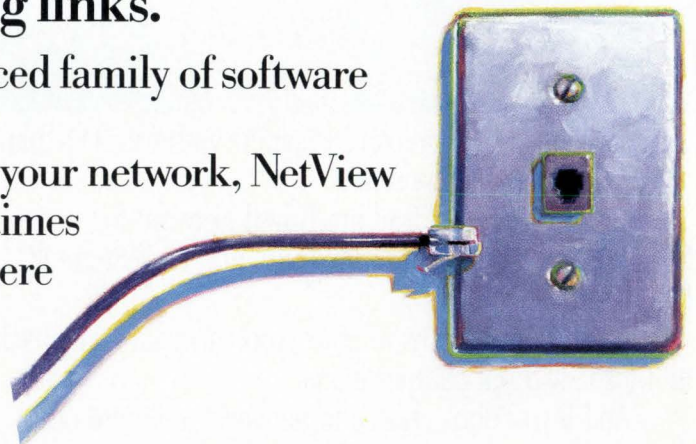
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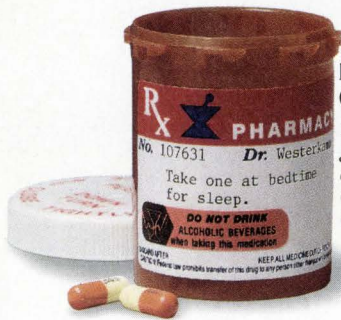
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CA's Datacom Plans

ATLANTA—**Computer Associates International Inc.**, Garden City, N.Y., is expected to issue a position paper today on plans for its two DBMSs—Datacom/DB, acquired with its recent purchase of **Applied Data Research Inc.** (Princeton, N.J.); and its own CA-Universe. About 1,700 Datacom sites have been anxiously awaiting the announcement, especially after CA decided to delay indefinitely the original Nov. 30 delivery date of Datacom's release 8.0. CA is expected to add some functionality, such as referential integrity, to Datacom. One possibility is that it may put forward Universe for prototyping and Datacom for production work. The company also told users at the recent Cadre users meeting here that it will issue a position paper on the 4GL Ideal as well. But CA officials made it quite clear that support for Datacom is a top priority—even if it means drawing on development staff for help. A CA official says support for the product has "taken a back seat to development" and that there are now some "60 problems in the queue." CA will also review pricing strategy for the entire ADR product line, which, according to the official, differs significantly from CA's. Also in line for careful assessment are ADR's development projects, many of which, the official asserts, "were off the wall." One project for a CASE-like data modeling tool called Depictor is already on hold.

Wide Horizons For Ideal

ATLANTA—Meanwhile, CA will have much to consider as it reviews ADR's development plans, particularly for Ideal. The ADR development folk have much on the proverbial wish list. Long-range plans for Ideal include support for intelligent workstations and support for SQL/DS. Under what it calls "long-range plans of interest," the list has such items as support under IMS/DC, a full-panel windowing capability and nonstop CICS. And in the category called "blue skies" or "futures" is support for such midrange platforms as VAX, Unix, and the AS/400.

Delay for A-T DBMS

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Brazilian Deal For IBM

SÃO PAULO—There has apparently been a breakthrough in IBM's approach to the protected information systems market in Brazil—and users could be the big winners. It seems that for the first time, IBM has agreed to allow a Brazilian company to market and partially manufacture some of its products, and has signed a technology transfer agreement that will allow Brazilian vendor **SID Informatica** to market its 3725 and 3745 communications controllers in Brazil. Until now, Big Blue has turned its back on such technology transfers. As a

result, the government has kept the IBM boxes out of the country while allowing vendors such as NCR Comten access to Brazil's large market through local partners, which meant higher prices and fewer choices for users (see "The Plight of the Brazilian User," Nov. 1, p. 30).

Super Results For Convex

RICHARDSON, TEXAS—Is **Convex Computer Corp.** on a roll or what? As if the company's record third quarter revenues (up 50% over last year's third quarter) and profits (up 54% over this year's second quarter) weren't enough, the minisuper maker will be the only vendor making a product presentation at this week's IEEE Supercomputing '88 conference in Orlando, Fla. Steve Wallach, vp of technology, promises to knock 'em dead with what he calls a blow-and-go presentation. "We had to go through an unbelievable amount of screening by the academic committees to make sure this wasn't going to be a market presentation," Wallach says. "I'll just tell them the facts." The facts, according to Convex, are that it has soared far above the minisuper peasants. "Our real competition is **Cray, IBM, and DEC**," says Convex president Bob Paluck. "We see the other minisuper makers only for sport. They're fun to play with, and our marketing is going to reflect that."

Shape Up Or Ship Out

SAN FRANCISCO—Shipping giant **Matson Navigation Co.** here has apparently decided to make big changes in its information systems operations. The company is revamping its core business systems, which will now include IBM 3090 mainframe technology plus VMXA, DB2, Supra, Easytrieve, and Mantis development tools. And, at the same time, Matson is making changes in its top IS management. Out is MIS vice president Dave Dawson, and filling in temporarily is computer services director Jerome Hyman.

Hands Across the Water

EL SEGUNDO, CALIF.—There is at least one U.S. systems integrator that seems to have its eyes trained on the other side of the Atlantic. That would be **Computer Sciences Corp.**, which has quietly signed a technical and marketing exchange agreement with **British Telecom**. CSC will help British Telecom provide facilities management, financial application development, and other services to customers primarily in Europe.

No New Zenith Laptop Yet

GLENVIEW, ILL.—With Compaq Computer Corp., Houston, entering the laptop market, and four other manufacturers recently announcing new laptops (leading some industry pundits to label the month of October "Laptoberfest"), many industry watchers have been waiting for **Zenith Data Systems** to make some noise with a new laptop of its own. Zenith has been extremely successful in the laptop market, even to the point of overshadowing its more basic PC products, company insiders say. But don't expect any new laptops from the company just yet. Zenith will probably wait until March,

when it may announce a new product at the Hannover industry trade show in West Germany.

The Sun Never Sets

SunOS is running slightly behind schedule. Originally, Sun said phase 1 of the project—upgrading SunOS to comply with the SVID source-level interface standard—would be available by mid-1988. The company later said better make that the end of 1988. Now, Sun is telling users not to expect the SVID-compliant SunOS before the end of 1989. Sun says that's because it decided to hold SVID compliance for the next planned release of SunOS, which will also include some new hardware drivers, an improved mail tool, and international support. Sun and AT&T are still hoping to meet their deadlines on phase 2 of their joint development project. The Unix/SunOS merge was originally targeted for release sometime in 1989. AT&T is now promising users the merged Unix System V/SunOS in the second half of next year.

Secure System Project

Defense Trusted Computer System Evaluation Criteria (TCSEC). The secure implementation, built over **Digital Equipment Corp.**'s Ultrix operating system, is targeted to pass the so-called B2 classification, the third most secure implementation recognized by DOD.

Manual Beats On-line

next two years to set up innovative pilot and demonstration projects. But the on-line database industry has a long way to go, according to the results of a recent survey by the **British Library and Scientific Documentation Center**. The survey showed that on-line searching produced only 5% of the possible references on a subject and was the most expensive search technique. While card indexes and manual methods were much slower, they did significantly better with the number of references.

Soviets Shop for Micro Deals

between the **Soviet Radio Ministry, Innovation International** (Boston, Mass.), and **Innovation Computer Corp.** (Cleveland, Wis.) to set up a microcomputer assembly plant in the USSR. Meanwhile, **Televideo Systems**, Sunnyvale, Calif., hopes to set up a similar joint venture

MOUNTAIN VIEW, CALIF.—This probably won't come as a jolting shock to most users, but it looks like the much ballyhooed multiphase joint **Sun-AT&T** effort to merge Unix System V and

EMERYVILLE, CALIF.—Relational DBMS vendor **Sybase Inc.** is reportedly in the final stages of a joint project with **TRW** to develop a secure version of its system that can pass the Department of

BRUSSELS—In an effort to improve the products and expand the markets for the on-line database industry, the **European Commission** has promised around \$35 million over the

MOSCOW—The Soviet Union is rapidly forging links with Western micro suppliers in a bid to meet its target of 1.1 million micros in use by the end of 1990. A letter of intent has been signed

with Moscow-based company **Kompan**. Italy's **Olivetti** is also getting in on the act with a contract to build a factory near Leningrad to produce numerical control systems.

Tokyo Flu

Japanese occurrence of the phenomenon a month ago. It is now gathering a team of software developers—backed by \$250,000—to come up with a vaccine program for Japanese users. **NEC**, which was hit by a virus on its PC-VAN, has set up a similar project.

Inmos Chips Used

innovative Transputer line of processors. Sources close to the Bristol company reveal that **IBM** is now using the Transputer in two internal research projects: one, at Yorktown Heights, N.Y., is harnessing the 10MIPS power of the Transputer in supercomputer development; and another, at **IBM Japan**, where the British processors are being built into industrial control systems.

Wang Pushes VS Videotex

considerably more common. In France, for example, there are now over 4 million videotex users. The Wang system supports the Prestel, Teletel, and CEPT standards.

That's A Contract!

project sometime in the next few weeks. The contract, which covers a number of taxation systems throughout the country, could be worth around \$500 million dollars altogether. **IBM** and **Digital** are fighting it out for a slice of the action, along with **Unisys** and local services company **Computer Power**.

Raw Random Data

on-line buddy searches. The California memorial is to be unveiled here on Dec. 9, and EDS and other vendors such as **Pacific Bell** are building a special system to handle a database that could account for upwards of 70,000 California veterans' names. Veterans at the unveiling on state capitol grounds will be able to access EDS's data processing center (also in Sacramento) from dozens of terminals to find the whereabouts of war buddies.

TOKYO—The **Japanese Ministry of Trade and Industry** (MITI) is getting panicky about computer viruses after the first

BRISTOL, ENGLAND—U.K. semiconductor company **Inmos**, which supplies graphics chips for IBM's PS/2 range, is hoping to extend its deal with the Armonk giant to cover other models of its

BRUSSELS—Watch for **Wang** to launch multistandard videotex support for its VS range in the U.S. next year. Two U.S. companies already have the system on trial. The company has just re-

SYDNEY, AUSTRALIA—The **Australian government** will announce the winner of its largest-ever systems integration

To celebrate the creation of a California Vietnam Veterans' memorial, **Electronic Data Systems Corp.**, Sacramento, and others are creating a new subset to on-line applications:

“Adventure is the result of poor planning.”

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THE PURCHASING OUTLOOK

The new Datamation/Cowen & Co. 1988/89 Mini-Micro survey reveals a cloudy horizon for PCs; but IBM's new AS/400 will bolster the prospects for minicomputers overall.

BY GARY McWILLIAMS

For the past seven years, the one certainty in the DATAMATION/Cowen & Co. annual survey of mini/microcomputer purchase plans was the yearly double-digit growth in PC spending and shipments. No more. PC purchases are falling, knocked off course by the crosswinds of operating system and applications software changes and the rising demand for local area networks.

According to an extensive poll of 5,257 DATAMATION readers conducted in July and August, PC unit shipments will fall by 5%, the first decline recorded since readers began reporting their purchase plans in the late '70s. The decline compares with a 21% unit shipment growth projected in 1987. In dollars, a modest 10% growth rate is forecast, down from 23% forecast by survey respondents in the prior year.

In some ways, the PC now appears to have as many gray hairs as the minicomputer. The abundance of new PC users that was once seen entering the survey population is no longer. In fact, the rate of first-ever PC installations among this year's survey group equals that of the mature minicomputer arena.

The relatively slow transition to more powerful PCs and software suggests another reason for the slowdown in buying intentions. Respondents' purchases of 32-bit IBM PS/2 models, although growing, make up less than a fifth of the coming year's total PS/2 acquisitions. By far, the mainstay PC applications also continue to be those packages that first rallied around the original IBM PC. That old faithful, word processing, remains the most widely used PC application. Taken together, the two factors may suggest that the new generation of software to take advantage of the 32-bit technology has not yet emerged. Two current examples are the delays in Lotus's 1-2-3, release 3, and Ashton-Tate's dBase IV.

As this year's survey results illustrate, new gains for both the PC and minicomputer may now depend largely on replacement plans. The driving force in

that regard is IBM's AS/400. Announced just prior to this year's survey, the AS/400 has rocketed to the lead spot in respondents' anticipated minicomputer purchases both in unit volume and dollar value. And the effect on the overall minicomputer market has been telling. Respondent purchases promise to send overall minicomputer buys up 15.3% in dollars for the 12 months ending June 1989—topping last year's projected 14.4% increase among the survey population.

Minicomputer shipment revenues, however, will rise only 8.5% when AS/400 purchases are normalized to last year's Systems/3X revenue level. In that light, minicomputer growth overall continues at the single-digit level first set in the 1986 survey.

Again this year, new applications are twice as likely to be hosted on PCs and workstations for both office/MIS and scientific/engineering/factory applications. The shift away from minis in the office has leveled off,

suggesting that for at least this year IBM's AS/400 and Digital Equipment Corp.'s MicroVAX have stemmed further PC/workstation inroads there. In the technical arena, workstations are still taking new applications away from minis.

The strong showing by the AS/400 promises to overshadow DEC's midrange gains. Even though in the last 18 months IBM garnered about 21% to Digital's 37% of minicomputer purchase dollars, IBM pulls abreast of DEC in new purchase plans. Each looks to gather about a third of the \$860 million respondents plan to spend on minis in the 12 months ending July 1989. For DEC, a revitalized IBM and lingering problems with its resellers suggest the bloom may be off the rose in Maynard.

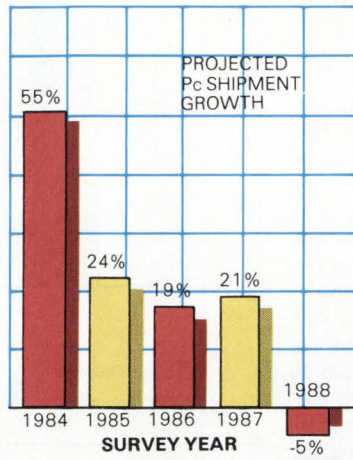
Neither DEC nor other minicomputer makers, however, appear to be in mortal danger from IBM's rising stature and the favorable reaction to the AS/400. Perhaps not surprisingly, purchases of the new IBM mini are confined largely to existing IBM System/36 and 38 users. Among IBM mini rivals, only NCR users report sizable interest in evaluating the new line. The new

One reason for the slowdown could be that new software to take advantage of more advanced PCs is not yet available.

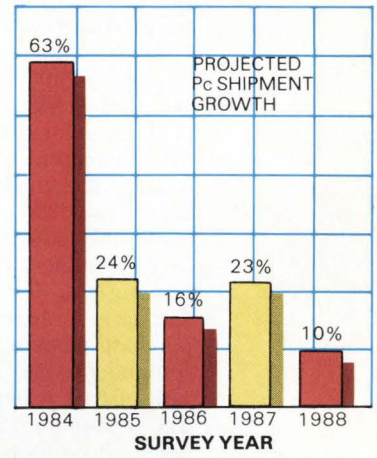
PC Sales Hit the Wall

Shipments Fall 5% While Prices Rise 10%

IN UNITS



IN DOLLARS



Source: DATAMATION/ Cowen & Co.



Photograph by Walter Wick

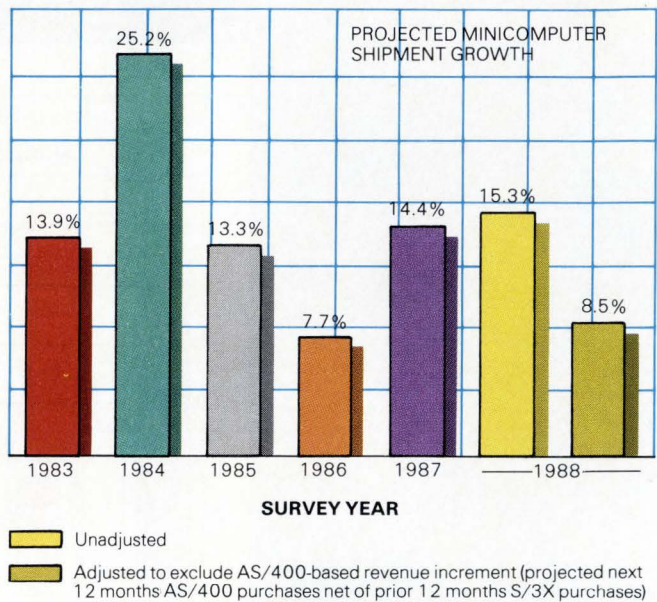
mini's impact is likely to be on used Systems/3X prices. Over 65% of Systems/3X users aiming to acquire AS/400s plan to sell their existing systems in the used market.

Those hoping to fund part of their AS/400 purchase by selling their existing systems could be in for a surprise. Just as plummeting 308X mainframe prices three years ago slowed IBM 3090 sales, so too could the potential glut of used equipment derail some planned AS/400 purchases. The largest share of AS/400 purchase plans occur among respondents at companies with annual revenues in the \$11 million to \$250 million range. In contrast, those at companies with less than \$10 million in annual revenues—a group targeted by IBM for the new midrange line—are less interested. Only 6.3% of respondents at these small businesses say they will respond to IBM's AS/400 entreaties.

Despite the power IBM is showing in the midrange, Big Blue is not without its soft spots. The most prominent is in PCs. IBM continues to lose ground to clone makers in users' upcoming personal computer purchase plans. Among respondent sites, those planning to buy IBM PCs declines to 37%, the third consecutive year the number of sites favoring IBM has declined.

AS/400 Drives Mini Growth

IBM's Midrange System Accounts for Half of Industry's 15% Growth



Moreover, OS/2 is less accepted as a future standard among PC and compatible users than the key SAA operating system was a year ago. Plans to standardize on OS/2 slipped to 21% of IBM and compatible PC users from nearly 25% a year ago.

Survey respondents' subdued regard for the use of Unix on PCs makes the oft-mentioned contest between Unix and OS/2 unlikely anytime soon. The battle lines for this group are better drawn around OS/2 and Microsoft Corp.'s DOS operating system. DOS again this year is named by two thirds of respondents as their future PC operating system standard. Only

A Surge for IBM Across the Board

The AS/400 is the most dramatic evidence of a revitalized IBM in the eyes of this year's survey group. In four key categories—office systems, software availability, networks, and purchases by oems/systems house—IBM receives either a larger share of purchases or better grades than a year ago.

Based on these and the results of a spring polling of DATAMATION readers at mainframe sites, IBM appears poised to recapture the momentum lost in recent years to midrange and mainframe rivals Digital Equipment Corp. and Amdahl Corp. (see "The 1988 Large-Scale Systems Survey," May 15, p. 88).

The biggest boost for IBM has come from the AS/400 minicomputer and MVS/ESA mainframe operating system. Only in PCs, where OS/2 so far lacks the punch to help its PC fight, does IBM fail to stand toe-to-toe with the competition, according to survey data. Moreover, Big Blue's improved favorability ratings could also stem from the product and organizational changes that reflect a concerted effort to include users in its product deliberations.

Examples of this renewed approval from minicomputer users abound. For instance, after Stratus Computer Inc., IBM gathers the second largest improvement rating by users. Again, after Stratus, IBM users are this year least likely to consider a switch to another vendor, according to respondent rankings.

Among oems and systems house customers, only 5.4% this

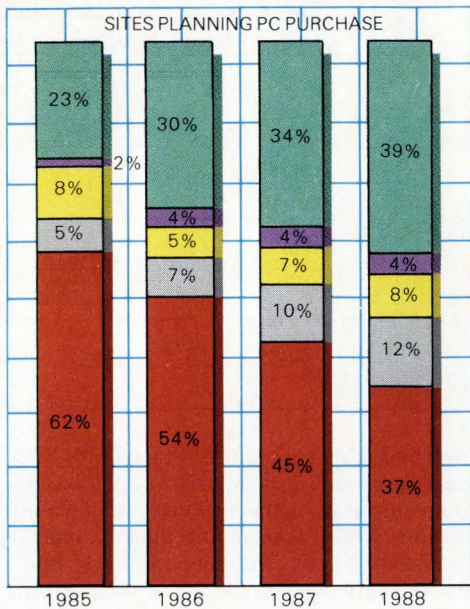
year say they are considering dropping or will drop IBM as their primary vendor. Three years ago, nearly 19% considered such a switch. In the competition for oem and systems houses, IBM shows up significantly more often than it did three years ago, and emerged as the runner-up nearly 17% of time this year in oem/systems house vendor selections. That's an improvement of more than 60% from the second place mentions it received in 1986.

IBM can also boast new gains in minicomputer software availability and quality. A spin-off benefit from the AS/400, which consolidates System/36 and System/38 operating environments, is that Big Blue is no longer plagued by the perception that its software is weak, according to the survey. This year, it is a close number two to perennial leader Digital Equipment Corp. in minicomputer software availability and quality.

But IBM does have some weaknesses to address, particularly in its support. Among mainframe survey respondents, service and support ratings fall well behind its product army. In the midrange, software support continues to be the largest source of dissatisfaction among users planning a switch to another vendor. Even here though, IBM has improved consistently in the past three years. The percentage of sites that mentioned software support among their reasons for considering a change this year has dropped by half from 1986.

IBM Loses PC Ground

Compaq, Apple, and Pc Clones Gain On IBM



*Mainly IBM PC clones, but specifically in 1988 includes PC's Limited 3.0%, HP 2.1%, AT&T 1.4%, Unisys 1.4%, Leading Edge 1.2%, Tandy 1.0%, Wang 1.0%, etc.

Source: DATAMATION/Cowen & Co.

The DATAMATION Dozen

The Roster of the hottest minicomputers, past and future, shows some machines maintaining their clout, others sliding into oblivion.

The past	The future
IBM System/36	IBM AS/400, Unspecified
DEC MicroVAX II	DEC MicroVAX, Unspecified
DEC MicroVAX, Unspecified	DEC MicroVAX II
IBM System/38	DEC VAX, Unspecified
IBM PS/2- Model 80	IBM System/36
DEC VAX 8500/8530	HP 3000 Series, Unspecified
HP 3000 Series, Unspecified	IBM 9370, Unspecified
IBM 9370, Unspecified	IBM PS/2- Model 70
DEC VAX, Unspecified	HP Spectrum, 3000 950
AT&T 3B2	DEC MicroVAX 2000
Compaq 386, Unspecified	IBM RT PC
HP 3000 Model 70	DEC VAX 6210

*Including workstations

among IBM users, where DOS still prevails with 55.8% of mentions, is OS/2 gaining any ground. The newer PC operating system is preferred by 39% of IBM users, a slight gain from a year ago.

According to the survey, those respondents selecting OS/2 and its extended edition version are more likely to work at larger corporations. So, while IBM is losing market share among respondent sites overall, there is evidence to show that the giant's hold on those larger-volume PC buyers isn't slipping as much as might be assumed. For example, IBM's share of expected unit purchases among survey respondents has, at 39%, changed little. Unit share is declining but not as much as the growing number of sites not purchasing IBM PCs. In all, respondents plan to purchase 124,780 PCs through June 1989, down from 150,435 units between July 1987 and June 1988.

One reason for the difference may lie with PC purchases made directly from the manufacturer. While the propensity to use retail stores for PC purchases is accelerating, the volume that's moving via retail is not increasing equivalently. Hardware purchases made direct from the manufacturer account for half or better of all respondents' unit purchases, a ratio that has held since at least 1985.

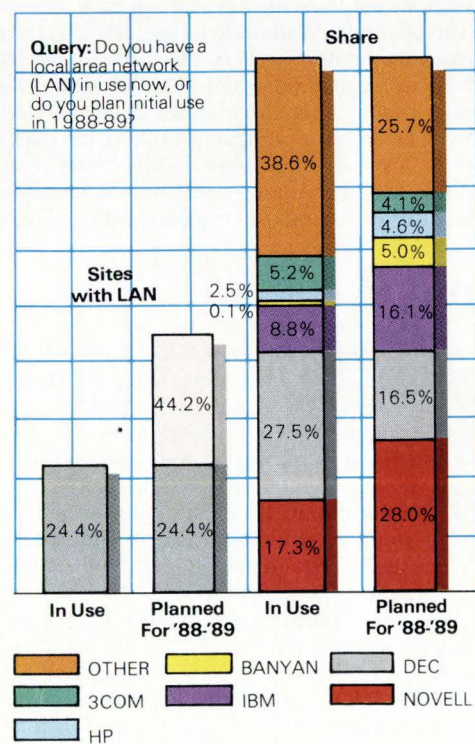
PS/2 Hasn't Stemmed Defections from IBM

Given IBM's market share problems, the company's actions in the past year to accelerate PS/2 unveilings have not proved adequate to stem the defections. The model for the PC industry continues to be Compaq Computer Corp., Houston, which has rapidly boosted its Intel 80386-based offerings. Within the survey group, 80386 units make up nearly 40% of Compaqs to be purchased in coming months. The number could well be substantially higher because a sizable portion of respondents did not specify the individual models to be purchased.

Apple Computer Inc.'s share of installed PCs among respondents was flat in the last survey period. Despite the overall PC decline, Apple ekes out a slight increase among purchases through 1989. The latest

Network Demand Is High

Novell, IBM, and Banyan Capture LAN Share



*Implicit 49% compound growth rate 7/88-12/89

Source: DATAMATION/Cowen & Co.

Charts by Catherine Francis

survey also shows that Apple users rate the software quality and availability for their systems on a par with IBM and compatible users' ratings.

Local area networks (LANs), integrated office systems, relational databases, and

on-line transaction processing similarly rank as high-priority items in this year's survey. But where workstations and PCs have been far and away the beneficiaries of the move away from the mini-computer, this year's projected PC shipment decline suggests that there are alternative scenarios.

For instance, the percentage of sites initially installing LANs is rising sharply. Where about 25% of respondent sites reported use of a LAN this year, that is expected to grow to a projected 44% by June 1989. Moreover, the number of PCs attached to networks is approaching a quarter of all PCs installed, according to survey results. Respondents reported that some 23.6% of their installed PCs are linked via networks—a substantial increase from last year's 18.3%.

The interest in networking PCs is reflected by the vendors that respondents favor for new LAN purchases. The four leaders are Novell Inc. (Provo, Utah), DEC, IBM, and Banyan Systems Inc., Westboro, Mass.

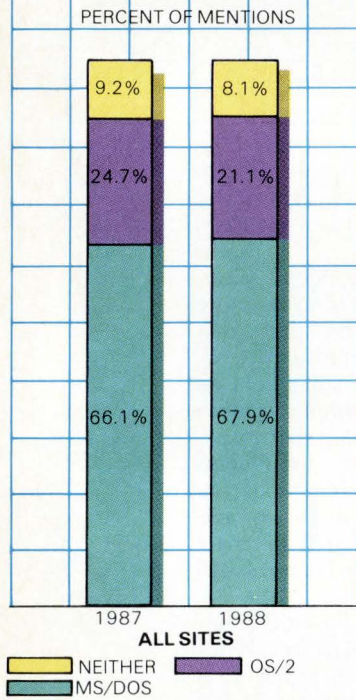
Some Hot 386s				
Specific 386 machines purchased/planned				
Machine	Purchases 1/87-6/88		Expected Purchases 7/88-12/89	
	Units	Sites	Units	Sites
Compaq				
Deskpro 386	781	175	978	144
Deskpro 386-20	156	48	164	23
Deskpro 386-25	6	4	62	15
IBM				
PS/2-70	69	22	1,461	79
PS/2-80	831	154	1,600	134
PC's Limited (Dell)				
366 16	73	14	120	19
Wyse				
PC 386	54	20	84	12
Zenith				
Z-386	73	20	288	19

Source: DATAMATION/Cowen & Co.

DOS Stronger Than Ever

Only Two out of 10 Users Plan To Switch to OS/2

Query: For IBM and PC clone users, specifically, which OS do you expect to standardize on for future pc purchases?



Source: DATAMATION/Cowen & Co.

Novell looks to edge out DEC, which holds 27.5% of the survey group's existing LAN installations, for the number one position this year in terms of planned installations. Novell's recent unveiling of minicomputer versions of its NetWare network operating software have enhanced its already strong PC networking reputation.

The growth patterns established a year ago for database and integrated office systems software continues in the latest survey. Last year's database growth leader, Oracle Corp., again leads the independent DBMS software vendors with an estimated 22% of planned purchases this year. IBM, which provided office software on a test basis with initial AS/400 sales, also gains significant market share in office systems and databases. A relational database is incorporated into the AS/400 OS.

For DEC overall, the signs are mixed. The company continues to gain new office systems and network installations but loses market share in each, according to survey results. And while its favorability rating increases among its own users, DEC takes a sudden turn for the worse in another important indicator of customer loyalty. After three consecutive years of improved favorability ratings, its ranking for customer loyalty this year is now only slightly better than the industry average. Among oems and systems houses, where dissatisfaction over discount policies lingers, a

Survey Methodology

Results of the 12th annual DATAMATION/Cowen & Co. mini/micro computer survey are culled from the responses of DATAMATION readers throughout the United States. The respondent audience is selected based on their acknowledged purchase or use of minicomputers, small business systems, or microcomputers.

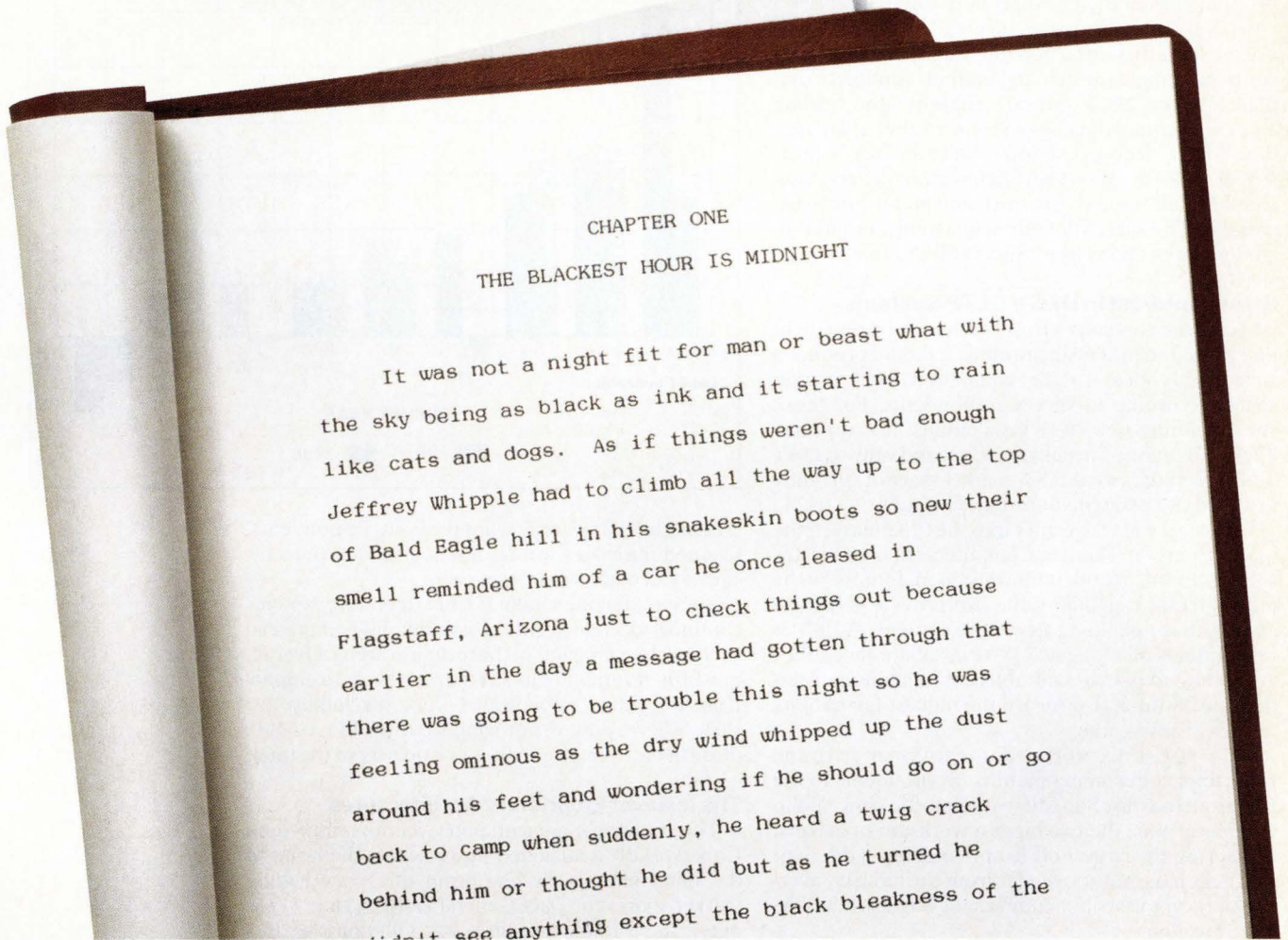
Cowen & Co., a Boston brokerage firm that has directed the survey since 1976, mailed 55,000 questionnaires beginning the week of July 11, 1988. Those questionnaires were directed to no more than three individuals at a single site; final selection of recipients was based on the subscriber's title. The qualified and unduplicated replies that were received totaled 5,257—a return of 9.7%. Results were presented to Cowen's institutional investor clients on Sept. 26.

For the purposes of the survey, the definition of minicomputers covers a broad category of systems, including 16-bit to 32-bit

processors (such as the Digital Equipment Corp. PDP-11, MicroVAX, and VAX 8XXX and comparable systems from IBM, Data General Corp., Hewlett-Packard Co., Tandem Computers Inc., and others); minisupercomputers; departmental and small business systems; office systems; network servers; and workstations. The latter are defined as single- or multi-user systems priced generally in excess of \$5,000 per station. Personal computers are single-user, desktop, or portable systems priced in general below \$5,000 and include the IBM PC and PS/2 models 25-60, Compaq, and Apple II and Macintosh, among others.

This year's projected 5% decline in PC unit shipments and the related 10% dollar value increase are calculated including purchases of IBM PS/2 models 60 and 70 and comparable Intel 80386-based systems. Those computers, in all other instances, are counted as workstations. To order the complete survey results, please call Laraine Donisi at (212) 463-6893.

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third now say they expect or are seriously considering dropping DEC as their primary mini supplier.

DEC's proprietary architecture was the second-highest cause of dissatisfaction cited by those DEC users contemplating a switch to another vendor. Complaints about DEC's software support—the leading source of complaints against most other mini vendors—have dropped sharply, however. DEC's post-survey release of a RISC architecture workstation should quell some of the price and architecture discontent. The survey definition of a minicomputer includes workstations (see "Survey Methodology").

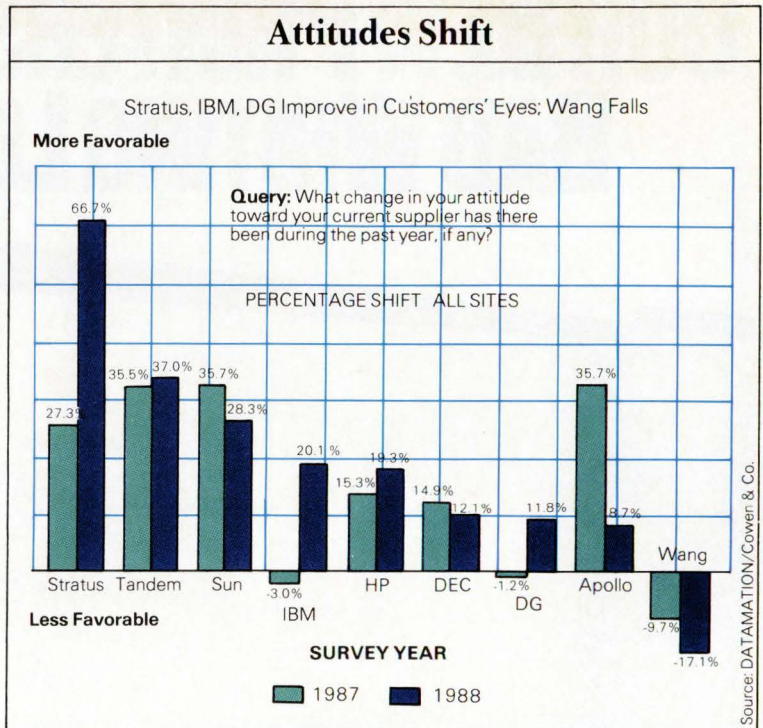
Strong Interest in DEC's OLTP Systems

DECtp, the company's freshly released complement of transaction processing products, should produce a substantial boost to the company's OLTP market share, according to survey respondents. For those sites planning new OLTP installations, DEC captures 22.4% of planned installations, second only to IBM's 42.2%. It rates a weak 5.8% market share of currently installed OLTP systems at respondent sites.

In the wake of DEC's entry into the OLTP market, the implications for Tandem Computers Inc. and Stratus Computer Inc. are not uniformly good. Interest in the fault tolerant capabilities the two provide is highest among those planning new OLTP systems. A fifth of respondents planning new OLTP installations say they are willing to pay for fault tolerant capabilities. Tandem and Stratus also record the highest favorability ratings of any vendor.

DEC's RISC/Unix workstation entry may have the same impact in coming months. Respondents to the survey already list Sun Microsystems Inc. and Apollo Computer Inc., the two biggest workstation makers, as offering the largest off-list pricing. DEC's discount practices have not strayed far from the industry average in recent years but could change as a result of its RISC unveiling.

The new Unix-based workstation cuts both ways: it frees DEC to price more aggressively against Sun and Apollo, and potentially less so in its proprietary MicroVAX line. In fact, while the MicroVAX family is in-



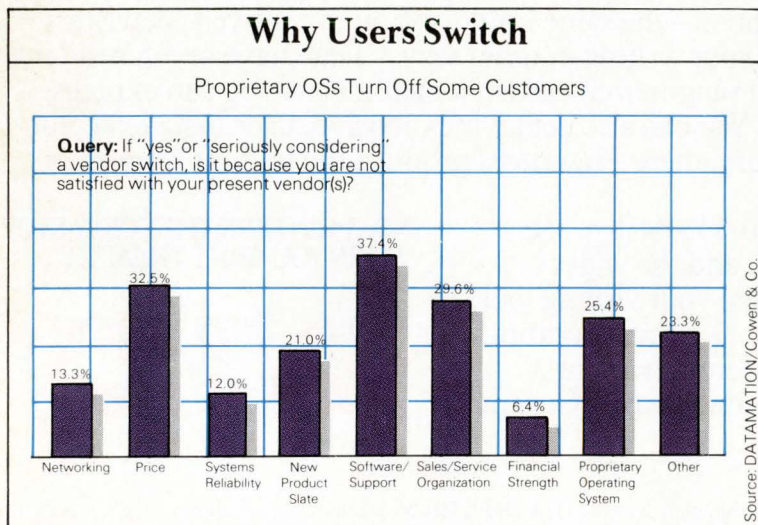
creasingly favored for new applications, respondents' planned purchases will represent a smaller percentage of VAX outlays than a year ago.

Among all mini vendors, Unix operating systems continue to make slight inroads among commercial users and steady gains in the technical arena. Overall, one fifth of respondents say they are likely to employ Unix for future applications work. Excluding IBM sites, where Unix is not supported on the AS/400, those likely to employ Unix is one quarter of the total.

The Issue of Proprietary Architectures

The traditional minicomputer vendors, for whom Unix typically is an added thrust, suffer the brunt of the minicomputer decline again this year. Falling market shares for Data General Corp., Prime Computer Inc., Tandem, and Wang Laboratories Inc. show up in respondents' planned minicomputer purchases, according to survey results. Importantly, proprietary architecture ranks as a significant issue among those considering a switch. Hewlett-Packard Co., whose Unix-based HP 3000 8xx minicomputers make up an ever-increasing portion of its sales, and Sun Microsystems again gain share of respondents' planned purchases. This year, Unisys will increase its market share through a pair of large government procurements for Unix-based systems.

One of the mini makers whose perception among users fell sharply in past years has made significant progress in redeeming itself. Among this year's survey respondents, Data General garners the first positive favorability ratings among both oems and end users in three years.



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Oracle's Olympian Challenge

The 1 1-year-old legend is seeking new DBMS kingdoms, but it will have to fight server startups, IBM, and DEC for new turf. Oracle hopes systems consulting and financial applications are the keys to new accounts.

BY GARY McWILLIAMS

Oracle Corp. pursues the relational DBMS throne with all the cunning and guile of the mythological Zeus. Like Zeus, who defeated the Titans to become the chief god of Mount Olympus, Oracle is carefully crafting a bid to rule the DBMS pantheon. Its battle plans, moreover, are sweeping: Not only do they entail major DBMS product enhancements; they'll also take the \$282 million company into new fields of applications software and consulting services, against giant competitors.

Now the largest independent database software vendor in the world and the fourth-largest independent software vendor overall, Oracle must face its own Titans. The company is setting out to confront IBM's DB2 mainframe database.

It's developing financial applications software to compete in the domains of McCormack & Dodge Corp., based in Natick, Mass., and Atlanta-based Management Science America Inc. It's investing heavily in consulting services, which may challenge the IS divisions of the Big Eight accounting firms. And finally, it is having to contend with newer relational DBMS entries whose onslaughts are already affecting its database sales. The company recently warned that its ability to double revenues annually will halt, if only for a quarter.

Oracle's thunderbolts are a revamped DBMS, known as Version 6, and a transaction processing subsystem, Oracle TPS; a new series of financial and office automation applications; and a substantial expan-

sion in its consulting services operation. Oracle president Lawrence J. Ellison brashly predicts that within two years his company's applications will outsell those of MSA. And, he boasts, Oracle's 350-person consulting group one day will have 10,000 employees, topping even Arthur Andersen & Co.'s 6,600 IS consultants.

Understandably, admirers and critics alike describe Oracle as the most aggressive company in the industry. Others say that, like the ancient Greeks, it is given to myth-making. Delayed product deliveries and marketing hyperbole are as much a part of Oracle lore as its vaunted sales force. For instance, Ellison says Oracle DBMS, only a year after its DOS release, is the second largest selling pc DBMS. Researchers and consultants reject the claim as nonsense.

Moreover, even as IBM's DB2 continues to bloody the likes of ADR Inc., Cullinet, and Software AG of North America, Oracle is increasing its attacks on the mainframe cyclops. Database consultants, including Rich Finkelstein, president of Performance Computer Inc., Chicago, calls its attacks "bravado." Of Oracle's 350 mainframe DBMS licenses, an overwhelming majority are for IBM's smaller VM machines where DB2 does not run, say observers.

Despite such knocks, Oracle has two things going for it—an enviable track record, and significant momentum. Having grasped early the importance of database portability and IBM's SQL data manipulation language, the company quickly surpassed relational DBMS rivals Relational Technology Inc. and Informix Software Inc. in the early 1980s. (All three companies are based in northern California: Oracle in Belmont; RTI in Alameda; and Informix in Menlo Park.) And, with sales doubling every year since its founding in 1977, Oracle recently eclipsed DBMS pio-

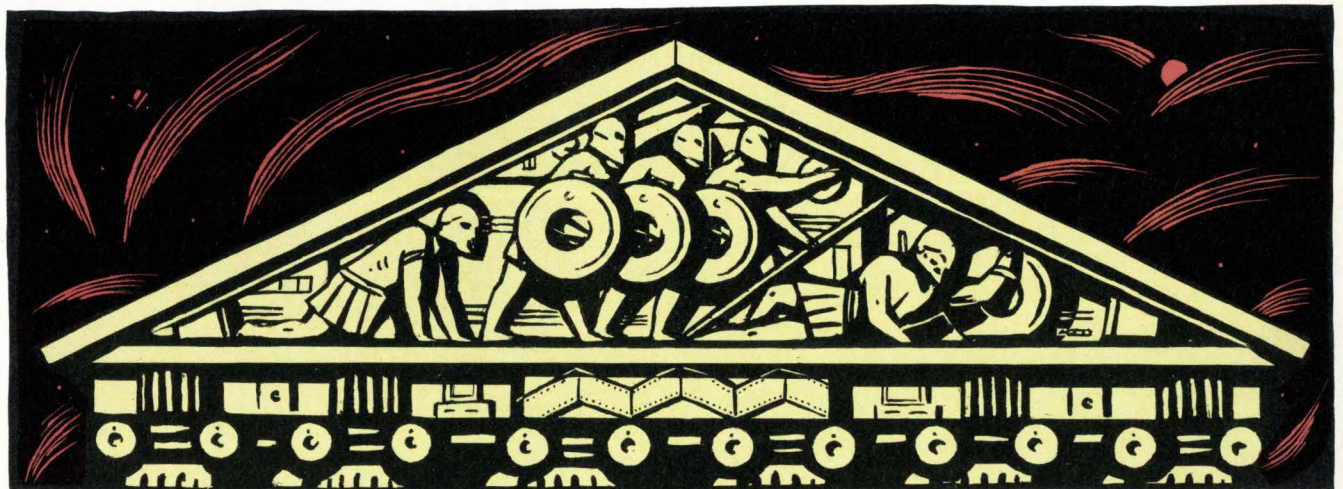
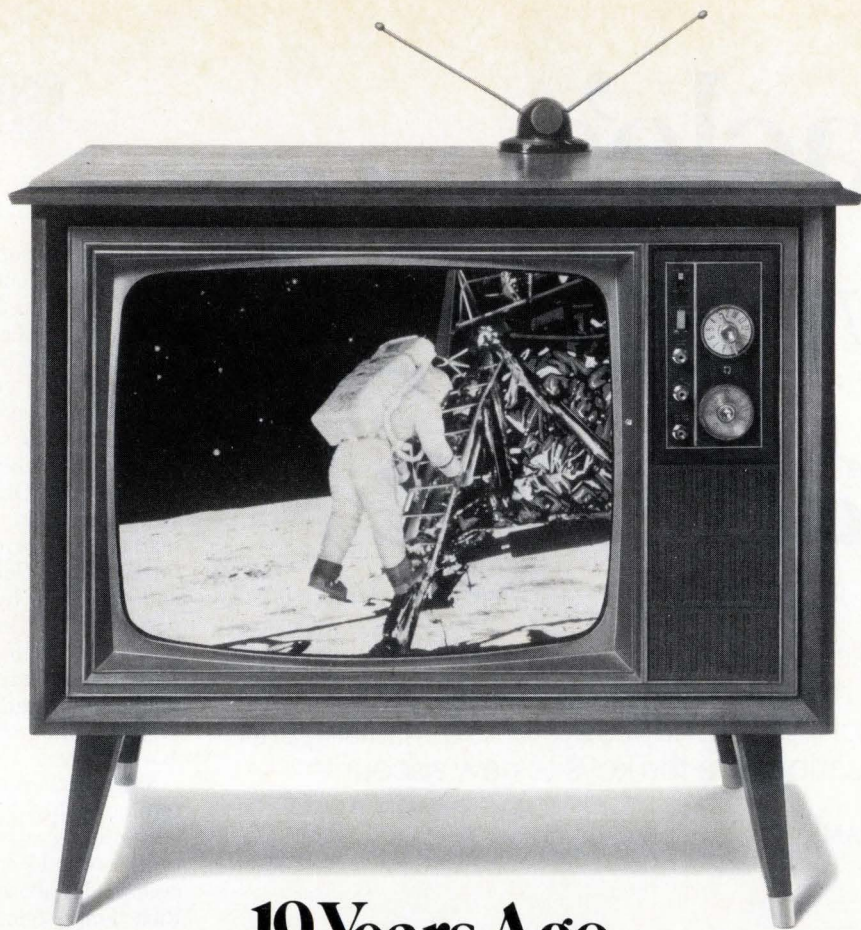


Illustration by Mark Matcho



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Past Success Rode on VAXs

Where pioneers like Cullinet, Software AG of North America, and others initially missed the shift from nonrelational to SQL DBMSs, Oracle has ridden relational technology and the burgeoning market for DBMSs running on midrange systems to the fullest. Computer Intelligence Corp. estimates that Oracle holds a 31% share of the market for relational database software running on Digital Equipment Corp.'s VAX machines. DEC's relational database, RDB, records 27%, according to the spring survey of VAX user sites by the La Jolla, Calif.-based market research firm.

That market share alone results in many opportunities. London-based UBS Securities recently began an Oracle pilot without a serious evaluation of other relational DBMSs. Why Oracle? "The project we're putting it on is VAX-based and Oracle is one of the market leaders," says a UBS Securities IS manager who asked not to be named. "In looking at the type of equipment Oracle ran on, it seemed a good first choice."

Others, like Liberty Mutual Insurance Co., the Boston-based insurer, say Oracle's reputation as a "safe" choice got it a recent evaluation. Bob Renshaw, database analyst at the company's Portsmouth, N.H., data center, says performance testing ruled out its use in a distributed VAX development program, but Oracle is back in the running on a Macintosh workstation project.

Its sheer number of implementations—Oracle says it supports 55 different computer makes—continues to fuel its sales. Oracle's DBMSs range in price from \$2,495 to \$64,000. Major corporations—including Monsanto Chemical Co., St. Louis; British Petroleum, London; and Shell International BV, the Netherlands—use Oracle for their reporting application needs. Monsanto, for one, uses Oracle for manufacturing applications that cross mainframe, midrange, and micro lines. "Monsanto Chemical is a multivendor environment," says manager of computer and systems technology Bill Fleming. "We use IBM in the data center, DEC in the large [manufacturing] plants, and Hewlett-Packard in the small plants. Oracle offered us the only alternative. At the time we did our evaluation [late 1986], there was no other."

While IBM's Information Management System (IMS) database remains the lynch-

How Relational Architectures Differ

The almost universal acceptance of relational technology for new applications development is changing what for years had been a raging debate. Even as the Codasyl-compliant versus relational argument ceases to boil, there is little calm on the waters. Instead, as applications shift from hosts (running on mainframes and minis) to servers (running over networks of pcs, workstations, and servers), the technology is again in the spotlight.

In place of the Codasyl-relational tussle, the architectural differences within relational technology are coming to the surface. Jeffrey B. Tash, president of consulting firm Database Decisions Inc. in Newton, Mass., identifies three relational database archetypes: process, server, and memory linked. Each architecture has its advantages and disadvantages, and each may have different implications for applications development.

Process databases such as IBM's DB2 once were the most common type of relational databases. That may be changing with the arrival of server databases from Cullinet Software Inc., Westwood, Mass.; Sybase Inc., Emeryville, Calif.; and Gupta Technologies Inc., Menlo Park, Calif. Moreover, Relational Technology Inc., Alameda, Calif., and Oracle Corp., Belmont, Calif., recently rewrote their process databases to implement server architectures. Unlike process architectures in which an application runs wholly on the host computer, server architectures enable the applications to run on computers separate from the database computer.

Some database experts believe the distinction will prove important in the future. "The client-server model in general is one we believe will become the dominant style of delivering information. The pc on your desk becomes the only general purpose computer. Everything—servers, other processors, mainframes—are all special purpose computers," says Bill Fleming, manager of computer and systems technology for Monsanto Chemical Co., St. Louis.

And it isn't just for information delivery. Applications developers say the server architecture eliminates some problems they've faced in the past. "The client-server philosophy," says Bob Renshaw, a database analyst at Liberty Mutual Insurance Co., Portsmouth, N.H., "provides a clean separation of an application from the database engine. It's easier to rewrite an application if the integrity checks are in the [database] engine [rather than the application]."

Other database experts offer important caveats, however. David Root, vice president of operations at InterBase Software Inc., Bedford, Mass., developer of a memory-linked DBMS, says, "It isn't clear any one is the ideal answer. Interacting with the architecture are applications needs and the type of hardware [the DBMS] runs on."

In fact, these newer architectures have their own needs. Tash says server databases such as Sybase create a database operating environment within the operating system. "The key is not to invoke and spawn new processes, because of the systems and communications overhead it creates," he says. The typically faster performance of server architectures in transaction applications derives from the separation of applications and database to run on separate processors.

Even within server architectures there are variations. Relational Technology Inc.'s Ingres and Oracle's Version 6 DBMSs are multiserver architectures, says Tash. They are designed to exploit multiprocessors that allow for a variable number of cpus, such as the IBM 3090 model 600 and Digital Equipment Corp.'s VAX 8840. Sybase, whose database is a uniprocessor server, is developing what it promises will address software fault tolerance by creating a virtual server architecture.

Where the three architectures differ widely is their use of physical memory. Process architectures establish separate areas within a single processor's physical memory for applications and database. Performance is largely a factor of available physical memory. IBM's Enterprise Systems Architecture is one example of how process database architectures exploit huge physical memories for improved performance, Tash says.

Memory-linked architectures provide for both the application and database to occupy the same memory space. Cullinet's IDMS/SQL and InterBase map the database execution routines to the program's address space. Unlike servers, whose context switching creates systems overhead to link applications and database processes, memory-linked database architectures require no context switching and hence require less systems overhead. Yet, again, there are differences. InterBase, which is available for computers from DEC, Apollo Computer Inc., and Sun Microsystems Inc., incorporates a server facility for remote databases. If the data are not in local memory, InterBase spawns a communications process to retrieve them.

pin of Monsanto's transaction-based applications, Oracle fulfills the chemical company's needs for a common data distribution mechanism. "We've more than enough data already captured; the problem is getting our hands on it," says Fleming. "We now take data from those [IMS] systems, transfer it to Oracle, define the data, clean up the definitions, and make it available to other applications. We're replacing a lot of reporting systems with the Oracle database and query tools."

Server DBMSs Pose Challenge

Developed originally for information center applications, Oracle's products expanded as reporting and query applications migrated to midrange computers. Yet, just as it was quick to seize the relational technology chariot, a new group of competitors is finding server database architectures a faster vehicle. Typified by their use of personal computers, networks, and stored database procedures, server databases are becoming popular for applications requiring larger users and high database transactions. Some challengers also have adapted server architectures to run on several computer makes, to a lesser extent emulating the Oracle DBMS portability.

Contel Service Corp., Wentzville, Mo., and Northern Telecom Inc., Concord, N.H., each rejected Oracle after testing versions against a server database from Sybase Inc., based in Emeryville, Calif. In both cases, a superior performance evaluation won out over Oracle's then multiprocess architecture. "There was only one thing we were allowed to choose our database on—performance," explains Rich Koch, Contel's records and design system administrator, who used a prerelease copy of Oracle's Version 6 in his trials. Sybase's design provided a much cleaner split between the application and database engine, he says. "It gives us reduced communications overhead, and required fewer computer cycles," says Koch. "The application passes a simple call to Sybase and it executes 6,000 or 7,000 lines of code."

Northern Telecom also discovered a sufficient degree of portability in the same database. Steven L. Olson, a senior software engineer who evaluated Oracle Version 5 in mid-1987, notes, "We wanted to make sure we weren't locked in to a piece of hardware. Sybase supports Sun [Microsystems Inc. computers], VAXs, Stratus

[Computer Inc. computers], and is working with others. So portability is not such a problem."

Although Oracle's DBMS products run on more than 50 computer models, most sales are on DEC VAXs. Half its business came from VAX installations last year; two thirds came from VAX sites the previous year. "It's really been a DEC game they've been playing," says Robert Therrien, a software industry analyst at Paine Webber Inc. "Oracle's been the only player, but that's about to change."

DEC's past lack of attention to its Rdb

charges. "Oracle is trying to be everything to everybody," he says. "There's no such thing as one size fits all."

Oracle itself has realized that. Version 6 incorporates wholesale changes to the underlying database kernel. Where earlier versions employed a multiprocess architecture, Version 6 implements a server architecture and in the future will support multiple servers on the same machine, Ellison says. "Our competition was pointing out we would never be able to achieve high-volume transactions per second without rewriting a lot of code. We did," he says (see "How Relational Architectures Differ").

The company's new transaction processing subsystem, Oracle TPS, furthers the attempt to broaden capabilities beyond purely decision support applications. (TPS works only in conjunction with Version 6, and it costs about half as much as the DBMS). Of the 20 computer manufacturers that resell Oracle DBMS, 11 have committed to marketing the subsystem, says an Oracle

spokesman. One of them, Harris Corp., is so enthusiastic about Oracle TPS's prospects, it will modify its Unix operating system to better support the subsystem, says Doug Pushard, a marketing programs manager at the Melbourne, Fla., company.

Such enhancements come at a time when Oracle faces heightened competition from all sides. "For a long time, we were the only SQL vendor; now there are others. But there is no one even close in portability," Ellison says. "There is no one other than Oracle with a pc [product] and an MVS product."

That may change soon. Independent vendors, from Cullinet—with its own array of financial, distribution, manufacturing, and banking applications—to tiny Sybase, are promising compatible mainframe, mini, and micro DBMS implementations. Cullinet's IDMS/SQL will be released on a pc by year's end, and the company is close to completing SQL support for its mainframe IDMS/R. Sybase alliances with Microsoft and Ashton-Tate enable it to offer pc versions with its VAX and Sun workstation ports. Such companies may hope to narrow the gap, but none has replicated the wide support of the Oracle DBMS, Ellison says. Should one get too close, Oracle still has its thunderbolts. "As other vendors catch up in portability, we're not standing still," Ellison says. "What's next? Financial, office automation appli-

Distinctive Architectures

Three types of relational designs dominate today's products

TYPE	EXAMPLES	ATTRIBUTES
Process	Database 2, Rdb, Oracle version 5	DBMS and all applications run in their own address space.
Server	Ingres, Oracle version 6, Sybase, SQL Server	DBMS functions as an OS within the OS; multiple threads, each with separate execution within a common address space.
Memory Linked	IDMS/SQL, InterBase	DBMS and applications are mapped to same address space.

and its lack of integrated tools made Oracle all the more popular, say analysts. Yet DEC's focus on commercial applications is stirring the computer maker's database efforts. SQL and performance enhancements to RDB are aiding the vendor's fortunes. In the 14 months between April 1987 and June 1988, RDB licensees jumped to 8,000 from 3,000, according to DEC database systems marketing manager Victoria Z. Farrell. DEC's weakness in database tools is also being addressed by a campaign that involves recruiting third-party developers, she says.

Taking on Big Blue and DB2

Demand for IBM's relational database seems to be running with Mercury. DB2 buying intentions recorded in the Cowen/DATAMATION spring 1988 mainframe users survey soared among IBM 30XX users. DB2 overwhelmingly was favored by 57% of respondents planning to acquire a database package in 1988 and 1989. Oracle's DBMS was named in the purchase plans of 7% of 30XX users, trailing Cincinnati-based Cincom Systems Inc., and Cullinet.

Heightened competition will force Oracle "to decide where it is going to put its money and deliver products that really meet their claims," says Performance's Finkelstein, a critic of Oracle's portability. Because the Oracle DBMS is designed to run in so many different operating environments, it is not optimized for any, he

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Still, simple ambition does not count for much. To date, the Oracle DBMS is too weak to threaten IBM's souped-up DB2, and Oracle TPS is too new to have any impact. Analysts also say Oracle's hopes of catching up to DB2 may be misplaced. “Oracle TPS is a year and a half too late to compete with DB2, which has 2,000 installations compared to a negligible amount on Oracle's part,” says database consultant Finkelstein. The company obviously has higher hopes for TPS. “Oracle TPS will go after the mainstream transaction business applications,” Ellison says. “We're looking forward to competing for all applications on the mainframe.”

If Monsanto's experience with Oracle's product on MVS is any indication, the DBMS

supplier still has a lot of work to do. Monsanto's MVS implementation of the Oracle DBMS is limited to a single application and just a few users. “From what we know and understand, the MVS version—until it gets to [Oracle] TPS—won't have the same level of production capabilities that people are used to in the MVS environment,” says MIS manager Bill Fleming. “Until then, they won't have a lot of success in penetrating the MVS shops.” Despite the company's mainframe experiences, Fleming is optimistic that Oracle TPS will succeed.

Mainframes aren't the only machines where Oracle has yet to make its mark. The company has ground to cover in the pc realm as well. Spring surveys by market researcher InfoCorp, Santa Clara, show slim use of the company's pc DBMS, Profes-

sional Oracle. “I think it has sold 10,000 to 20,000 units,” says Bill Higgs, InfoCorp's vice president of software research, noting that industry leader Ashton-Tate last year shipped 300,000 units of its dBase product.

The Risks of Expansion

Oracle's expansions outside DBMS also are notable for their scale and potential risk. A continued boost in employment at its National Consulting Group, Boston, could hold repercussions for Oracle as it tries to move its DBMS into production environments. “One of the things that hurt Cullinet when it got into applications was that the other applications vendors wouldn't recommend Cullinet's database,” recalls David A. Litwack, a former

Why Oracle Wants To Be Consulted

Its 400 employees aren't about to threaten the Big Eight IS consulting divisions. But as Oracle Corp. looks to applications software to fuel already heady revenue growth, its consulting services operation will have a strong part to play.

The consulting group, now in its third year, could affect the company more than any other factor on the success or failure of its fledgling applications push, according to analysts. Among the dozens of vendors that tried to move from systems software into applications software, there are few successes. For that reason, there are many who believe that Oracle's financial and office thrusts will not succeed without a strong consulting hand guiding them.

Oracle is substantially increasing the number of consultants within its National Consulting Group. At the end of its first year in existence, the operation employed 70 full-time consultants and contributed some \$6 million in revenues, says Oracle vp Ken Marshall. The company expects to employ 550 consultants and aims for revenues of \$50 million by the end of this fiscal year, says Marshall. “We are very serious about applications consulting because we believe it will play an important role in how customers implement our applications,” he adds.

To emphasize its growing applications focus, Marshall says 20 of the 30 managers now on board once worked for Big Eight consulting groups. And while database work is the group's staple, Marshall rules out nothing. “We'll do whatever is required. If we need to provide a customer with a full-time staff to integrate their order entry or payroll, we'll do that.”

The company operates its consulting business as a separate profit and loss center, charging between \$800 and \$1,400 a day per consultant. “We're not a body shop,” insists Marshall. “If you compare our rates on a deliverables basis . . . in most cases

we're lower [than the Big Eight].” Oracle also is hedging its bets by discussing consulting alliances with Big Eight firms such as Coopers & Lybrand, New York. At press time, the two companies were in active talks. That may be a good thing. So far, Oracle's consulting organization has gotten mixed reviews from customers. Bob Renshaw, a database analyst at Liberty Mutual Insurance Co., Portsmouth, N.H., used Oracle's consulting group during the company's evaluation of the company's DBMS. “Oracle had some good people but it seemed to be part of the marketing. They pushed hiring consultants on us” during pilot testing, he adds.

Oracle's Marshall concedes that there were minor difficulties in the process of delineating consulting from the Oracle DBMS sales force. However, the separation is complete, he says. “Oracle was smart enough to realize that for us to be successful, we needed to be a profit center and independent from sales.”

Alex Stolitzka, who runs a four-person decision support group for Union Bank of Switzerland, New York, says he didn't know Oracle provided consulting until he asked. He's now glad he did. Oracle's consultants are “some of the best people I've worked with,” says Stolitzka. Union Bank of Switzerland has contracted for Oracle to build an accounts receivable system for the bank's branch operations. “We've only four developers who use Oracle heavily,” he says. “We felt it would be synergistic to bring in the people who know

what they are doing.”

Still, Bill Fleming, manager of computer and systems technology at Oracle DBMS user Monsanto Chemical Co., St. Louis, offers another view. “Oracle is growing so rapidly it is difficult to match in field support what they can do in technology,” he says. “I believe they are trying mightily. They know what they are doing and what to accomplish, but they can only go so fast.”



ORACLE'S ELLISON: “As others catch up in portability, we're not standing still.”

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

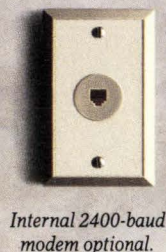
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It simply works better.

Cullinet Software vp, who is now forming his own company. "If Arthur Andersen & Co. thinks Oracle will get their consulting business, they may push [the software of] someone else."

Already, some Oracle resellers are wary of its fledgling entry into applications software sales. Richard Artus, vp of marketing at Bechtel Software Inc. in Acton, Mass., an Oracle var that markets project management packages built atop Oracle DBMSs, says, "Oracle's got an extremely strong network of salespeople. Any company that would not be concerned that Oracle could move into its applications area—especially those who have a database application—is sort of an ostrich."

Still, Oracle's current momentum may be reason enough to ignore the threat. "If you don't give careful consideration to Oracle, you are missing an opportunity," Artus says. "Oracle may not technically be the best DBMS out there, but it is the most popular." Don't tell that to Ross Systems Inc., Palo Alto, the largest developer of financial applications for VAX computers. Ross already has ruled out Oracle DBMS in its product plans. Sue Sweeney, Ross Systems' director of strategic marketing, says it will use DEC's RDB in a future release of its packages. Why RDB? "We wanted to stay all DEC," she replies.

Oracle's expansion presents no threats to resellers or others, Ellison argues. "We expect our vars to sometimes compete with us. We think it's more important that our customers have a choice," he says. Similarly, if Oracle consultants sometimes compete with the Big Eight's IS divisions, the business is larger than any presently can satisfy, he says. "Yes, we will be competitors, but I hope we will see more cooperation than competition."

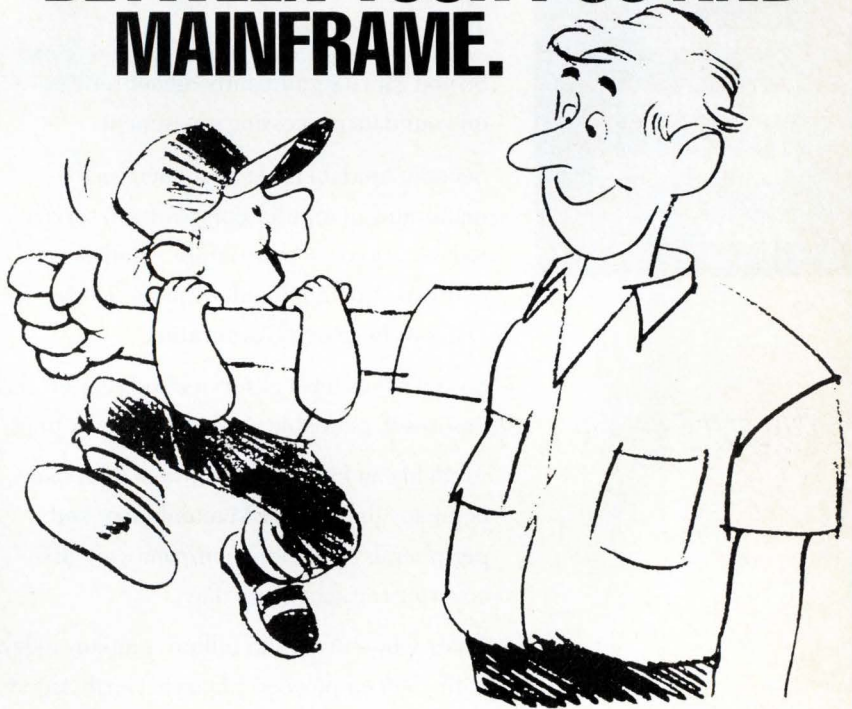
A test may come soon of its relations with the Big Eight accounting firms whose consulting divisions influence many large IS purchases. At press time, Coopers & Lybrand Information Services was exploring a marketing alliance with Oracle. Edward J. Reed, a partner in Coopers & Lybrand MCS division, San Francisco, says, "I don't think we know enough about Oracle's [consulting] plans to know whether they will be competitive or we could work together. It's easy to see where we could work jointly in financial applications. When you get into the pure consulting areas, it gets fuzzy."

Competition with the Big Eight may be inevitable for Oracle even if its consulting services do not meet its plans. Already, Cullinet, Computer Associates Inc., and others have software marketing agreements with Big Eight consulting opera-

tions. Others are just forming. Price Waterhouse & Co. and Relational Technology are building one such alliance, confirms Bob Howerter, director of vendor software services at Price Waterhouse & Co.'s Applied Technology Center, Tampa, Fla. "Certainly, the industry is changing," says Howerter.

Oracle's investment in its consulting services group is part and parcel of its DBMS and applications campaigns, Ellison insists. Like Zeus, who was able to defeat the Titans only after forging alliances, Oracle may have to rely on more than its cunning and guile as it prepares to face rivals many times larger than itself.

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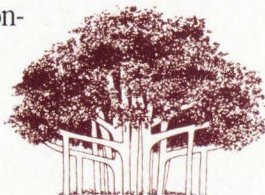




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CSP: The Weak Link In SAA?

Users say that so far IBM's CSP 4GL has not provided them with an efficient means of migrating applications between architectures, but Big Blue is trying to change that.

BY JEFF MOAD

For some products and technologies, carrying the IBM System Application Architecture imprimatur has been a blessing. SQL and APPC, to name a couple, are enjoying broad user acceptance, at least in part because IBM has anointed them as key elements in its grand plan to bridge the gaps between its different system architectures.

The SAA embrace has so far failed to turn some technology frogs into princes, however. Take IBM's Cross System Product as an example. Twenty months ago, when Big Blue unveiled SAA, it said future portability of applications between architectures would be supported by a common programming interface based on standard languages. Among those languages, said IBM, would be an application generator, based on its existing fourth generation language, CSP. That seemed to make sense since CSP was one of a few IBM products already focusing on easy migration of applications between IBM hardware environments.

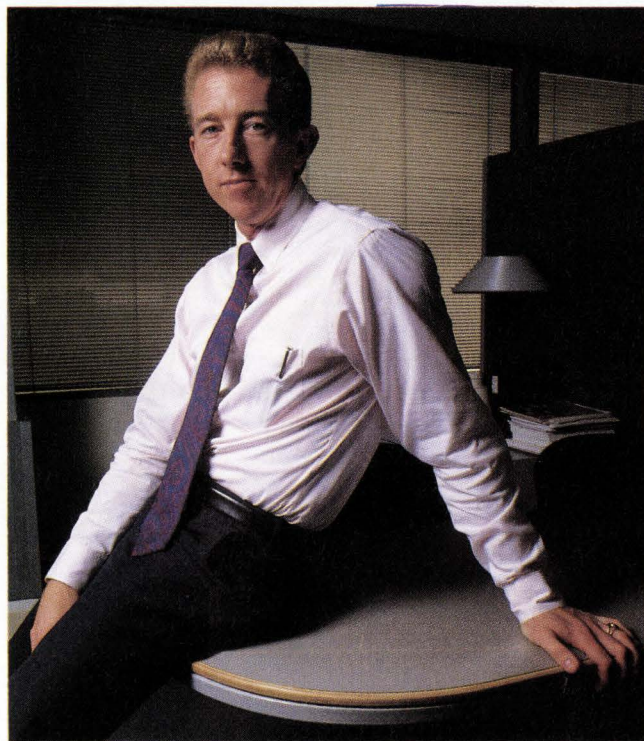
Since then, however, IBM has failed to build much momentum for CSP. Few third-party software developers are using CSP despite IBM's promise that applications developed with the 4GL will eventually be easily migrated between MVS-, AS/400-, and PS/2-based environments. Only a smattering of end users have adopted CSP, and many of them seem luke-

warm on the product despite recent IBM attempts to upgrade CSP's image as a key SAA component. In short, although CSP is positioned to play a critical role in SAA, some observers are wondering just how

now nonstrategic 8100 midrange system, so it lacks much of the robustness and raw performance needed by large systems users and many of the features needed by users developing network- and pc-based applications. In the MVS world, for example, many users are critical of CSP because it lacks access to a common, shared library for storing and accessing source code statements. Instead, CSP requires programmers to use up to seven member specification libraries, some of which are common libraries and some of which are accessed by a single programmer. CSP administrative tools, such as audit trails, are weak, users point out, and that makes it difficult to keep track of the contents of the various libraries, particularly on large projects involving lots of programmers.

"CSP is for smaller kinds of projects. It's not really an industrial strength 4GL yet," says Dave Davis, a senior application consultant with Chevron in San Ramon, Calif., which evaluated the IBM offering before opting for an application generator approach.

Users say that because of CSP's midrange systems origins, it also tends to force developers to break projects up into many small pieces, which are then bound together by CSP before execution. That approach puts a premium on precoding application design and severely penalizes development



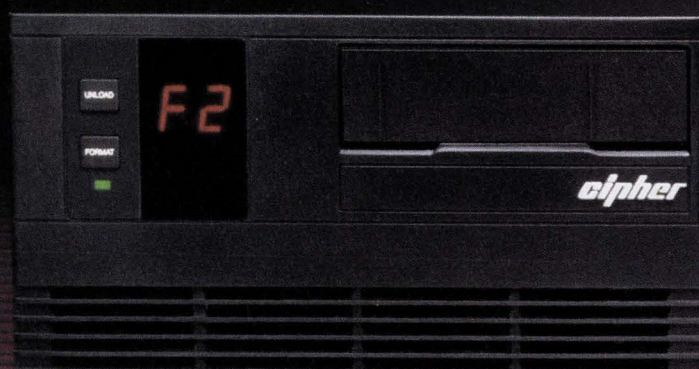
WORLD SAVING'S GRAHAM: "We're not using CSP now."

much of CSP will survive as the SAA 4GL of choice for IBM systems users.

Midrange Systems Origins

Part of CSP's problem, say users, stems from its origin. It was developed for the

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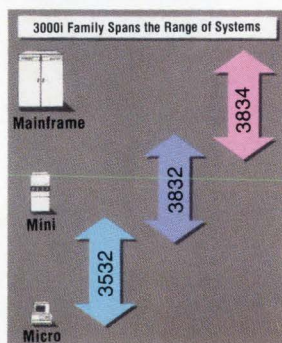
What's been needed is a family of tape drives offering the performance, price and form factor required by low-end and midrange systems. Plus an economical means of interchanging data from

low to high-end computers.

It begins with a new standard recording format: MSR-Multi-track Serpentine Recording. Now for the first time data can be interchanged from micros to small mainframes with amazing new levels of performance and economy.

Cipher makes this possible with an all new family of MSR-compatible half-inch cartridge tape drives. The Cipher 3000i family. Compared to standard technology, they offer space saving benefits that are nothing short of phenomenal.

The 3000i records on industry standard 3480-type cartridges,



each with a formatted capacity of 320 megabytes. An optional 10 cartridge stacker increases total storage capacity to 3.2 gigabytes. There are 2 different 3000i series with 26 models in all. The series with an 8-inch form factor is the

world's first tape drive system to address the size and high performance needs of workstations, midrange systems and small mainframes. The 5 1/4-inch form factor series will complement the economy and performance of micros and low-end minis.

cipher 3000i



What about backup speed? Transfer rates range from 242 to 896 kilobytes per second. For instance, a Cipher 3000i drive, using only 2 cartridges, can backup a 500 megabyte disk in just 11 minutes. A high performance GCR open reel drive takes 4 reels of tape and twice the time to do the same job.

The 3000i offers a choice of configurations including horizontal or vertical mounting, tabletop and 19-inch rack mount versions. System integration couldn't be easier with a wide selection of interfaces—Cipher/Pertec, SCSI and IPI-3. AC or DC power. And standard 9-track reel-to-reel functionality is

a special feature of the 3000i. This ensures compatibility with existing system software and protects the enormous investment in software development.

The 3000i continues in the same tradition as our 1/2" reel-to-reel streaming tape systems, now the industry standard. Cipher also developed cached tape drives, and the widely used end loading device on 1/4" streaming cartridge systems. The company is also at the forefront in optical disk drive technology, subsystems and interfaces—including the new SCSI-2.

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teams that don't tailor their designs to CSP's requirements. At the same time, users say, CSP offers no tools to help in the design process.

Finding Out the Hard Way

"CSP forces you into doing good design, but it doesn't really help you get there. If you start out with a bad design, you'll quickly lose all the productivity you're supposed to be getting from a 4GL," says Michael Graham, manager of investment systems for Oakland-based World Savings. World, which began using CSP three years ago on applications to manage its \$2.4 billion investments in mortgage-backed securities, found that out the hard way. It chose CSP because it wanted to do development under VM but execute applications under MVS. Midway through the first prototype, however, World fell behind schedule and was forced to stop and reevaluate the program.

"We found we'd done some improper design work," says Graham. World decided to redesign its application and try again with CSP. This time, the project was finished, but World still doesn't seem enthralled with CSP. "We're not using it now," says Graham. "It's a little better than a 3GL if you're working a small project with junior to mid-level programmers. But if you have people with a lot of experience, COBOL can actually be faster."

That seems to be the experience of many who have tried CSP. Market researcher International Data Corp., Boston, recently did a study of large systems users and found that of the 43% who were using a 4GL, 29% had tried CSP. While that made CSP the most widely installed 4GL in the study, many of those users reported that they weren't using CSP for production but mainly for prototyping, according to director of application tools program Scott McLarmon: "CSP still has a way to go. It's not really a competitive product."

Important DB2 Interface Upgrade

Not that IBM hasn't tried to upgrade CSP's image and its function. Recent upgrades have vastly improved CSP's interface to DB2 as well as its efficiency by adding functions such as a perform verb. Users say the DB2 interface upgrade was crucial. "Until recently, the DB2-CSP interface was virtually unusable," says Vaughan Merlyn, chairman of CASE Research Corp. of Bellevue, Wash. It was unusable because CSP didn't use the DB2 catalogue and didn't use static SQL queries.

More recently, IBM has tried to promote CSP by wrapping it more tightly in the SAA

cloak. In late September, Big Blue reaffirmed its commitment to convert at least the Application Execution portion of CSP to the AS/400 sometime next year. IBM has said it also plans to support the CSP execution function in the IMS/DC environment. Those are the last two SAA environments not somehow currently supporting CSP.

Although IBM hasn't said when CSP for the AS/400 will ship, the impression that CSP is becoming a more integral part of SAA is reassuring to users and developers who have decided to go with the IBM 4GL. One such developer is Integral Systems of Walnut Creek, Calif., which decided almost a year ago to develop its human resource software for DB2 using CSP. According to Integral SAA product manager Steve Knowles, "We really wanted something we felt would be developed along with DB2 and SAA. We feel we've been vindicated in that choice."

□ FEW THIRD-PARTY SOFTWARE DEVELOPERS ARE USING CSP DESPITE IBM'S PROMISES.

Integral is seeing development productivity improvements with CSP of up to 700% compared with straight COBOL, and run-time performance improvements of up to 50% with CSP. Moreover, says Knowles, IBM's commitment to CSP as an SAA language "means they'll continue to support it. They can't drop it, and that means our investment is protected."

Bringing CSP Up to Speed

While IBM promises continued CSP support, it's clear that the product is in store for some big changes soon. According to CSP business area manager Martha Rivers, IBM is working on three major fronts to bring CSP up to speed. First, IBM acknowledges user requirements for improved performance and features like a shared source library and application design tools. Because of those performance issues, IBM says only about 30% of its 3,000 CSP users are large S/370 users.

Second, says Rivers, IBM is working hard to support CSP in all of the SAA environments. That includes a plan to support CSP applications development at the workstation level. And third, IBM is planning to integrate CSP into its forthcoming Application Development Environment (ADE) architecture, due out next year (see Look Ahead, Nov. 1, p. 13). ADE is expected to offer a universal DB2-based data dictionary and repository, plus source library

and development tools.

To support all that, Rivers says IBM has increased the number of engineers working on CSP in Cary, N.C., to over 100. "We've been growing our investment in CSP for the last three years, and there's a lot of work ahead of us," says Rivers.

The biggest change for CSP may come as IBM tries to boost its performance. Many users and consultants criticize CSP for its interpretive approach to generating applications. CSP, unlike other 4GLs such as Computer Associates' Ideal, uses an intermediate language to generate code rather than directly compiling to generate a 3GL such as COBOL or object code. Critics say that this makes CSP too slow.

This summer, IBM took steps to change that, signing a software licensing agreement with a small Scottsdale, Ariz., company called Transform Logic Corp. The company, which has been in business since 1980, makes an expert systems-enhanced application generator that uses a common source library and generates COBOL and standard IBM JCL.

Reversing Fear, Uncertainty, Doubt

Until now, IBM has kept quiet about its plans for the Transform technology. That has prompted some third-party competitors to try "reverse" FUD strategy, suggesting that, despite what IBM has said about CSP being part of SAA, it will dump CSP in favor of a Transform-like application generator. In support of their claims, competitors point to language in IBM's SAA documentation to the effect that SAA application generator will be "based on elements of the interfaces found in" CSP, not necessarily CSP in its entirety.

Rivers acknowledges the Transform deal could change CSP over the next two years, and says IBM hopes to be able to offer users options. After developing applications using the current CSP, she says, users would have the option of generating and executing code in either the current interpretive way or, like Transform, in a compiled way that generates COBOL.

"But," says Rivers, "because CSP is announced as the SAA application generator, we will protect the investments our customers have made today using the current interfaces and allow them to migrate to the new level of interfaces."

That statement and the level of investment IBM is making in CSP probably illustrate as well as anything the challenge IBM faces in implementing SAA across its multiple architectures using existing products and technologies. It may also explain why many large users won't be committing to CSP any time soon.

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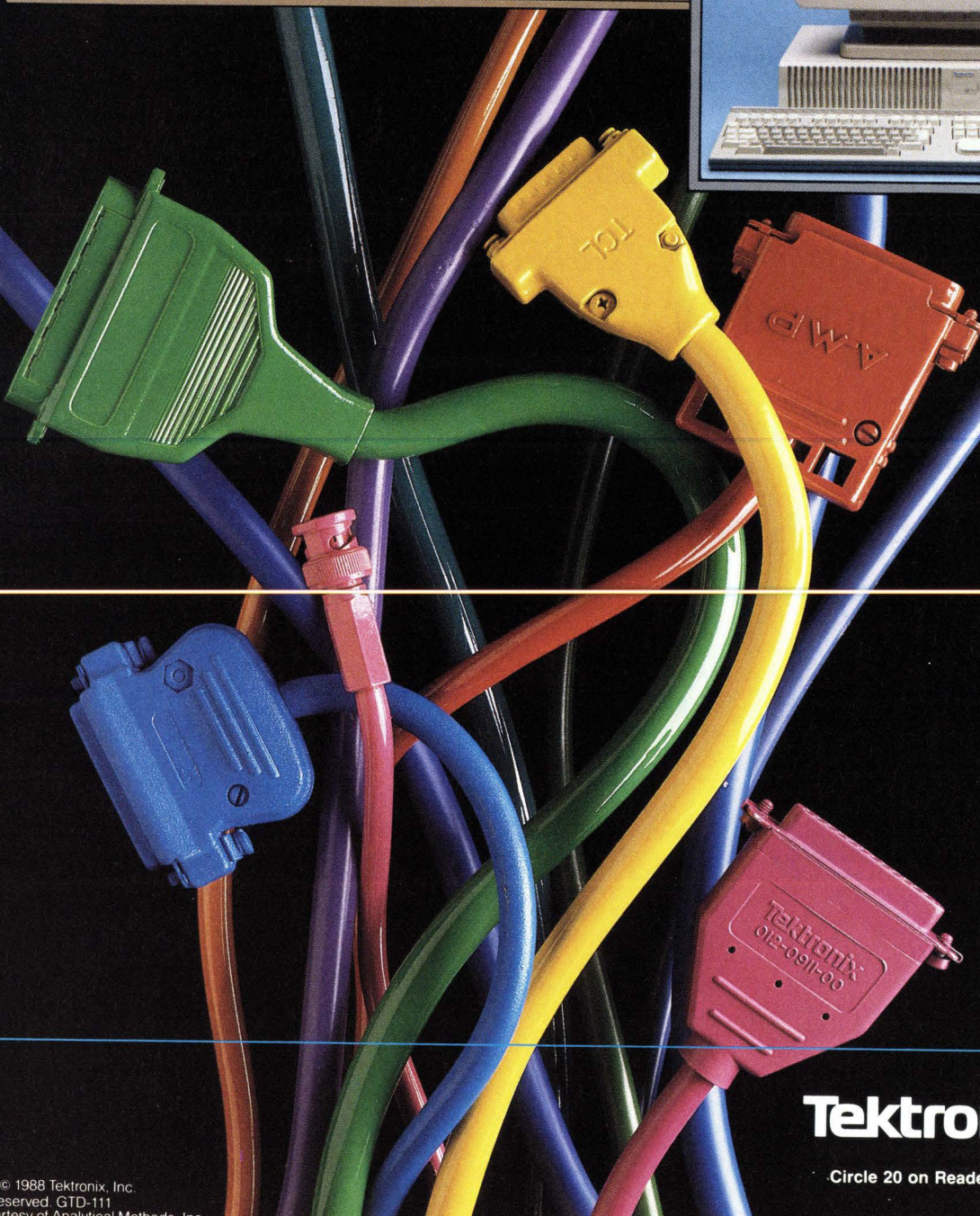
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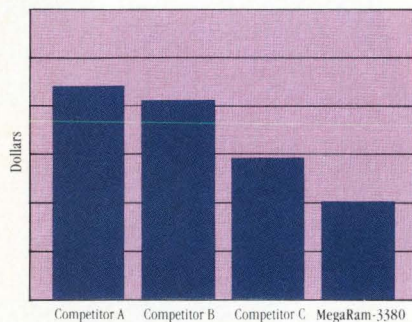
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Emulates the IBM 3880/3380 disk subsystem.

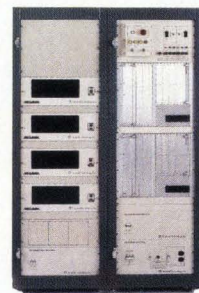
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Portables Get Raves On The Road

Portable computer sales are soaring. More than a million will be shipped in 1988. Meanwhile, the mighty midgets are remaking the sales and accounting businesses, and work is following executives to their homes and hideaways.

BY MARK HALPER

Nearly one million portables—from laptops to luggables—will be shipped in 1988, according to International Data Corp. The Framingham, Mass.-based company says this is up from last year's 740,000, and more than double 1986's 411,000. Moreover, applications for such itinerate circuitry seem unbounded, and include the tracking of corn niblets, multiple vitamins, frozen fish, dead moose, gasoline supplies and prices, corporate profit and loss statements, and Alka Seltzer.

The two broad categories of use are sales force automation—which gives on-the-road muffler and Twinkie salespeople access to inventory, price, and customer information stored on a distant mainframe—and off-site auditing and accounting. In the latter group, for instance, the Internal Revenue Service has armed its examiners with 18,000 Zenith laptops.

For sales automation, laptops are particularly popular with traveling consumer goods salespeople, who traditionally have hauled volumes of loose-leaf binders and spiral notebooks to keep them abreast of vital statistics. Laptops not only lighten their travel load, they offer them up-to-the-mainframe-minute information while they're out in the field.

"Many of our users are account executives who are on

the road all the time and work out of their homes," notes Terry L. Marksberry, who is director of management systems for Pillsbury Co., Minneapolis. Pillsbury's consumer food operation is issuing Zenith Supersport 286 laptop computers to help salespeople stock supermarkets with flour, cake and cookie mixes, frozen foods, and canned vegetables. About half of the 300 computers are in use, says Marksberry, and the other half will be distributed by the end of next year.

The company is setting up X.25 transmission to tie the laptops into a Novell Ethernet local area network in Minneapolis, which in turn is connected via 3270 gateways to an IBM 3090 mainframe, Marksberry says. The system will allow the user to download customer and product information from the 3090, and, using a Higgins Administrative System program resident in the LAN, to communicate via electronic mail with other portable and desktop computers.

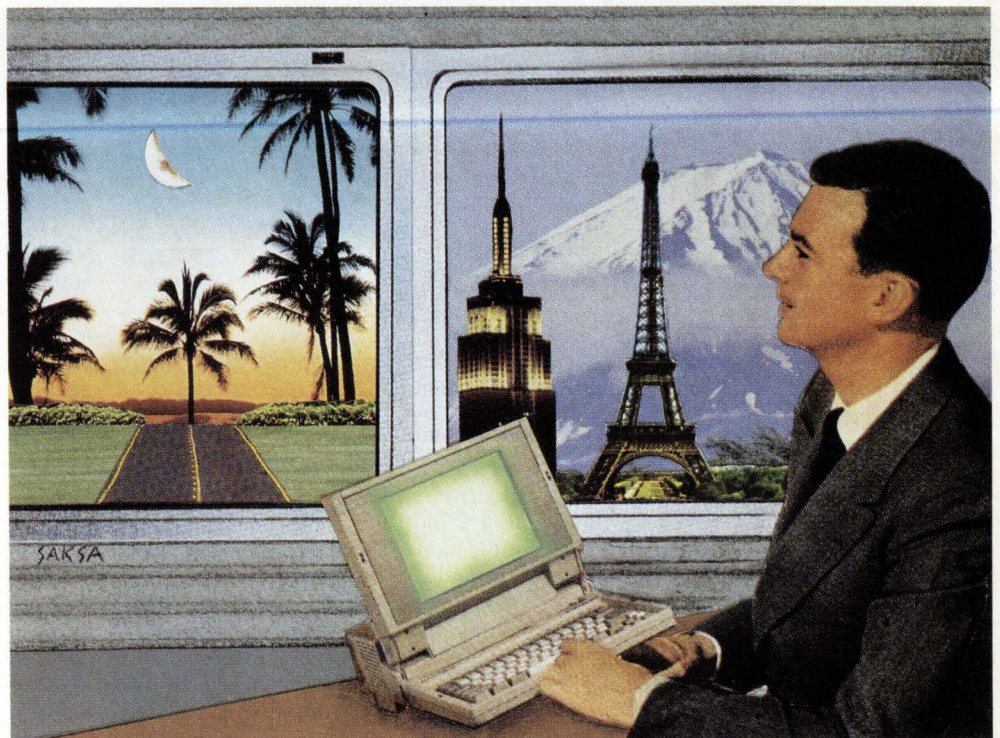


Illustration by Cathy Saska

SYSTEMS
PORTABLES

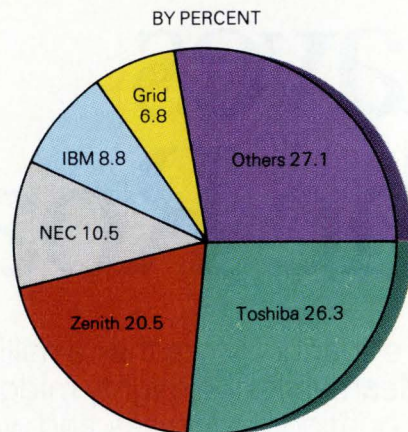
Miles Laboratories' consumer health care division has, for the last 10 months, equipped about 25 sales executives in Chicago, New York, and Philadelphia with NEC laptop computers. It plans eventually to have 100 units in circulation to help it sell multiple vitamins and Alka Seltzer to drug store chains, mass merchandisers, food stores, and other outlets. The division is also serving as a test for other Miles divisions. "We wanted to put technology out there to provide our salespeople with better information," notes Fred Randazzo, manager of sales training.

The company started with the 720KB dual-floppy Multi Speed model, and switched to the 20MB hard disk version out of speed and capacity concerns, Randazzo says. Sales officials use a sales communication program, developed by the company's MIS department to include electronic mail, a customer file, a sales progress report, order status information, and a form for reporting the salesperson's assessment of a sales call. Data are called down from an IBM 3081 mainframe and routed through a DEC MicroVAX II. Spreadsheet and word processing programs are also loaded. Software occupies a little over 2MB of the 20MB hard disk, says Randazzo.

Portables are also playing a key role for companies that are selling information

Who Shipped IBM-Compatible Portables in 1987

"Other" manufacturers dominated U.S. shipments of IBM-compatible portables.



Source: International Data Corp., Framingham, Mass.

"Much of the work time is spent at the client's site, and we move frequently from one to another," notes Don Smith, a Chicago partner, and chairman of the company's steering committee on microcomputer use. "We can spend as little as a couple of hours at some jobs. At others, like Exxon or Mobile, we're there year-round."

A typical configuration at a client's site is 640KB of RAM and a 20MB hard disk drive. About 5MB of the 20MB are occupied by internally developed and loaded programs such as tax and audit forms

and formulas, financial schedules, and memo writing, he says.

tomers to buy telecommunications software from D&B that would allow them on-line and on-board access to the constantly updated D&B database, which resides on an IBM 3090 mainframe.

D&B salespeople also use the Compaq to demonstrate disk-based company profiles with bimonthly updates, and a CDROM version of D&B's business reference directory, which in hardcopy "is about as big as four New York City phone books," Harris says.

Machine configurations vary and depend to some extent on when they were

and memo writing, he says.

"Downloading can be a substantial problem because of the lack of uniformity in the infinite variety of minis and mainframes our clients use," Smith notes. The company asks clients to copy needed files onto magnetic tape, which Price Waterhouse then processes through a reader in Chicago for downloading to the appropriate Compaq computer. The procedure, continues Smith, also helps address security concerns among clients who are able to deliver pertinent files without opening entire databases.

The company has been buying Compaqs since 1982 and, like D&B, buys new models as they come out. As more powerful machines are brought in, older models are kept for word processing and other "lower utilization" functions. Smith says Price Waterhouse has also retrofitted many of its earlier Compaqs with memory expansion boards and microprocessor accelerators.

While laptops and luggables raise the standard of efficiency for salespeople and auditors they may also spell bad news for some workers, like middle managers looking forward to next month's resort area seminar as an escape from office rigors.

With the communications capabilities of most portable units, executives on the road can—and are expected to—send and receive mail, file memos, and tend to other tasks that previously required on-site presence. "It used to be if a guy went to a conference for a week, the office would say, 'Oh, Fred's out until Monday.' Laptops have changed the way people do business," asserts Chris Broome, senior technical consultant for Arco Products Co., Los Angeles, the oil refining marketing segment of Atlantic Richfield Co.

About 60 Arco officials, described by

Laptops, Transportables in the U.S., Past & Future

Laptop and portable computer sales are being driven by the automation of sales forces and accountancies.

	1985	1986	1987	1988
IBM compatibles	80,000	140,000	400,000	600,000
Growth rate (%)		75.0	186.0	50.0
Other portables	72,000	120,000	218,000	190,000
Growth rate (%)		66.7	81.7	-12.8
Subtotal portables	152,000	260,000	618,000	790,000
Transportable pcs	245,175	151,600	122,000	148,000
Growth rate (%)		-38.2	-19.5	21.3
Total: portables & transportables	397,175	411,600	740,000	938,000
All business pcs	2,690,000	3,402,000	5,227,000	6,300,000
% portable & transportable	14.8	12.1	14.2	14.9

Source: International Data Corp., Framingham, Mass.

and that need to showcase their databases and downloading capabilities to potential customers.

Dun & Bradstreet Credit Services, Murray Hill, N.J., or example, has supplied its sales and sales support staff with some 200 Compaq portables. In 1985, it introduced the 8086-based model, and has purchased each of the subsequent 80286 and 80386 units, according to Ernie Harris, vp of electronic delivery systems.

The machines are used to persuade cus-

bought. They are generally equipped with hard disk drives, either 10MB or 20MB, a disk drive ranging from 360KB to 1.2MB, and a 1,200-baud Hayes or Hayes-compatible modem. The 3090 links are made in tty mode.

Compaq is also the brand of choice for auditing and accounting giant Price Waterhouse, which uses an estimated 2,500 units to download information to its nomadic number crunchers at offsite locations.

Chart by Catherine Francis

A Compendium of Top Portable Computing Vendors

Blue Chip Electronics

7305 W. Boston St.
Chandler, AZ 85226
(602) 961-1485

Master PC Portable

Circle 150

Compaq Computer Corp.

20555 FM 149
Houston, TX 77070
(713) 370-0670

Compaq Portable II, III; and 386 luggables

Circle 151

CTXT Systems Inc.

9205 Alabama Ave.
Chatsworth, CA 91311
(818) 341-4227

LTP-7 luggable

Circle 152

Data General Corp.

4400 Computer Dr.
Westboro, MA 01580
(617) 366-8911

DG One/Model 2T laptop

Circle 153

Datavue

One Meca Way
Norcross, GA 30093
(404) 564-5555

Snap 1 + 1 and Spark laptops; DV25 luggable

Circle 154

Dynamac Computer

14001 E. Iliff Ave., Suite 410
Aurora, CO 80014
(303) 695-7780

Dynamac SE laptop

Circle 155

Epson America Inc.

2780 Lomita Blvd.
Torrance, CA 90505
(800) 421-5426

Equity LT laptop; HX 20; and HX 40 laptops

Circle 156

Hewlett-Packard Co.

Customer Information Center
19310 Pruneridge Ave.
Cupertino, CA 95014
(800) 752-0900

Portable Plus and Portable Vectra CS luggables; will soon offer custom version of Zenith SupersPort laptop

Circle 157

IBM

155 Chestnut Ridge Rd.
Montvale, NJ 07645
(201) 930-5000

PC Convertible laptop

Circle 158

International Systems Marketing

943A Russell Ave.
Gaithersburg, MD 20879
(301) 670-1813

Express-286 and Express-386 luggables

Circle 159

Jonos International Corp.

930 South Placentia Ave., Suite A
Placentia, CA 92670
(714) 630-2771

C2100 luggable

Circle 160

Kaypro Corp.

533 Stevens Ave.
Solana Beach, CA 92075
(800) 542-9776

2000+ and 2020 laptops

Circle 161

Micro Express

2114 South Grand Ave.
Santa Ana, CA 92705
(800) 642-7621

The Roadrunner luggable

Circle 162

Mini-Micro Business Systems

P.O. Box 13063
Boulder, CO 80308
(303) 444-3746

Models 286 and 386 luggables; resells

ExecuMate laptops made by U.S. Micro

Engineering

Circle 163

Mitsubishi Electronics America Inc.

991 Knox St.
Torrance, CA 90502
(213) 515-3993

Big Screen Desktop/Laptop laptop

Circle 164

NEC Home Electronics

1255 Michael Dr.
Wood Dale, IL 60101
(312) 860-9500

Multispeed HD and EL laptops

Circle 165

Ogivar Technologies

7200 Trans Canada Hwy.
St. Laurent, Quebec
H4T 1A3, Canada

(800) 361-3694

286 Laptop

Circle 166

Sharp Electronics Corp.

Systems Div.
Sharp Plaza
Mahwah, NJ 07403
(201) 529-8200

Models 4600 and 5541 laptops

Circle 167

Tandy Corp.

1700 One Tandy Center
Fort Worth, TX 76102
(817) 390-3700

Models 1400 and 100 laptops. Also owns Grid Systems Corp., which offers Series 1500 laptops; GridLite Plus laptop; GridCase EXP laptop; GridCase Tempest (for military use). Phone: (800) 200-GRID

Circle 168

Toshiba America Inc.

9740 Irvine Blvd.
Irvine, CA 92718
(714) 583-3000

T5100, T3200, T3100 series; T1200, T1000

Circle 169

Trans PC System Inc.

11849 E. Firestone Blvd.
Norwalk, CA 90650
(213) 868-6930

LT laptops; LC luggable series; crt luggable; GP luggable

Circle 170

U.S. Micro Engineering

P.O. Box 17728
Boulder, CO 80308
(303) 529-8200

Models 286 and 386 ExecuMate laptops

Circle 171

Zenith Data Systems

1000 Milwaukee Ave.
Glenview, IL 60025
(312) 391-7000

SupersPort 286 laptop

Circle 172

Broome as "normal office workers," use Toshiba 1100, 1200, and 3100 laptop computers "to do work while they're away on business trips," typically using 1MB of on-board RAM and a 20MB hard disk drive.

Broome says the most common use for these laptops is dialing IBM's PROFS office automation software, which resides on a host 3090 at Arco's Los Angeles headquarters. PROFS connectivity permits portable users to transmit electronic mail, check their calendars and those of others

in the system, and schedule meetings. Among other tasks, PROFS also allows users to send documents to printers at other sites provided they are on the same IBM SNA network.

Meanwhile, north of the border, it was a seemingly eager bunch of workers that prompted the city of Montreal to purchase 20 Ogivar 80286-based laptop computers, each equipped with 20MB hard disk, 720KB floppy disk, and 1MB of on-board RAM. "Our [desktop] users mentioned

that if they had portable PCs, they could do more work at home," says IS director Claude Couture.

The city bought the machines from Montreal-based Ogivar in June, loaded them with Wordperfect, Lotus 1-2-3, dBase III, and DataEase, and distributed them throughout 20 departments. It will equip them with mainframe connectivity after it "installs a good security system with multiple level passwords," Couture says. Desktop-to-mainframe connections



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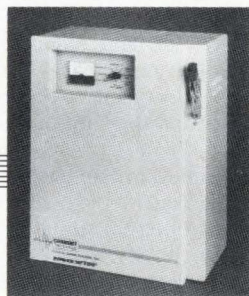
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SYSTEMS PORTABLES

are made via dedicated lines. "The central data include city land use plans. If somebody was able to figure out how to get hold of it, it could generate land speculation and this sort of thing," Couture notes.

Another governmental agency in Canada, the Ontario Ministry of Natural Resources, is using a Compaq Model II for both tracking and increasing its moose population, according to John Barbowski, information data systems coordinator.

One problem even more endemic with portables than with desktop computers is theft. It's not difficult to slip off with a 10-

☐ LAPTOPS ALLOW EXECUTIVES TO DO THINGS THAT PREVIOUSLY REQUIRED ON-SITE PRESENCE.

inch by 12-inch by 2-inch piece of plastic. Sohio Oil Co., the Cleveland-based gasoline retail arm of BP America, has taken a precautionary measure by preventing some 1,400 Tandy model 100 and 102 laptops from printing or running anything but proprietary programs downloaded into bubble RAM from one of 10 DEC MicroVAX IIs.

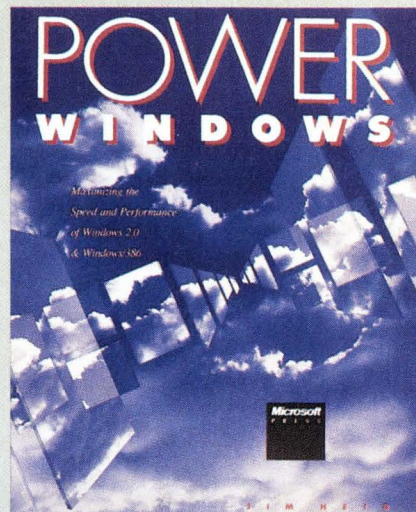
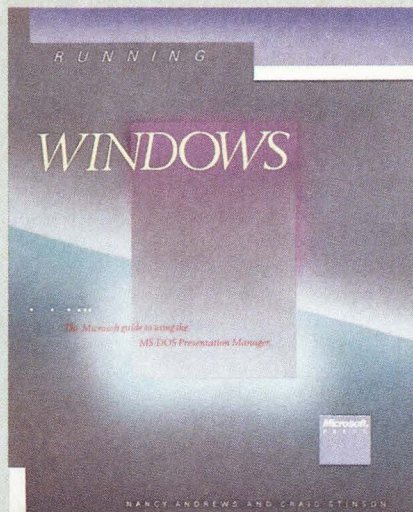
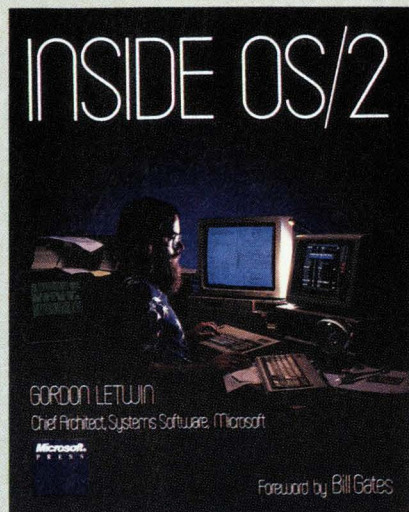
The company has issued one 128KB machine to each of its 1,400 service stations in the eastern U.S., for daily reports on sales and competitors' prices, according to Bryant Santini, manager of retail automation. (Sohio runs service stations under its own name as well as Gulf, Boron, Gibbs, and Gas & Co.) The Tandy-to-DEC transmissions are made in two-minute sessions via standard telephone point-to-point communications, although Santini says Sohio is considering establishing leased-line services for stations with long distance connections to a VAX. The regional VAXs route the daily information to either a Prime Computer Inc. or Hewlett-Packard mini in Cleveland.

While Sohio presently loads the programs into bubble memory, it is considering buying new replacement machines equipped with less-expensive static RAM for the same purposes, says Santini. To protect the machines from motor oil and other physical rigors of gas station wear and tear, Sohio shelf-mounts them and covers the keys with plastic. "There are a lot of gorillas out there banging on them," he quips.

Mark Halper is a freelance writer based in New York City.

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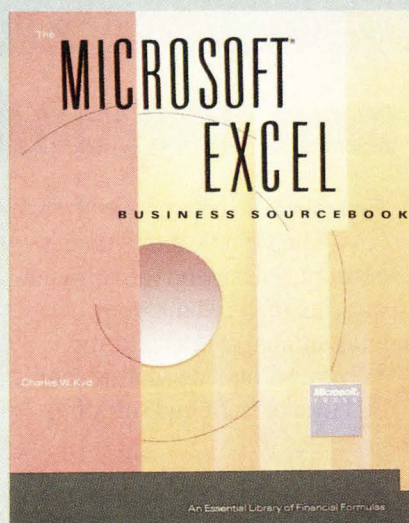
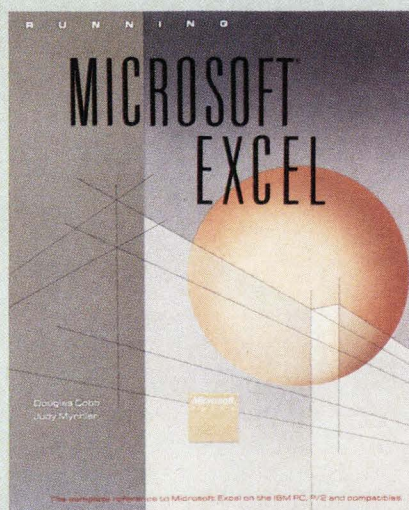
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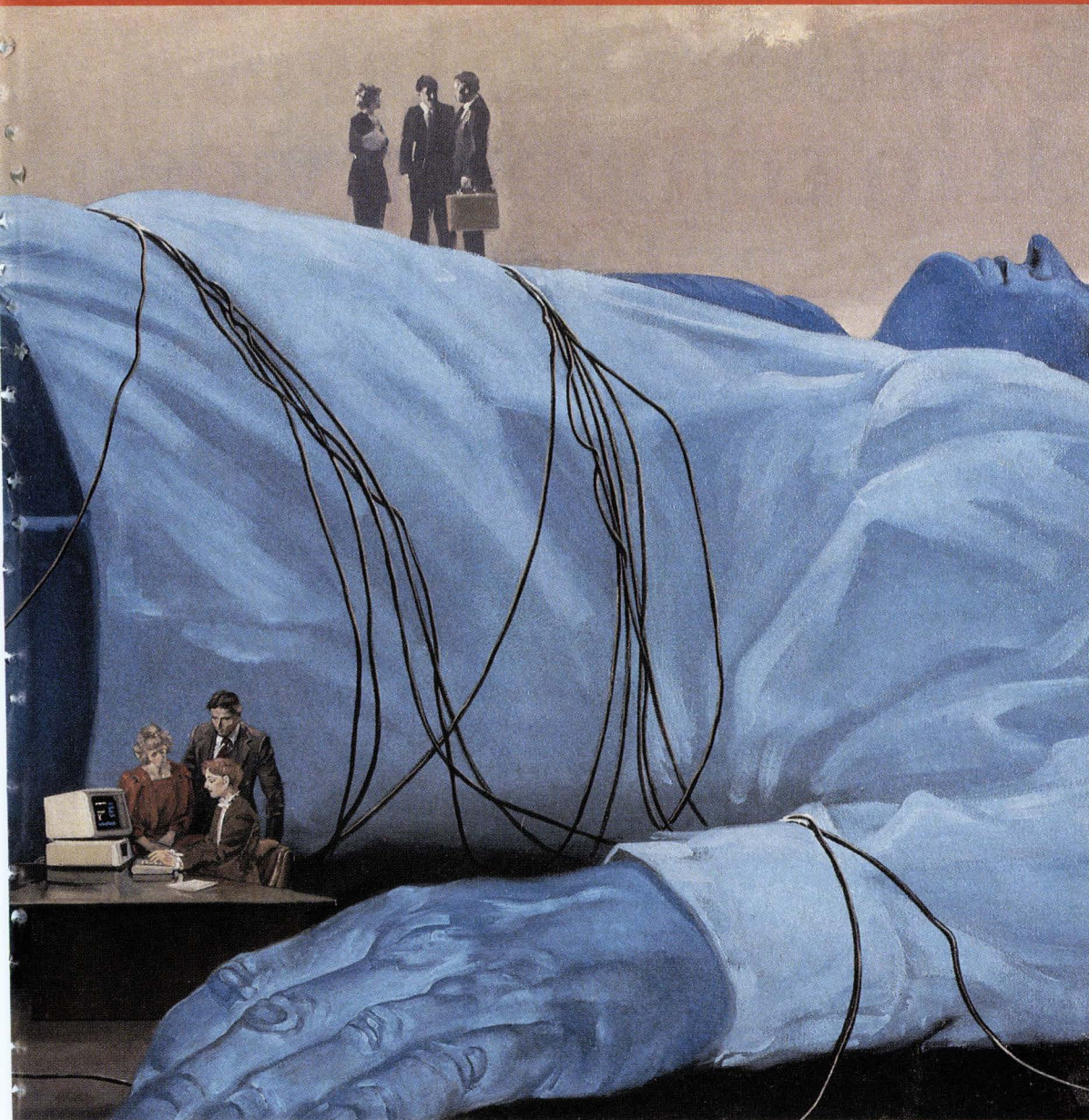
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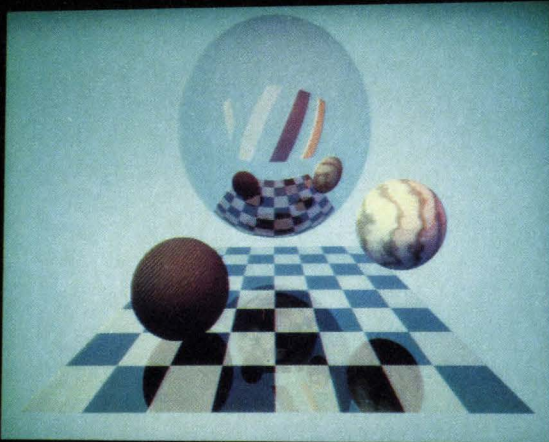
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Top Drug Firms to Digitize Documentation

The biggest pharmaceutical firms have recognized the value of digital document processing systems in reducing their R&D cycles and FDA approval time. Could it speed new drugs into the hands of the sick?

BY SCOTT C. McCREADY

Fifteen of the top 25 pharmaceutical companies are poised to spend \$23 million dollars over the next 18 to 24 months on the relatively new technology of digital document systems, according to recent research conducted by CAP International Inc., Norwell, Mass.

ICI Pharmaceuticals (Wilmington, Del.), Warner Lambert (Morris Plains, N.J.), Glaxo (Research Triangle Park, N.C.), and Pfizer (New York), have already taken the plunge. While the other 11 firms asked not to be identified for competitive reasons, they will all have optical storage-based document systems by the end of the year, at an average cost of over \$1 million. The remaining 10 have committed to spending \$17 million over the same period.

There are approximately 156 drug companies in the U.S., many of which are trying to speed the manufacture of new drugs by computerizing the new drug application (NDA) process with standard technologies (see "Is the Best Medicine for Drug Monitoring," Aug. 1, p. 41).

What is it about optical-based document processing systems that is prompting the major pharmaceutical companies to assign it a large portion of their office automation budgets? They have discovered that digitizing document images and processing them electronically offers the greatest potential for shortening the R&D cycle, the time required for Food and Drug Administration

(FDA) approval, improving the effectiveness of label design and approval, and minimizing other administration expenses.

"Senior management is finally beginning to wake up. We process documents. That is the essence of this business. Because of the long R&D cycle and the strict regulatory environment, we need every



tool available to improve the process and protect the integrity of our files," says a spokesperson for Ciba-Geigy, which is evaluating systems.

"This technology appears to be readily adaptable to the R&D environment," says David H. McCurdy, former ICI director of pharmaceutical research administration

and an internal pioneer of its system, now a consultant to the firm. ICI Pharmaceuticals began investigating the use of electronic documentation as far back as 1984 and, after determining its existing costs of managing documentation, became the first pharmaceutical firm to employ optical disk technology with a pilot FileNet Corp. system in January 1986.

A spokesperson for Warner Lambert says, "This is the first technology in perhaps 20 years that will allow us to alter the basis of competition within this industry. Internal efficiencies stand to save us millions of dollars, while the impact on the FDA could amount to hundreds of millions."

Pharmaceutical firms, however, face a particularly cumbersome, paper-intensive process of bringing a new drug to market, a process that can take up to 10 years and \$125 million to complete. Their health in the highly competitive industry is related entirely to their ability to innovate continually and bring those innovations to market first. Therefore, any investment in a technology—in this case, optical disk systems—that offers the potential to reduce radically the mountains of paper-based drug research information required by the FDA, while simultaneously offering significant economies for the R&D cycle, is money well spent.

The industry as a whole will spend in excess of \$5 billion on R&D this year, but the average product will still take eight years to complete the cycle unless the means for accomplishing the process can be altered radically.

Both phases of the drug approval process, as they are conducted today, present overwhelming document processing problems. During the exhaustive clinical testing required by the FDA of any new drug, pharmaceutical firms have to manage not only internal R&D but a great deal of research that is performed, of necessity, by organizations outside the firm's control. It is not unusual for a pharmaceutical

company to receive 600,000 case report forms per year from outside testing parties. Since these records are the "go or no go" evidence for the FDA to approve the drug, it is imperative that any incomplete case reports or patient records be clarified completely before being shipped to FDA evaluators. Today, clarifying the of-

SYSTEMS

IMAGE PROCESSING

ten incomplete case reports is done in batches, which usually are too large to be handled by phone and must be mailed back and forth between the pharmaceutical firm and the clinical testing site.

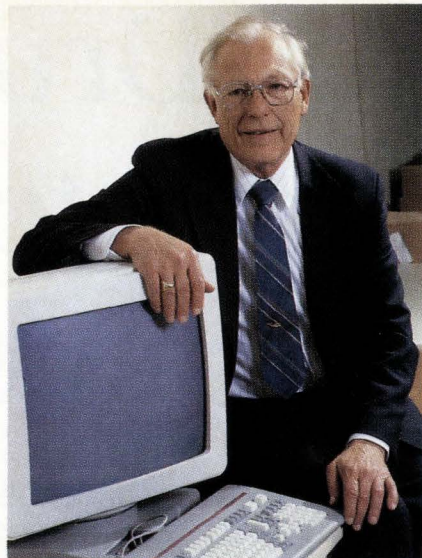
How to speed up the process of clarification? One answer: digitize the incoming documents and electronically route the report form to the appropriate department for review. Should further clarification be needed, those forms can be downloaded overnight to the appropriate testing center. The clarification process can then be conducted by telephone and annotations made to the document in real time. This is no small investment on the part of the pharmaceutical manufacturer, but the potential financial return is relatively easy to discern.

In the second phase of the drug approval process, the FDA requires that each pharmaceutical company deliver the clinical test results to the agency in a strictly regulated format for evaluation by an assortment of physicians and medical experts. The net result is that the pharmaceutical company has to create new docu-

mentation that compiles and tabulates the statistical information contained in the case reports. The statistics must be classified to clearly show whether the drug caused any adverse reactions or reacted with other medications, and its overall effectiveness.

Since 1962, NDAs have been submitted on paper as the law requires, commonly delivered by tractor trailer. While the paper method of document presentation has yielded a remarkable level of safety for the U.S. population, the price it exacts is twofold: the great cost, which is eventually passed onto the consumer, and the lengthy approval process.

Using paper slows the process, not only because of the huge volume of documents involved, but also because paper documents do not allow simultaneous access by multiple users. Therefore, should an FDA inspector require a piece of unavailable documentation to continue an evaluation, he or she simply will go on to another NDA. The volume of documentation precludes the FDA from handling multiple copies were they even available.



CONSULTANT McCURDY: Began looking at electronic documentation for ICI in 1984.

Furthermore, should an inspector require clarification, the entire process must be conducted by mail to provide a record of the change for legal protection.

The FDA approval process is not likely to improve by streamlining the documentation itself. In fact, though the FDA, for the first time in its history, rewrote the requirements for drug filings over the past

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three years, the table "New Technology Hasn't Helped Yet" shows this has not shortened the approval cycle.

Submitting NDA documentation via optical storage media is the most obvious solution to ultimately eliminating the paper glut, since one 12-inch optical disk can store approximately 50,000 pages. Unfortunately, until the law that requires NDA documentation on paper is changed, the drug companies will have to back up any optical disk-based NDAs with paper. The FDA has said it intends to change the law, though that could take years.

Using optical storage technology for NDAs would also allow immediate, multiple access to the same document and provide the benefits of on-line indexing techniques. Clarification requests would no longer have to be handled by mail, since sending images over telecommunications lines overnight is reasonably economical—if they are relatively few in number.

"The ability to rapidly introduce [this] technology to large paper-based files has been found to be possible, and integra-

tion into a computer-based information system is proven to be practical and readily implemented," says ICI's McCurdy. In June 1988, ICI was the first company to submit an optical NDA to the FDA. That NDA was backed up with paper documentation.

Once a drug has been approved, there is a step that represents another potential application for digital document systems: the design of an appropriate label and directions. To a greater degree than in the consumer products world, pharmaceutical companies have to be concerned about accuracy and safety in labeling.

The design of an appropriate label can become a nightmare of coordination to ensure that everyone is working with the latest version, and get the appropriate level of approval. The process can be streamlined and accelerated by digitizing the original draft and electronically routing it to the right people, along with the appropriate deadlines for changes and final approval. As with many applications for optical document systems, the net economic benefits are usually derived from being able to move the image around the

office electronically and enforce discipline on the business system via work flow software.

Marketing & Legal

The introduction of any new technology always raises the issue of which departments should be able to access it and, perhaps, thereby contribute unforeseen benefits to the entire organization. Pharmaceutical companies could benefit by extending the system to the marketing and legal departments.

Marketing may be more of a hands-off proposition in the pharmaceutical industry than, for example, it is in the automobile industry, where marketing tends to set product direction and development.

Marketing's potential to contribute to the R&D process was demonstrated in the case of a pharmaceutical company that was developing a drug to control high blood pressure. The drug was successful in its primary goal, but marketing personnel noticed that it also caused weight loss. Therefore the drug had a potential secondary market that was missed by the origi-

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nal development team, but which could have provided a lucrative potential revenue stream sooner than it did.

Because the potential legal liability incurred by the introduction of a new drug is large, the legal staff must also be able to have access to R&D information to try to anticipate problems related to safety or effectiveness.

If optical document systems offer such improvements in the drug manufacturing process, given the hundreds of millions of dollars at stake, why aren't all pharmaceutical companies clamoring to have systems in place? Several issues have to be resolved prior to the optical NDA becoming a full-blown reality: FDA funding, system standards, and man's inevitable preference for homeostasis.

FDA Funding

Despite special congressional budget approval for a separate department to speed up approval of AIDS-related drugs, the FDA is severely underfunded. This year's FDA information systems budget, according to an official there, is "about \$3.5 million, with \$2.5 million of that scheduled to be spent on hardware, but this represents a figure much higher than the average funds available historically, and it is not certain that next year we will be able to spend as much."

Even if the FDA had the money to invest in digital document systems, a lack of standards makes its selection of a single system difficult. The issue is especially problematic, since the FDA must service the approximately 156 companies in the U.S. actively involved in the drug R&D process. Those pharmaceutical firms will undoubtedly purchase systems that reflect their individual methods of research and development. The dilemma arises in that the FDA cannot afford to invest in incompatible equipment or to train their examiners on a variety of systems.

The same standards problem arises within the pharmaceutical companies themselves. "Standards are an issue," says a Squibb spokesperson, "since there is certainly the need to have interoperability within the corporation, but we don't have that now, since departments use a variety of document creation programs and microfilm still remains lacking in the standards arena."

Issues such as file structure and media size standards, which would allow media interchangeability, are problems, but indexing, screen layout, and database query

facilities are more pressing problems. In fact, says a high-level spokesman for the FDA Center for Drug Evaluation and Research, in Washington, D.C., "The issue is not media interchangeability. What is vital is a standard software to manipulate the data portion of the image."

One of the biggest problems in setting standards for digital image systems is their conflict with expected advances in the technology. Some of those improvements may include expert system-type logic for the database query facility that would translate queries between multiple

age systems can be overcome, however, as the Upjohn Co. of Kalamazoo, Mich., has found. "We will have several systems in the near future, but they will have to use our existing workstations in order to keep cost down on a per-user basis," says an Upjohn spokesperson. Before Upjohn can use its pcs as image workstations, however, it will have to equip them with add-in boards to provide upgraded communications, image compression/decompression, and between 2MB and 10MB of extra RAM.

We all talk about technology as a competitive advantage but rarely do we take the time to classify technologies into those that provide a tactical advantage and those that offer a strategic pathway to success in an industry. Image processing is that technology pathway of the '90s.

Some companies have recognized image processing as such. "This is a tightly knit community," says a representative of Hoescht-Celanese, New York, "and optical systems is the most frequently discussed topic at industry gatherings. Everyone is seriously looking at it, but the pharmaceutical industry is traditionally closed to outsiders, therefore no one wants to talk about what they're doing."

The fact is that the pioneers of this technology have a strategic advantage in an industry that has been traditionally reluctant to adopt any new technology. ICI Pharmaceuticals has a two-year lead over Warner Lambert, Glaxo, and Pfizer. The next tier of adopters are another 12 to 18 months behind those three. The question becomes, what further shot in the arm will it take for the rest of the industry to wake up? Or will they continue to behave like a child after a tetanus injection, thinking that, if they just sit on their hands, it won't hurt too much?

Up until now, pharmaceutical firms could have responded that way to a new technology with no ill effect, as success in the industry was predicated solely on the drug R&D and marketing efforts. As the spokesman for Warner Lambert indicates, however, the potential for image processing means that the most successful pharmaceutical companies will be those that take a leadership position in office systems technology.

Scott C. McCready is associate director of the optical disk systems market research group at CAP International, Norwell, Mass.

Technology Hasn't Helped Yet

The average time required to get a drug approved has not shortened, although the worst-case situation has improved.

	1983	1984	1985	1986	1987
New Drug Applications	94	142	100	98	68
Average Approval Time*	14.7	18.7	22.1	21.6	27.0
Best Case	.9	1.5	2.6	1.2	2.9
Worst Case	93.3	131.3	121.0	127.5	87.3

Source: FDA, 1988

Approval times are measured in number of months.

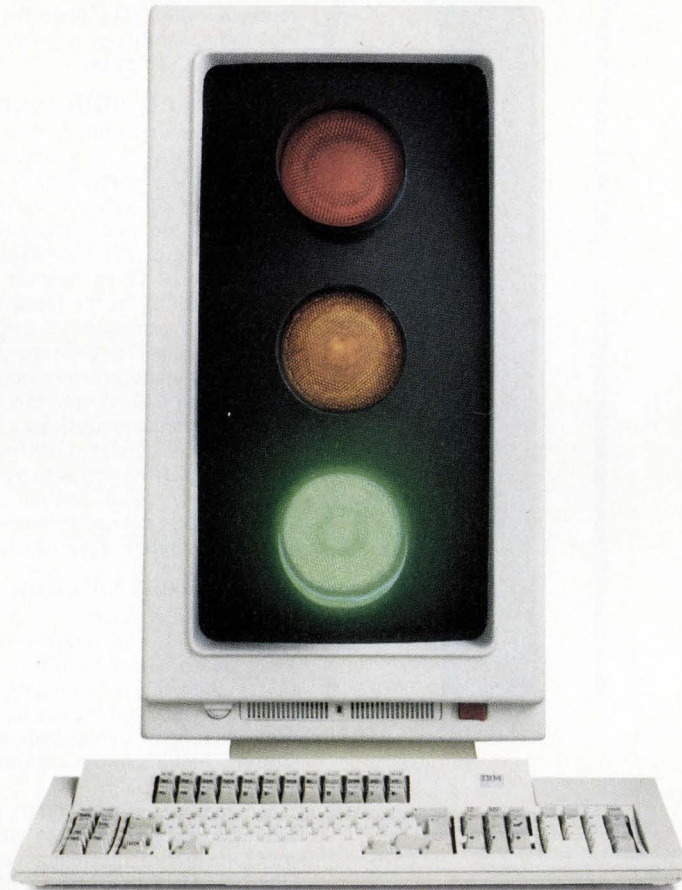
vendor environments. A natural language interface to statistical test results would allow researchers and FDA reviewers to recombine data to obtain new statistical findings. Improved scanning technology will allow the data portion of the image to be converted into a form that can be manipulated.

Standards at the physical level, as defined by ISO, are not likely to exist for several years. Still, an advisory body made up of FDA officials, pharmaceutical manufacturers, the vendor community, and pharmaceutical associations could take the first step toward uniformity by separating data standards from image standards, which would pave the way to further progress. This is not an application of technology that can wait to be sorted by standards committees or de facto standards; getting drugs approved quickly involves the welfare of the nation.

Given man's tendency to perpetuate the status quo, it is relatively easy for end users to review digital document systems and decide that the technology is not quite there yet or that the system cannot be cost-justified. Cost-justifying any piece of office automation equipment is a large task since many of the benefits are difficult to quantify. Just ask IS managers to cost-justify upgrading a System/36 to an AS/400.

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3 NY Purch	Green	Green	Green
4 DC Borch	Green	Green	Green
5 SF Sales	Green	Green	Green
6 HIS Test	Green	Green	Green
7 DB2 Test	Green	Green	Green

Enter PF1=Help PF2=Return from ZOOMed OMEGAMON

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What's Ahead For IBM's On-line Systems

Evidence is emerging that the major products found in the IBM on-line systems environment today are converging toward a more uniform architecture in which each product plays the role it is best suited to play.

BY JAN RYPDAL

Today, the IBM world of on-line systems primarily consists of CICS and IMS/DC. Once, both CICS and IMS/DC tried to do everything for everybody, but a new picture of the once-competitive systems now seems to be emerging. Ac-

ording to various IBM presentations, the products are evolving in different, yet converging, directions.

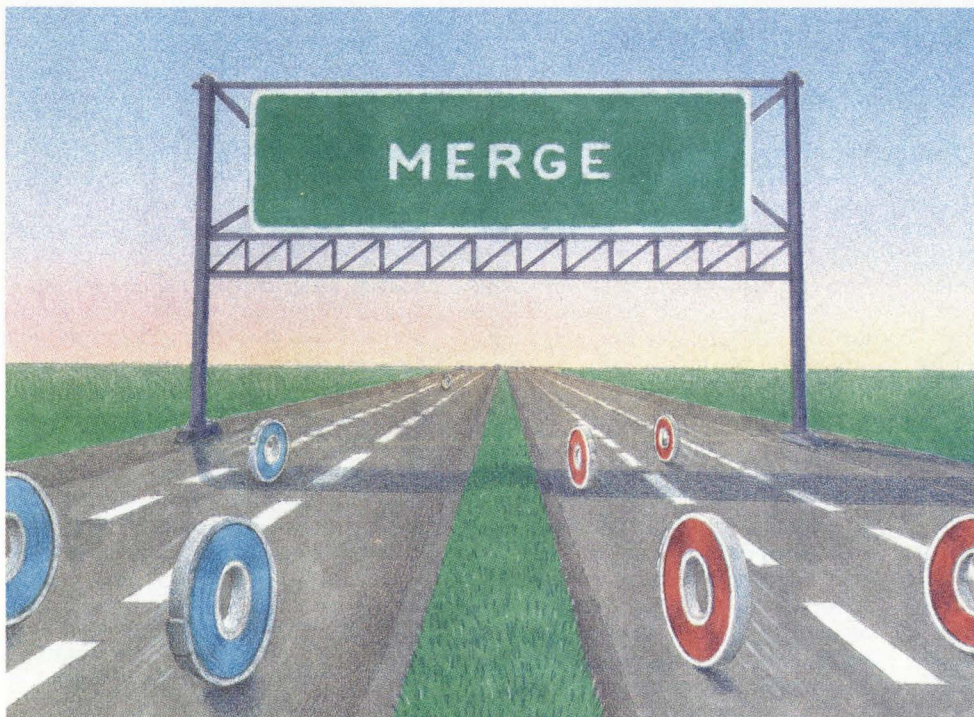
While IBM probably will clarify further its directions during the 1990s, currently available information and the evolution of

the software to date indicates that CICS, IMS, and DB2 will converge into an on-line system:

- CICS will be the IBM on-line system of the '90s as it becomes responsible for data communications and terminal and applications handling.

- IMS/DC apparently will be positioned for the foreseeable future as the agent responsible for disk logging, recovery, data sharing, and other back-end operational functions; and
- DB2 will be the primary database component, supplemented with IMS, DL/I, and Fastpath as special requirement database components.

Part of the evidence for these conclusions can be found in the work done at IBM's Santa Teresa, Calif., lab, which is responsible for IMS and DB2. Both IMS and DB2 have evolved rapidly with respect to backup/recovery, disk logging, and data sharing, particularly the latter two. Today, however, terminal handling, networking, and other transaction processing (TP) facilities of IMS/DC are almost as primitive as they were in the 1960s.



CICS, on the other hand, even if still greatly troubled with its macro-level applications support, has evolved strongly in the TP area. Examples of this are LUC, as it was originally called (now LU 6.2), auto-install of terminals, and on-line definition of (so far only selected) resources.

This restructuring, with the on-line applications executing under CICS in the data communications part of DB/DC systems, can easily be misinterpreted as CICS winning a battle with IMS/DC. More precisely, however, it seems to be an example of IBM finally bringing together its hardware and software into a more uniform architecture. Its push in this direction is shown also in its announcements in support of Systems Application Architecture (SAA).

Future DB/DC Structure

Based on today's available information, it seems reasonable to assume that within a few releases, CICS will get access to IMS logging and recovery, just as it already has access to IMS's Database Recovery Control (DBRC) and data sharing mechanisms via IMS Resource Lock Manager (IRLM). Likewise, it seems reasonable to assume that IMS Fastpath databases will become available to CICS and others as a separate subsystem, as is DB2 already. (DL/1 has been available to CICS for many releases. However, it was not many releases ago that CICS had to manipulate DL/1 into believing it was driven by IMS/DC. Today,

DL/1 accepts both IMS/DC and CICS as its transaction processing monitors. DL/1 is also expected to become a separate subsystem like DB2.)

These new components will give CICS some long-awaited functions, such as dual logs, dual database copies, and better recovery routines.

□ CICS SHOULD GET ACCESS TO IMS LOGGING AND RECOVERY IN A FEW RELEASES.

As CICS already has started to make certain functions obsolete, such as ISAM files and VSAM ICIP (a not-very-successful CICS Fastpath implementation), users can expect that its ultimate use of other IMS components or separate subsystems will make more functions obsolete. This evolution points toward CICS as a relatively pure TP monitor, depending upon other systems for functions earlier contained within the basic system.

For most new IBM systems, CICS is already the preferred TP monitor. The only major exception is special high-performance financial systems, where IMS/DC Fastpath has proven itself as the best performer.

To be able to take advantage of the expected changes in the DB/DC area, installa-

tions need to position their DB/DC systems, software, and support organization. Existing IMS/DC users need not worry or do anything special to position themselves for the expected DB/DC system of the future. IMS has always tried to hide any changes to the system for the Application Programming Interface (API) and will continue to do so.

Installations that are happy with or able to live with IMS/DC's lack of connectivity and lack of cooperative processing should stay with it. IMS/DC can be expected to stay around as we know it today as long as IMS/DC systems are running in installations. If, however, the installation needs LU 6.2 and other terminal controlling features, probably the best approach is one in which new DB/DC applications systems using CICS and DB2 or DL/1 are developed and which leave the older systems intact until they are replaced by new applications that are developed in-house.

The Right Strategy

For existing CICS users and the IMS/DC users converting to or starting to utilize CICS for new systems, I believe that the right strategy for positioning tomorrow's systems comprises several steps.

All terminals accessing CICS should, if possible, be pipelined through a single terminal region, perhaps also with a printer region, depending upon the number of printers.

Applications should be grouped together based upon common files, databases, and programs in one or more application regions. Old application programs written in Macro Level should be converted to or rewritten in Command Level.

If possible, any dependency on the CICS four-character terminal ID should be avoided. For identification purposes or resource keys, use the eight-character Netname. Whenever the terminal name must be used, base this on the Exec Interface Block (EIB) or try to use the same algorithm for converting a Netname to a terminal name that is used when auto-installing terminals. (As long as CICS supports Macro Level, there will be some problems with limited key lengths and identification of resources, such as for Temporary Storage. In these situations, the four-character terminal ID can be used in conjunction with the transaction ID for uniqueness.)

Printing transactions should no longer be developed; use instead the SPOOL interface in CICS. VSAM files and DL/1 databases can be separated in one or more File/DL/1 Owning Regions. Beware, however, the

An Emerging Niche Market for the CICS Environment

IBM would seem to have its hands full in catering to the growth in CICS systems by adapting the CICS structure to the new software and hardware components becoming available. It seems unlikely that IBM will have the resources necessary both to restructure the basic system and to provide adequate tools needed by applications programmers, systems programmers, and operators/supervisors. Some vendors already have recognized this and provide excellent tools for selected areas, such as storage control (CICS only), debugging tools, dump handling, and performance monitoring.

A new niche that will increase in importance, and from which new systems and software will emerge, is operations control and monitoring. Some examples of the needs outstanding in this area include:

- consolidated message handling for all

regions in a CICS complex;

- consolidated operator and systems programmer interface to all regions in the complex from a single transaction in a single CICS region;
- on-line definition not only for transactions, programs, and terminals, but also for files and database resources, among other items;
- broadcast and message services across all regions in a CICS complex, with appropriate applications interfaces;
- automated actions on the various error messages, automated time-initiated services for triggering CICS internal or external activities, such as closing down databases, submitting batch jobs, and re-opening the databases automatically upon batch job completion; and
- consolidated performance monitoring, as some vendors are beginning to offer.

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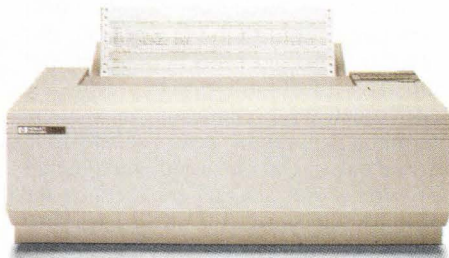
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gross overhead of DL/1 function shipping, as this is still based on the old internal CICS architecture. IMS's expected evolution with DL/1 as a separate subsystem will provide automatically a Database Owning System. For VSAM files, the preferred method is to let each application region own its own files and to function-ship requests for common files between application regions.

The Right DB Storage Strategy

The optimum database storage strategy as it relates to the on-line environment today seems to be to take the following steps.

For high-performance databases, consider DL/1 HDAM or use VSAM files instead of databases. Try to avoid features like alternate indexes, which will make later conversion to Fastpath databases difficult. When the Fastpath subsystem becomes available, consider converting the HDAM databases or VSAM files to Fastpath databases. If neither HDAM nor VSAM provides adequate performance or recovery/restart capabilities, use IMS/DC Fastpath instead. (It should be noted that the hardware options for disk duplication may be used as an alternative to the software duplication of logs and databases provided by Fastpath.)

For normal performance requirements, balance DB2 ease of use with DL/1 performance and functions. For users that can accept the lower performance and lack of intra-cpu data sharing of DB2 today, it should be the preferred choice. If DB2 is not selected, make sure the data is normalized so that a later conversion to a relational database management system is possible.

When selecting software packages for the CICS environment, make sure the packages conform to the following criteria:

- The package must be written in Command Level or the vendor should have officially committed to convert the package to Command Level. (Some packages, while written primarily in Command Level, are reliant upon some control blocks in CICS, DB2, and DL/1 to be able to perform their functions. For these packages, the vendor must have committed to eliminating the usage of such control blocks as soon as other interfaces are provided by IBM.)

- The package must be able to support transaction routing and the standard Multi-Region Operation (MRO) and Inter-System Communication (ISC) facilities. No functional differences should exist, regardless of whether the package is run in one single, independent CICS region, is

transaction-routed to an application region, or is accessed in the application region via the CICS routing transaction "CRTE." Ideally, the package should be capable of being split over more than one application region without any functional differences or problems arising.

Just as important as selecting the right software package is selecting the right vendor. When shopping around, keep in mind several guidelines. If possible, do not select single-function packages from different vendors. Instead, select multi-function packages, or packages from a broader product line, i.e., from a limited number of vendors. Make sure the vendor is willing to accept end-user suggestions

□ UNFORTUNATELY, IBM HAS NOT YET ADDRESSED THE IMPACT OF THE CICS CHANGES ON IS ORGANIZATIONS.

and requirements, and that it has demonstrated its ability to adjust to new software structures. Try to make sure the vendor has sound plans for future releases of its products and that these fit into IBM's emerging DB/DC structure. In addition, make sure the vendor is sound enough financially to ensure continued product development and support.

Supportive Organizational Changes

Unfortunately, to date, the impact of the CICS changes on IS organizations has not been addressed by IBM and is compounded by today's shortage of systems programmers. CICS, which once was a simple to install, single-region operations system, has grown into a complex, multi-region system that is difficult to install and maintain.

The systems programmer must assume full responsibility for the region setup and usage, as opposed to IMS/DC, where all regions are generated from a single system generation. CICS/VS 1.7 provided no systems programmer relief in this area, and CICS/MVS 2.1 doesn't seem to provide any such relief. While eliminating most of the terminal generation, new problems have arisen due to a lack of acquire options and problems with starting transactions for auto-installed terminals. CICS 2.1 will have XRF (hot standby) capabilities, as did IMS 2.1, but the systems programmer will have even one more option to cater to.

Having yet another responsibility can be problematic for systems programmers today, who often have to fill many roles si-

multaneously: applications support, end-user support, and, in smaller installations, sometimes technical support, troubleshooting, firefighting, and software strategy planning.

Consequently, installations should try to utilize scarce systems programming resources as efficiently as possible. Certain organizational changes, accompanied by the acquisition of appropriate software tools, can provide great relief for systems programmers and make it easy to perfect the on-line environment when tools do become available. Try to standardize the environment as much as possible, and let junior systems programmers or trainees perform the necessary generations and region setup.

Set up the production environment so that errors are avoided as much as possible:

- control all resource definitions centrally;
- make sure fallback possibilities to the previous resource definitions and program versions used are always available;
- run storage protection tools in quiesced mode, ready to be turned on in case of problems, or use stabilizing software for the production regions;
- protect all systems transactions, such as CICS master terminal transactions and debugging transactions; and
- automate general error handling and file/database close and reopen for batch processing.

Make applications programmers independent of the need for systems programmers' assistance by providing tools in the applications testing environment for storage control for all user applications, debugging, on-line dump handling, on-line performance monitoring and reporting, on-line definition of needed resources, access to necessary CICS master transactions, consolidated message and alarm message handling, and transaction and resource status and action capabilities.

If it has not already been organized, set up a special help desk to handle end-user problems, and provide the necessary tools for them to be able to diagnose problem situations without systems programmer assistance.

Such tools should provide access to necessary CICS master transactions, consolidated message and alarm message handling, transaction and resource status and action capabilities, on-line performance monitoring and reporting, and broadcast and log-on message possibilities.

Some of the tools listed above are already available from a number of vendors,

while others are yet to be marketed, and it is not possible to achieve a full systems programmer offload immediately.

The effects of technical changes in the DB/DC environment, the suggested organizational changes, and use of software tools are difficult to estimate in terms of measurable economic savings. Even without exact numbers, however, there is no question that the potential direct and indirect savings through increased productivity are large.

Nevertheless, the restructuring of IBM on-line systems, as described here, should provide the following benefits:

- For installations running both IMS/DC and CICS and requiring access to the same data, the costly duplication of data and overheads with LU 6.1 ISC solutions and/or data sharing can be eliminated when all DL/1 and Fastpath data is gathered in separate subsystems.
- CICS recovery/restart capabilities will improve, reducing the number of outages and amount of downtime, if outages do occur.
- CICS DL/1 function shipping, with its

gross overhead, will be eliminated.

- DL/1 and Fastpath database recovery will be more manageable, with the subsystem in charge of the recovery process.
- Resulting simpler applications solutions will require fewer CPU cycles and be less error prone.
- As DB2 usage becomes even more com-

□ IT IS DIFFICULT TO ESTIMATE WHAT THE COST SAVINGS FROM CHANGES TO DB/DC WOULD BE.

mon, its ease of use will continue to provide programmer productivity increases.

The beneficial effects that can be realized from organizational changes and the use of appropriate software tools include the following:

- fewer systems programmer disturbances for minor problems in large installations, which can save as much as a man-year or even more;

- more independent applications programmers who do not have to wait for systems programming assistance; this can give the individual CICS applications programmer an efficiency increase of anywhere from 5% to 10%, depending upon the installation—for large installations, this can save many man-years; and
- by handling all the time-consuming end-user assistance, more independent help desk operations can—in large installations—save many man-years in other parts of the organization.

Overall, the most important benefit of the expected, and suggested, changes in these systems will be higher-quality end-user services and increased responsiveness to end-user problems. For today's highly competitive businesses, this could be an important element in achieving a competitive edge over less well organized companies.

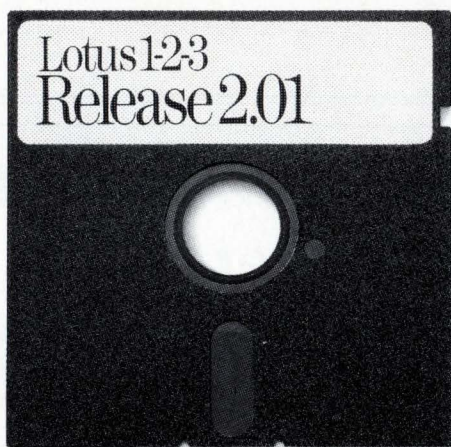
Jan Rypdal, managing director of FD Software AS, Oslo, Norway, has headed numerous user group activities and projects nationally and internationally in the IBM DB/DC area.

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Impact Of New Technologies

When it comes to electronic publishing, good crystal balls are a scarce commodity. The technology has evolved so quickly that industry soothsayers trying to identify trends see only the haziest of outlines.

One certainty, however, is that new hardware and applications software now under development—spurred by the demands of sophisticated end-users—will raise electronic publishing to a new performance plateau. Five years from now, the process will be easier, faster, and far more comprehensive than it is today.

Indeed, one of the keys to the future of electronic publishing is already here. Workstations built around 32-bit processors like Sun's Scalable Processor Architecture (SPARC), Motorola's 68030, and Intel's 80386 will have the processing power to run larger, more feature-rich publishing applications packages.

Such programs, for example, may someday incorporate the expertise of a publication layout designer. Using artificial intelligence software techniques, a smart electronic publishing program will evaluate a document as it's being composed to see if it follows the basic rules of good design layout and typography.

Such an intelligent publishing program might suggest more readable fonts for specific portions of a document—for example, to set off a list of machine parts from the running text of a maintenance manual. It might alert the user that the headline's type size is too large or too small. And it might question the use of italics in a certain context, and suggest better placement for an illustration to give proper balance to the page.

Along the same lines, a publishing

*By Dan Holtshouse
Mr. Holtshouse is manager of document processing systems marketing support, Xerox Corporation.*

Workstations will run smarter application programs, and be integrated with more sophisticated input devices.

system might also make recommendations as to the overall document format. A user might begin a session by specifying the type of publication to be created—say, a maintenance manual for use by service technicians for a digital PBX. An intelligent publishing system could weigh the expertise of the user, the time frame of the project and other variables, and then suggest two or three appropriate formats, commenting on the merits of each. The user could then add his or her own ideas, building upon the suggestions of the expert software.

Publication departments are continually seeking productivity improvements, and expert software could be used to manage the flow of multiple jobs through a publishing system. Expert software could help optimize the output of a busy production department by dynamically:

- deciding which high-speed laser printer to use;
- choosing electronic or offset printing on the basis of run-length economics and turnaround time; and
- selecting the ideal distribution method—for example, remote printing at the point of need, or centralized batch printing with mail or bulk delivery.

Building this degree of expertise into an electronic publishing system is entirely feasible. Expert systems are

already helping physicians diagnose illnesses, petroleum engineers search for oil, and telephone companies to lay out their Yellow Page directories. These tasks are certainly no less complex than choosing a document's format.

Intelligent tools such as this would answer one of the criticisms of electronic publishing—that very sophisticated graphics tools are being put in the hands of less sophisticated end users. By incorporating an expert system, publishing software would enable more people, with less training, to produce professional-quality documents.

Beyond boosting user productivity, artificial intelligence can also contribute to the actual performance of a publishing system. The way a publishing system uses scanned images provides a case in point. Today, most optical character recognition (OCR) scanners are limited to performing simple translation of a raster image of a character into its ASCII code equivalent.

In the future, a system will not only recognize the ASCII contents of a hardcopy document, but its style and format as well. The system would then translate these values into a universal formatting language that could be used as a starting point to build another document without having to start from scratch. For example, the system might automatically create a style sheet for a scanned document by reverse-specifying page headers and footers, column measures, margins, placement of graphics, font styles and sizes for headlines, subheads, body copy, captions, etc.

The user could then apply this style sheet to other documents without having to rekey text or redesign the style and layout manually. For example, the format of a 1983 maintenance manual could be quickly brought up to 1988 standards with little operator intervention. Likewise, any scanned document could be automatically reformatted by

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changing a few design parameters.

Intelligent scanning techniques may soon be used to convert raster (bit-mapped) electronic images into the vector format used by many computer-aided design (CAD) systems. Once in a vector format, the images can be manipulated on the vector-based system.

In today's electronic publishing environments, vector graphics data is regularly converted to raster data, allowing it to be printed on a laser printer, which is a raster device. By reversing this step, intelligent raster to vector conversion software will pro-

vide publishing operations with a new productivity tool.

A PUBLISHING SYSTEM MIGHT MAKE RECOMMENDATIONS AS TO THE OVER-ALL DOCUMENT FORMAT.

vide publishing operations with a new productivity tool.

For example, today hardcopy engineering drawings requiring revisions are either modified manually or scanned and sent to a graphic workstation for electronic editing. The modified drawing is typically a hybrid containing raster image data generated in the scanning process and raster/vector/text data added during the editing process. As a result, the page may reflect different levels of image quality where new changes are mixed with the older images.

With raster to vector conversion, all raster data is converted into the vector language of the publishing system, which provides powerful graphics functionality, and allows the creation of a uniform and high-quality illustration.

In addition to running smarter application programs, publishing workstations of the future will be integrated with more sophisticated input devices.

CD-ROMs (compact disk—read-only memories), for example, may replace paper as the distribution or archiving medium for many applications. These paper-thin platters are capable of storing tens of thousands of pages of

information—including line drawings, halftone images, and text in any font style and size. Moreover, users can locate information on a CD-ROM at speeds comparable to accessing data on a hard disk.

As CD-ROM prices drop, publishers will inevitably use the new medium to distribute everything from new tax codes to parts catalogs—and thereby save thousands of dollars in paper, printing, and shipping costs. In some cases, CD-ROMs may also serve as the distribution medium for on-demand publishing operations. Centralized cor-

porate publishing departments can output the latest iterations of lengthy documents onto CD-ROMs, then ship them to remote sites with electronic printers for printing at the point of need.

CD-ROMs offer another opportunity as well. Digital information stored on a disk can already be converted to video, audio, or text form—as demonstrated by the audio compact disk, video disk, and CD-ROM. In the future, each of these capabilities may co-exist on the same medium.

At the most basic level, such a system might simply enable the user to access information quickly—much as CD-ROMs do now. At the next level, however, a user might directly interact with the data. For example, a technician diagnosing a problem in an electrical circuit might interactively choose various paths through the circuit diagram, using video animation with audio accompaniment to call out circuit malfunction symptoms. The system might also allow the user to generate a hardcopy snapshot of the diagram.

This application scenario is not far-fetched, since some of the enabling technologies are already available. One

remaining hurdle would be to synchronize the output in some meaningful way, and play it back on a workstation capable of displaying both static and animated images. Perhaps the biggest hurdle is market demand—users must be convinced that this is a better way to convey large amounts of information.

The digital camera is another input device that may significantly impact electronic publishing. Today's smart scanner is, in fact, a digital camera with a recording field of only one line. A true digital camera would have one million sensing elements or more, and would be capable of taking a snapshot of any physical object—not just of a hardcopy document.

An illustrated parts catalog is an obvious application for such a device. With a digital camera, the photographer could record the picture as a frame on video tape, then connect the camera with the workstation and read the image in.

Color displays are another technical innovation with implications for electronic publishing. While color monitors have become the standard for high-end engineering workstations and high-quality, four-color publishing, they have yet to be widely adopted for general corporate publishing applications. The reason is obvious: Why have a color display when the printed output is still largely black-and-white?

Color displays will grow more commonplace when color printers—perhaps using laser or ink jet technology—come of age. Until then, however, color may be useful as a means of improving the human interface. For example, user revisions might be done in red—making them stand out until fully approved. Or text from multiple authors might be color-keyed to indicate who wrote what, and when.

Indeed, user demand is the hidden factor that will determine if and when any of the products discussed here come to market. Any innovation, no matter how technically wondrous, will make little headway without a groundswell of user demand. □

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Real-Time Production Publishing

Turnaround is the watchword for many corporate publishers. Quickly getting key documents into the hands of users is a mandate for MIS/DP and publications managers operating in an increasingly competitive business environment.

To that end, the need for robust document processing systems that can handle "real-time" publishing applications is crucial. One such system was demonstrated at the recent Electronic Printing Systems Conference.

There, document processing specialists from Xerox Corporation teamed up with conference sponsor Dunn Technology Inc. to produce for immediate distribution the complete proceedings of the event's first six sessions. The proceedings were in the hands of the 450 attendees early on final day. An additional 200 sets were printed for later distribution. By contrast, previous proceedings took as long as three months.

Altogether, nearly 120,000 pages of text and graphics were produced at the conference site, using a Xerox XPS 701 publishing system, Xerox and Kurzweil scanners, and two Xerox 9790 high-speed laser printing systems. Each 160-page volume covered more than 30 presentations and included speakers' abstracts, commentaries, and presentation graphics.

This first-of-its-kind project was conceived as an experiment to demonstrate that high-volume, real-time electronic publishing is viable today using readily-available products. Its success shows that production electronic publishing has arrived, not only in terms of volume and speed, but also with acceptable quality. The EPS conference proceedings were printed at a

By Dennis Connolly

Mr. Connolly, product marketing manager—Document Systems Marketing, Xerox Corporation, was on-site manager for the project described here.

Now, the just-in-time approach is applied to the publication of conference proceedings.

resolution of 300 dots per inch.

To attendees of professional conferences such as EPS, there are important benefits of "just-in-time" published proceedings. A complete and accurate record available for immediate reference allows attendees to:

- Formulate their questions more clearly to speakers and panelists.
- Select worthwhile sessions to attend.
- Carefully review the information they have received when interest is still heightened and focused.
- Make use of the information while still timely.

Production of the proceedings was done by a team of about 20 people working almost around the clock. All work was done on-site, and the most sophisticated publishing functions were on display in full view of attendees.

First, the text of the speakers' remarks had to be entered. The few presentations available as typescript were scanned in using a Kurzweil 7320 intelligent character recognition scanner. In most cases, however, the talks had to be transcribed from tape recordings; standalone PC word processors were used for this purpose.

The files were written to floppy diskettes, which were transferred to a PC equipped with a 3COM Ethernet board. From this PC, the files were routed to an Ethernet-compatible Xerox Network Services file server, in turn accessed on the network by the XPS 701 publishing system.

Overhead transparencies were scanned in using a Xerox 7650 Pro Imager graphics scanner. The digitized images were edited and formatted using a Xerox Publishing Illustrator's Workstation, then routed via Ethernet to the publishing system, where they were combined with text. The complete documents were sent—again via Ethernet—to the two 9790 production laser printers for volume printing at 120 pages per minute.

One difficulty in this scenario involved the handling of graphics received in 35-mm slide format. These were photographed with a Polaroid camera, and the shots were scanned into the system via the Pro Imager. In many cases, several photos had to be taken to capture an entire slide, and the illustration had to be reconstituted on the XPIW workstation by "pasting" several images together, a complex and time-consuming process.

The other major challenge was simply managing logistics. As it turned out, hand-carrying diskettes between PCs located in adjacent conference rooms was a chief obstacle; one was referred to this as the "sneakernet" portion of the scenario.

System improvements now under consideration include adding the PC word processors to the network and providing them with a low-volume laser printer for quick proofing. Also, reliable slide-digitizing equipment will eventually be used to replace the manual and cumbersome photo process.

The success of the publishing operation at the Electronic Printing Systems conference bodes well not only for the many professional conferences that put out proceedings, but also for corporate publishers. With a tight-knit networked publishing environment, in-house publishers can meet the need for fast turnaround of complex illustrated business and technical proposals and other time-critical documents. □



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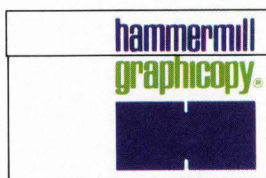
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Banks, Network Providers Eye EDI

ADP, AT&T, DEC, and IBM are exploring new service offerings that will tie banking services to business networks. While banks have been reluctant, they are now showing an interest in these efforts.

BY GARY McWILLIAMS

When General Motors Corp. set out to automate its payments to suppliers, the Detroit-based automaker forged a series of payment networks linking eight GM-affiliated banks to its suppliers. The network that GM created was and remains unique. In the rest of the business world, too often such electronic payments move along routes separate from the original purchase invoice.

Major U.S. banks, which routinely handle financial settlements using regional and national networks, have been slow, say observers, to mix payments and business purchasing data. Even those that do, such as Pittsburgh National Bank and Mellon Bank NA, two of the banks in GM's network, carry information on goods only as an adjunct to payment data, such as purchase orders and invoices.

It's a situation that many see changing soon. Interest in coordinated purchase and payment networks is spilling over into network providers as well as banks. Computer and service giants Automatic Data Processing Inc., AT&T, Digital Equipment Corp., and IBM each are exploring new service offerings that tie banking services, such as lending for accounts receivables, to existing or planned value-added business networks.

For example, ADP is testing one electronic document interchange service that employs Pittsburgh National Bank for credit authorization services. Bankers also say major computer vendors are seeking partners for upcoming network introductions. DEC and IBM decline comment on those activities. AT&T, which just added EDI services through an X.400-based network, and Chemical Bank, New York, are co-owners of Covidea, a videotex and home banking service that is now developing an EDI payment service that it will provide to banks.

At present, most business information networks, such as those operated by Mc-

Donnell Douglas Integrated Business Systems Div., San Jose, and General Electric Information Services, Rockville, Md., transfer purchase order and invoice data. Electronic payments for those same goods are exchanged via financial networks operated by banks and bank clearing houses. Yet, as more businesses look to align payment and trade information, the two ends are closing.

More Players Expected

New agreements between value-added network companies and banks such as Pittsburgh National may coordinate better the transfer of business information and payment data. The expected arrival of IBM and DEC with EDI network offerings may further accelerate interest in electronic payments and purchases.

While the two computer giants have not disclosed any plans to offer network-

based payment services, each acknowledges that the opportunities are inviting. "We have and are working with clients in a number of different areas on understanding their EDI needs," says Bill Carlisle, an EDI product marketing manager at DEC. "One is financial services and payments. EDI is strategically important to the capability we know we will be implementing in manufacturing, procurement, finance, distribution, and logistics."

In releases thus far restricted to the United Kingdom, DEC put out an EDI translation package and began offering value-added network services this year. That translation package includes a module that enables EDI messages to be incorporated into financial software from Ross Systems Inc., Palo Alto, or McCormack & Dodge Corp., Natick, Mass. "We see a need right now for links into business applications," says Carlisle. "That involves

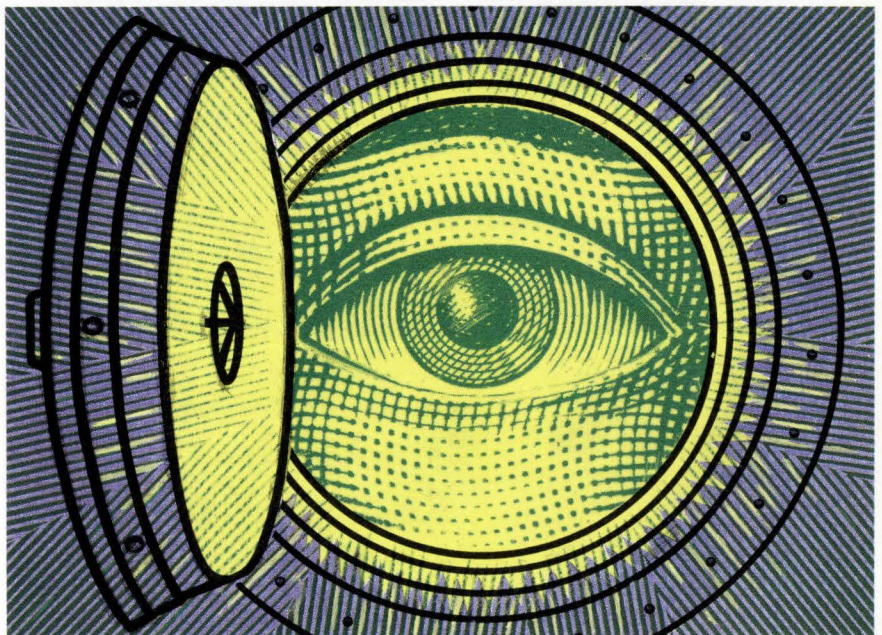


Illustration by Tim Grajek

consulting support and help. Whether it is financial or order processing there is a need for more integration at the applications level."

Similarly, Michael B. Ribet, marketing manager with IBM's Information Network, Tampa, Fla., calls corporate payments "a very attractive opportunity." Moreover, he insists, the planned incorporation of industry applications into the IBM value-added network (VAN) "offers a strategic thrust." Early this year, IBM joined with QRS Inc., a Greenbrea, Calif., software house, to provide EDI network services for retail stores. The inventory management services reside on the IBM Information Network. Additional industry-specific EDI network services are in development, Ribet says.

In part, the attention given to payment networks may be more a factor of interest in EDI than any failings in the present corporate payment system. "EDI is not a technology issue any longer," says Donald J. Holtz, who is vice president of EDI Services at ADP. "It's a marketing and service issue."

Holtz says that where past EDI networks grew out of single industry needs in pharmaceutical or insurance markets, the demands now are for cross-industry networks. "The thing attracting ADP is the number of smaller firms who have the same needs as larger companies, but don't have the same resources," he asserts.

As much as banks are interested in combining payment and trade information for customers, they are not necessarily willing to hand off the nonpayment portion to others. "I think the jury is still out on whether banks will handle or pass off the purchase order [information] to a network provider," says Frances B. Silverstein, an assistant vice president and EDI product manager at Manufacturers Hanover Trust Co., New York. "We already have the internal systems capabilities to do a lot of those things."

Pittsburgh National is working with ADP and GE Information Services to enable them to provide customers with the ability to consolidate payments and EDI trade data. Yet, Pittsburgh National's dealings do not signify its own lack of interest in

handling EDI network exchanges, says Cheri R. Evans, the bank's assistant vice president for cash management product development. "We just don't know where the market is going to be in 1995. When it all sorts out, we want to be in a position to maintain our customer relationships," she comments.

Mellon Bank in Pittsburgh is another example of a bank that already is handling payment-related data, such as remittance information. Sabra McConnell, a Mellon vice president and product line manager for electronic funds transfer services, says that such services enable bank customers to reduce the many different information formats that they have to handle to accommodate suppliers.

Partnerships May Be a Year Off

While activities such as those at Mellon Bank ostensibly could lead to partnerships with network providers, it isn't necessarily so, observes Stephen Bander, president of National Systems Corp., a New York-based financial software developer. "One of the dangers in the EDI world is virtually everyone wants to be in everyone else's business. The banks want the network portion and the network providers want the financial portion." Bander believes it could take a year before banks decide whether to add EDI capabilities to their networks or work with a partner.

One reason it could take a year is that banks believe that corporate payment networks accelerate a loss of interest revenue from float, or outstanding, payments. Those banks that hope to counter such losses with revenues from new service businesses may not be as willing to share their business revenues with the network provider. "Network revenue is where the money is," explains Carl Drisko, president of Interchange Systems Inc., Lexington, Mass., a specialist in EDI payment software. "It's long-term, recurring revenue. Just as people don't change their telephone company often, neither will businesses change their value-added network suppliers."

Frederick A. White, a vice president at financial services consultants Furash & Co., Washington, D.C., says value-added relationships are essential to new players' ability to secure a position in EDI networks. "In essence, they're a way of staking out a section of the marketplace with high growth long term, and being able to defend that."

One thing is for sure, as corporate payments begin to flow over EDI networks, the banks will do as much jostling for position as will network service companies.

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Document Interchange Reigns at DOD

The computer aided acquisition and logistic support program, known as CALS, promises to streamline the monolithic paper flow involved in government military equipment purchases.

BY SUSAN KERR

If you're a big supplier of paper products to the U.S. Department of Defense, now would probably be a good time to put those diversification plans into effect.

The reason is CALS, or computer aided acquisition and logistic support. What this catchy acronym represents is a full-scale effort by all U.S. military departments to set standards for the submission and interchange in digital form of documents from government contractors. These documents could range anywhere from product manuals and engineering drawings to manufacturing information.

"In the past," says Pete Prassinis, project leader of the Automated Interchange of Technical Information for the Lawrence Livermore Laboratory, Livermore, Calif., "when the DOD and the government bought a piece of equipment from industry, they just bought a part. Now, they want not only that part but all the information behind it."

To achieve that goal, communications protocols, databases, and text, document, illustration, and imagery structures are all being specified and standardized. These standards function at Layer 6 (presenta-

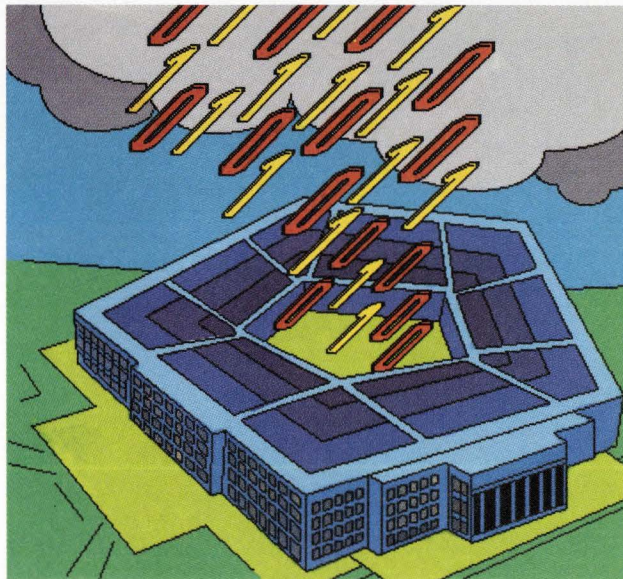
tion) and Layer 7 (application) of the Open Systems Interconnection model.

When it comes to buying power and influence, it's tough to top the U.S. government. Thus, the work on CALS is sure to have a trickle-down effect on nondefense

several emerging text and graphical standards, including PDES (Product Data Exchange Specification) and the CCITT Group 4 raster image specifications.

The Department of Defense, which has been smarting over the past few years from stories of overpriced goods, believes that digital document interchange will be a major step in improving the reliability and decreasing the cost of key weapons systems. Commonly cited numbers claim that 30% of a typical weapons system is spent in development and the remainder on deployment and support. Part of that support includes working with printed training and maintenance manuals. At any one time, 10% of the information in these manuals is believed to be outdated.

"The Air Force sees advanced tactical fighters in a couple of years, accompanied by an additional 1.5 million pages of paper. How can they deal with it? Electronically," says Dan Wick, who is director of federal programs for Mentor Graphics Corp., a computer aided engineering firm that is based in Beaverton, Ore. The hope is that one day in the future, an aircraft mechanic, for example, will be able to take a portable screen out on the field and



companies involved in engineering large, complex products, such as commercial aircraft and automotive companies. Though obviously a government initiative, there's little doubt that CALS is accelerating the acceptance and work on

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In the works for the past three years, CALS received a big boost this summer when Deputy Secretary of Defense William Taft signed a memorandum specifying formal CALS implementation for all weapon systems entering development after September 1988, as well as asking that program managers of systems already in use review how they could change to digital data delivery. Next month, a follow-up memo from DOD is expected to issue guidance on contract requirements, the wording of bids, as well as which current programs are affected.

To comply with CALS, defense contractors, many of them among the largest companies in the nation, say the ways in which they deal with information resources will need to change. "If I'm providing information in a digital fashion, definitely a different organization will emerge," says Stan Meyers, director of advanced systems for Grumman Corp.'s Grumman Data Systems Div., Woodbury, N.Y., and cochairman of the industrywide Digital Information Interchange Task Group that's looking at CALS.

Recalling the evolution from draftsmen to users of CAD/CAM systems, Meyers notes that all large companies presently have substantial organizations to handle technical manuals and documents. "As you bring technology into an activity, the nature of how it's done will change," Meyers adds.

One change will be better coordination at the beginning of a project to design products for the military. An IS manager at military supplier Northrop Corp., Pico Rivera, Calif., believes that although major contractors are already far, far along the computer road, there are some organizational challenges.

"Because of the title CALS," says the manager, "manufacturing and configuration management people are thinking it's just something concerning logistics and they don't need to be concerned. But CALS deals with the whole set of deliverables to the government." Thus, the whole cycle on a military product, from start to finish, has to be fine-tuned. The manager cites one theoretical problem in which a manufacturing group doesn't know how to use the CALS-specified raster image formats.

Is CALS Asking for Too Much?

There's no doubt that CALS does specify that a wide range of information be turned over to the military. According to one government employee, who asked not to be named, one initial fear voiced by suppliers

was that the military could turn around and use these data to allow another contractor to make the product instead. That fear has been alleviated as people realized that CALS is not asking for methods used in making products, just specifications.

CALS is being broken out into two phases. Phase I, in many senses a compilation of present, readily available standards, focuses on data interchange. A document, MIL-STD-1840A, provides rules for organizing files into a digitally deliverable document. Among the standards specified are SGML (Standard Generalized Markup Language, which identifies the structure of text documents), IGES (Initial Graphics Exchanged Standard, for drawings), and raster formats.

Phase I.1 Core Requirements is in draft stage and due to be published next month; Phase I.2 is scheduled for a 1989 release. These releases will broaden the applications environment with specifications on the Standard Page Description Languages, as well as the use of Electronic

□ DEFENSE CONTRACTORS SAY THE WAYS THEY WILL DEAL WITH INFORMATION WILL HAVE TO CHANGE.

Data Interchange (EDI) as the standard for on-line technical data ordering.

Further out is Phase II, which will focus on an SQL integrated database environment for the military, as well as true communications capabilities. Whereas initially CALS will call for contractors to supply magnetic tape to the government, further down the line is the very real possibility of on-line access into vendors' databases. This is a somewhat sticky security issue for all involved. One possible solution, says Livermore Lab's Prassinis, may be for contractors to dedicate a computer specifically to the task of storing government information.

That scenario is still a long way off. Among the definitions that still remain is the definition and quantification of a data dictionary. Likewise, work remains to be done on PDES, an outgrowth of IGES, which includes additional levels of information, such as product manufacturing information. A group composed primarily of government contractors, called PDES Inc., is helping this effort. Their charter over the next three years is to further refine the PDES standard, make products available, and then the group will dissolve.

Standards-making is all well and good,

but implementation is another matter. Just because more data will become available doesn't mean that the government will be able to do more with them. One question being asked concerns whether the government is willing to put money up front to buy some of the systems and services CALS requires. That's slowly being answered. One reason DOD is requesting on-line access into suppliers' databases is so that it won't have to store all of the data itself. Yet the services also are in the process of developing massive data repositories. The Air Force and Army are in the midst of a joint storage project using optical media. The prototype is due in the first quarter of next year. Other services are following suit.

Data Repositories Being Developed

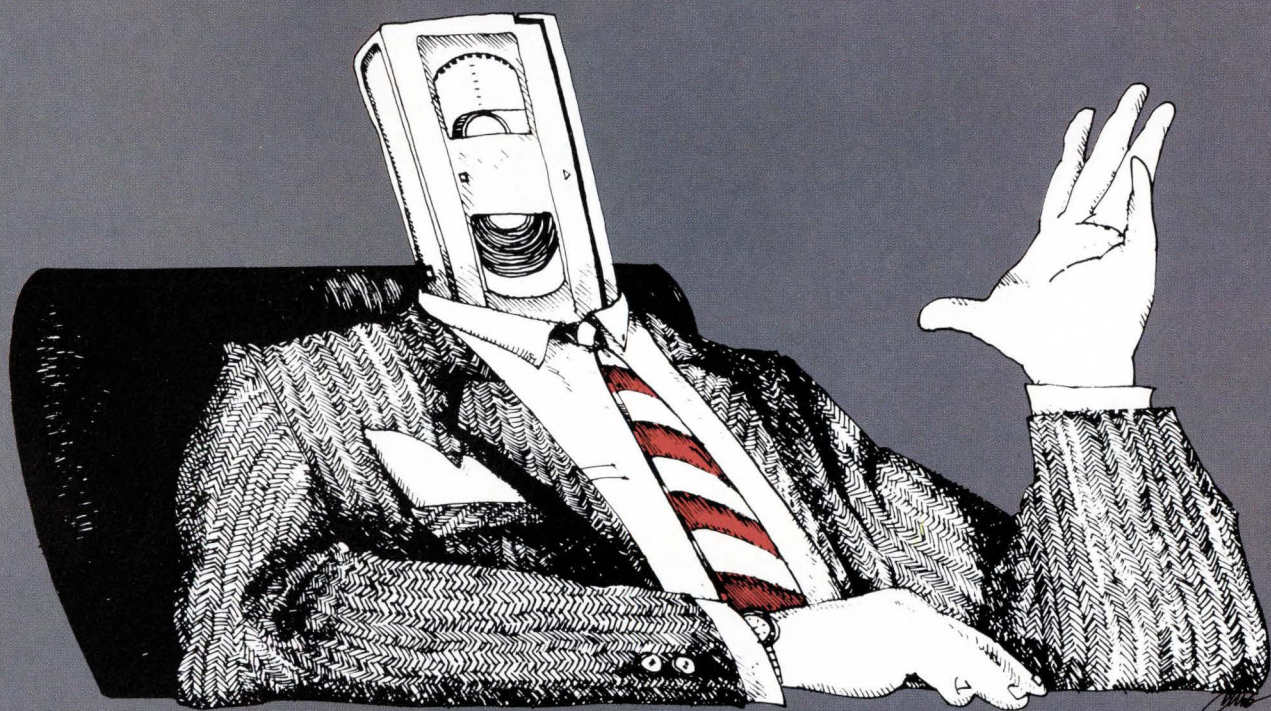
While most of the major definitions are already here, we're only in stage one of proving that the goals behind CALS are achievable. One step was last month's CALS Expo '88, a symposium and demonstration in Gaithersburg, Md. According to John Gocowski, director of advanced systems for Dynamics Research Corp., an Andover, Mass., firm involved in logistics systems, the show was different from another Maryland show, last summer's MAP/TOP Enterprise '88, held in Baltimore. "We wanted to concentrate more on [showing] that we're doing a complete function," he says. "We're not trying to show that we have high-speed data interchange."

Likewise, Livermore Lab, under contract with the Air Force, is conducting the CALS test network. By press time, five tests had been completed: four involving technical publications and the fifth involving raster images. In the planning stages are tests involving CAD data.

Yet while the technical feasibility appears to be there, at present no one knows if CALS will achieve its objectives. "CALS has not been justified as an advancement in information technology, rather, it is committed to improving readiness," writes editor William Beazley in a Houston-based newsletter, the *CALS Report*. He continues that the value of integrating logistics with design is most easily determined when a system is put to use. What's needed is a measurable test—without that test being a battlefield.

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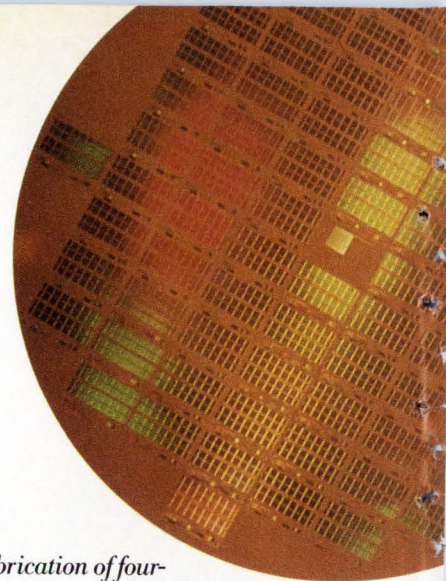
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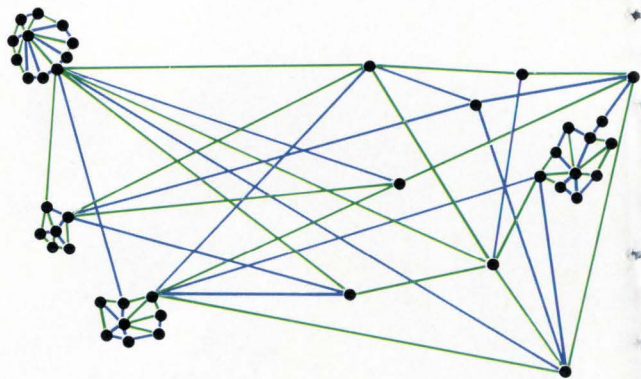
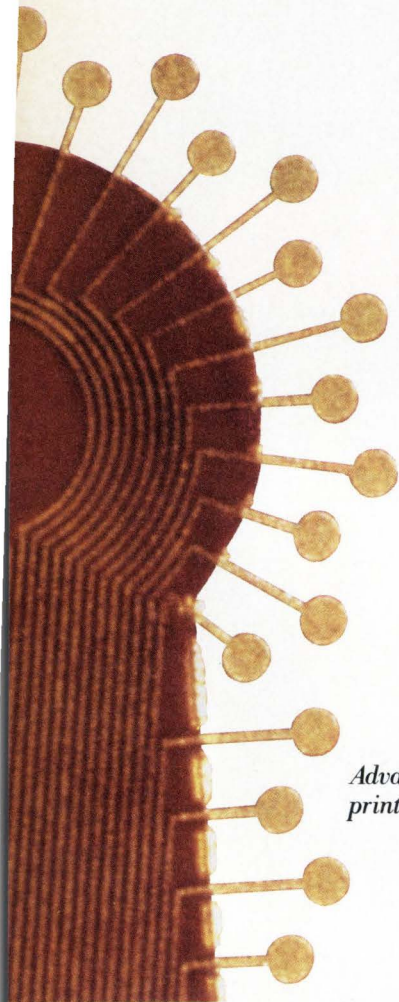
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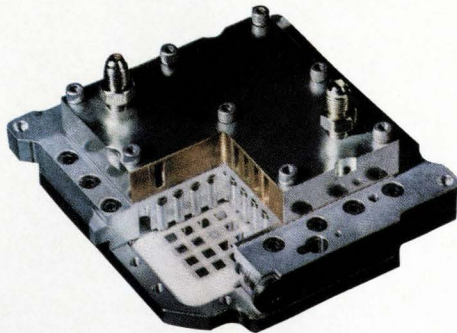
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Shaping Up Your Data Center

This fourth in a series of articles from McKinsey & Co. shows companies how to run data centers that are both quality- and cost-conscious.

BY MICHAEL FLEISCHER AND SAMEER PATEL

Today's IS executives along with their data center managers find themselves under increasing pressure to cut costs while keeping quality and reliability high to meet user expectations. Some actually master this challenge, achieving ever higher levels of cost-effectiveness and user satisfaction. And a few even turn the data center operation into a strategic advantage for their companies. Others, however, do not fare as well. As data center costs continue to spiral upward, so do user complaints. The price of such failure is substantial in terms of both corporate dollars and corporate careers.

A recent survey of data centers at 15 major companies conducted by McKinsey & Co. shows that it is indeed possible to run productive data centers that are both quality- and cost-conscious. They do that by skillfully managing critical economic levers and by creating a capable, performance-driven organization.

One lesson that the Japanese have taught U.S. manufacturers is that high quality and low cost are not mutually exclusive. In rating some of the data centers surveyed according to these two factors, we discovered that the best all-around performers were able to deliver superior quality with no trade-offs in cost-effectiveness. In real terms, these companies have managed to keep their cost per transaction at under five cents, while keeping their response time in the subsecond range and their meantime to fix failures at less than 15 minutes.

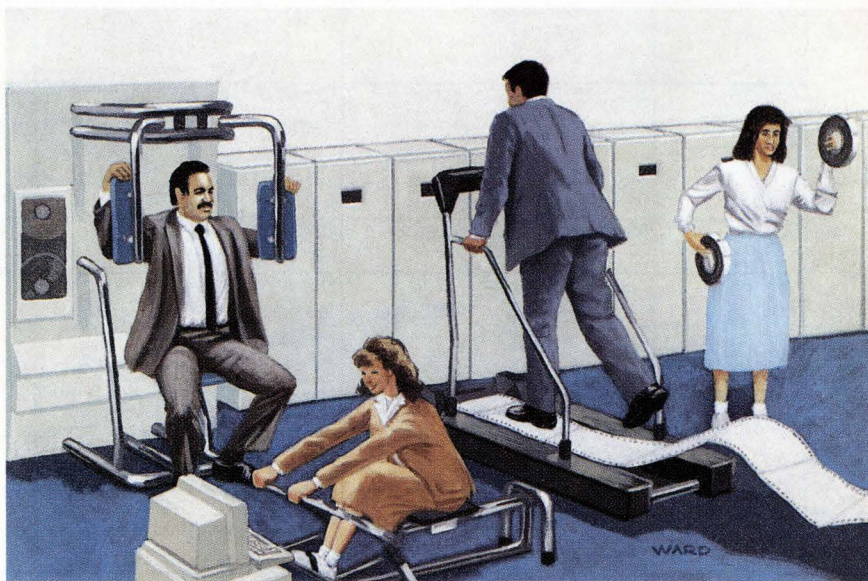
The companies that have data centers that score high marks in both quality and cost-effectiveness reap substantial rewards, whether those rewards are measured in tangible dollars or in intangible areas such as support for strategic objectives of the overall business. One large facility in the financial services field found that by matching the performance of the

top data center in its industry, it could cut its operating costs by at least \$25 million annually. We have seen instances where similar processing applications in similar businesses cost twice as much on a per transaction basis in poorly performing data centers as they do in the top shops.

Singular as it may seem, the mundane processing of transactions can also help financial institutions maintain a strategic

advantage. ter managers, there emerged two seemingly simple rules that you can use to make sure that all those little things are indeed done right in your data center. This advice constitutes "best practices," that is, managerially controllable principles, policies, and procedures that distinguish top performing data centers from the rest.

The first rule is *work the economic levers*. That means you should configure for



advantage. Shearson Lehman Hutton's strategy is to create revenue opportunities through acquisition. What makes this strategy feasible is that Shearson's data center configuration is flexible enough and large enough to absorb the processing volume of the business entities the company acquires.

In data center operations, as in manufacturing, excellence in execution comes from doing 10,000 little things right. In the course of our interviews with data cen-

scale and simplicity, invest regularly in software, source aggressively, and locate cheaply. The second rule is *create a capable, performance-driven organization*. You do that by leading the way toward clear performance goals and by automating operations and building skills. You must also develop human resources and coordinate the business through strong user links.

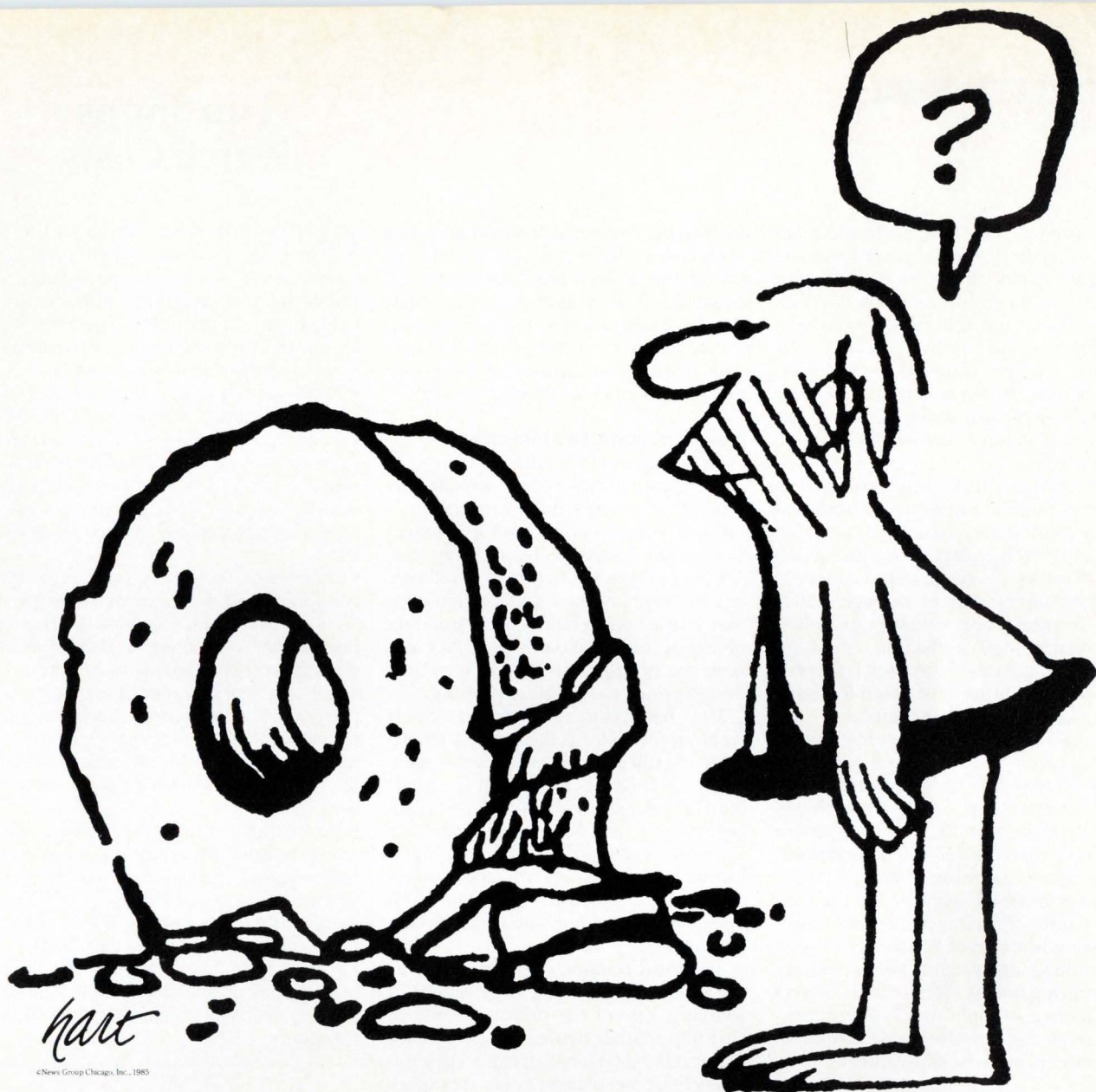
The three economic levers that drive data center performance and determine productivity are configuration, software,

First Half 1989

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Issue Date	Ad Closing Date	Special Reports	Software/ Services	Systems	Communications	Management	International
January 1	December 1, '88	IBM					IBM in Japan IBM in Europe
January 15	December 15, '88	Technology Forecast		RISC	Telecomm. Operations		
February 1	January 2		Transaction Control Systems	OLTP		PCs in IS	Offshore Software
February 15	January 16		OS/2 vs. Unix	Security		Product Development	
March 1	February 1	DEC		IBM-DEC Connectivity	T-1 Multiplexors		1992
March 15	February 15		PC-DBMSs	386-Based PCs		Corporate Profile	
April 1	March 1	Budget Survey		Weapon Systems	EDI		Eastern Bloc Computing
April 15	March 15	Connectivity Survey	Expert System Integration	Document Image Processing	Voice Messaging		
May 1	March 31	Companies to Watch	OS/2 on IBM Compatibles			Corporate Profile	Far East Operations
May 15	April 14	Large Scale Systems Survey	Operating Systems Evolution			Decentralization	
June 1	May 1		Object Oriented Programming (OOPs)	Macintosh in IS	LANs		Executive Information Systems
June 15	May 15	Application Software Survey		High Performance Computing		Corporate Profile	
June 21	May 22	DATAMATION 100					

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WITHOUT ADVERTISING EVEN THE BEST IDEAS TAKE AGES TO CATCH ON.

Every now and then, a new product becomes popular by word of mouth alone. But that process usually takes many months. Sometimes years. By then, the company that makes the new product may be in serious trouble — if they're around at all.

Advertising is the surest way to get an idea to the public. By advertising a new product or service, more people are able to try it more quickly than if it were allowed to "catch on" by itself.

Good ideas become popular right away and bad ideas...well, who needs a square wheel, anyway?

ADVERTISING.
ANOTHER WORD FOR FREEDOM OF CHOICE.
American Association of Advertising Agencies

and sourcing. The best performers adhere to specific practices in each case. The configuration of the most cost-effective data centers meets three criteria. The first criteria is that the data center *take advantage of economies of scale* by processing over 500,000 on-line transactions per day. Since almost 80% of data center costs are relatively fixed and don't fluctuate with transaction volume, consolidation is an obvious goal.

Our survey confirms the wisdom of data center consolidation. Scale, in terms of on-line transaction volume, appears to correlate closely with cost per transaction (see "Cost vs. Scale in Data Centers"). The data suggest that, on average, a 50% boost in transaction volume can yield a scale-related cost reduction of about 20%. In light of this evidence, it is surprising how many firms have opted for many small, decentralized data centers.

The second criterion for configuration is to *minimize the complexity of costly interfaces between multiple data centers by allowing processing units to work independently*. Many firms, believing that the quality of service depends on having dedicated operations, scatter their processing workload among a number of small facilities. To the contrary, we found that a single data center can take advantage of economies of scale by handling many applications without jeopardizing quality. Service and costs do fall off, when an application is interdependent, requiring downloading and uploading between different data centers.

Divvying Up the Tasks

One New England insurance company divides its work between two logical data centers, one for claims processing and the other for underwriting. In contrast, the data processing is not as well configured in a New York securities firm that continually swaps customer records with smaller centers that service certain types of financial products. The result is a complicated and costly operation.

We define independent processing as the ability to complete an application with minimal access to other centers. It is start-to-finish processing within a single center. One money center bank has achieved scale economies and independent processing by placing four data centers in one building constructed expressly for this purpose. Each center stands alone, focusing on a similar set of applications, while sharing physical facilities, utilities, UPS equipment, maintenance, and, to some degree, management.

The final configuration criterion is to *ease recovery in case of a disaster at the data cen-*

ter. Top performers with two or more data centers meet that criterion by making sure that all the facilities are of approximately equal size. If they have only one center, they have contracted with outside providers of disaster recovery services. Many data centers have either no plans or impractical schemes for disaster recovery.

New Software, Best Results

Organizations with superior data center performance use the second economic lever, software, to maximize hardware utilization, reduce staffing and equipment requirements, and decrease error rates. These companies structure their software environment around an integrated database and around a clearly understood set of architectural standards. And they also keep the portfolio itself and the related design projects as simple as possible.

Most important, the best data centers continuously refresh their software portfolios. Neither the systems nor the applications software is more than five years old. The majority consistently and regularly rewrote portions of their portfolio in a modular fashion. These same high-performers generally regard mega-project rewrites as risky efforts prone to delay, unexpected costs, and unsatisfactory performance.

The third economic lever used by the the highest performing data centers is sourcing, one of the primary drivers of cost differentials between organizations. Other related factors that cause large differences between data centers are capacity planning and scheduling. Finally, the long-term lock-in of fixed costs is determined by the location chosen for the data center.

It's normal to see variations in purchase prices due to volume discounts negotiated at the corporate level. Nevertheless, we were surprised by the large degree of price variation between operations. In our sample, the most cost-effective center paid 35% less for DASD and 40% less per installed MIPS than the least efficient facility. These discrepancies become more significant in consideration of the fact that total hardware costs account for roughly one third of all data center costs.

We do not believe that purchase price differentials can be attributed entirely to volume discounts squeezed from vendors. Nor are they due to technological choices. Management practices that consciously encourage vendor competition are responsible for some variances.

Most of the best data centers we surveyed were all, or almost all, IBM shops. Nevertheless, their sourcing policies still

Top Shops Watch Costs

One way a data center distinguishes itself as a top performer is by instilling an awareness of costs. It can encourage this cost-conscious attitude without sacrificing quality or reliability. The following four tactics show some of the ways companies have helped mold this mentality:

- Top-level managers often take an almost adversarial "show me" attitude toward IS acquisition requests. In one case, a senior IS exec at a major bank refused to permit any new DASD purchases until he was convinced that existing capacity was being completely and productively used.

- Managers who are responsible for the continuing cost of new capacity are given the tools and the opportunity to propose less-expensive alternatives when capacity planners recommend new increments.

- Risk and benefit tradeoffs for buffer capacity are made as business decisions with technical input. They are not delegated to technical staffers who are almost always ill-equipped to assess the business issues involved.

- Management insists on thorough, ongoing reviews of inventory levels and technological choices. Shops with costs that appear to be escalating usually have no idea of the equipment inventory that they actually have. Tightly run shops, on the other hand, are so well informed that managing acquisitions within the limits of existing depreciation charges is a routine procedure.

call for seeking bids from pcm vendors such as Amdahl Corp. Coupled with this approach is a real willingness to migrate to the lowest-cost IBM-compatible supplier.

The timing and sequence of hardware purchases reflect careful capacity planning and utilization policies. These policies can have considerable value for a company. At one very large facility that services a financial firm, each additional percentage point of cpu utilization was worth \$150,000 annually. Indeed, managers at top-performing data centers take capacity planning quite seriously. At these installations, hardware is perpetually on order, but there's always an option to cancel delivery of that hardware by a certain date. In this way, data center managers can bring new equipment in at exactly the moment when utilization and service quality require it. Even better, they avoid the cost of having it installed earlier for just-in-case situations.

Some companies think that they are putting teeth into their capacity planning

XEROX

**Shouldn't your printer
be as smart
as your computer?**



Xerox Intelligent Printing Systems. Printing systems

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

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

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

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



XEROX

as smart as your information system.

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

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

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

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

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



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

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

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

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

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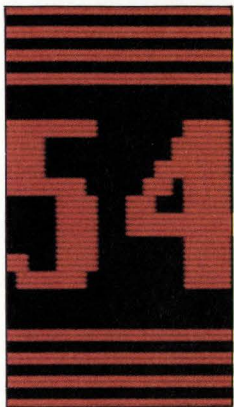
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**DATAMATION
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Software Bugs: A Matter of Life and Liability

You read it first in DATAMATION when a major software glitch was linked to the deaths of patients. Once again, the editors of DATAMATION went beyond business as usual to get the full story and its precedent setting legal ramifications for producers of software and hardware.

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

DATAMATION - The Leader in Information Technology Coverage

effort by delegating responsibility for hardware decisions. At one Wall Street data center, for example, hardware and timing decisions are left up to a staff executive who is evaluated on his performance in minimizing capacity shortfalls. The cost of the hardware is segregated from the rest of the budget and treated as essentially uncontrollable. The manager of the data center is charged with the ancillary support costs related to the new equipment. As you would expect, this shop operates at low utilization, but exceptionally high cost.

Who Decides the Hardware Costs

The best-practice approach is to assign responsibility for hardware costs to the executive who is in charge of capacity decisions. At the very least, a data center manager should be allowed to veto new budget-busting capacity schemes. Location decisions force even harder trade-offs. Expensive urban data centers freeze high costs for many years. Nonetheless, staffing constraints, and a sense of accountability through proximity, drive many firms to the pricier sites. In years to come, "lights out" operations that require a minimum amount of human intervention may encourage companies to locate centers in remote, inexpensive places.

The second piece of advice from the superior data centers is to create a capable, performance-driven organization. The ability to do that appears to hinge upon the company culture and other crucial success factors such as IS and corporate leadership, automation efforts, employee skill building, human resource development, and coordination of activities with the overall business.

On the leadership side, the survey showed that the best performing data centers expect their top IS person to have extensive industry experience—an average of nearly 20 years. In addition to having considerable industry experience and tenure, most of the IS chiefs we talked to had held substantive assignments outside the data centers, usu-

ally in systems development. Close to 50% had also worked in other operations and user departments within their companies.

In the most successful data centers, the IS leadership is able to convey a vision that

level of the IS department.

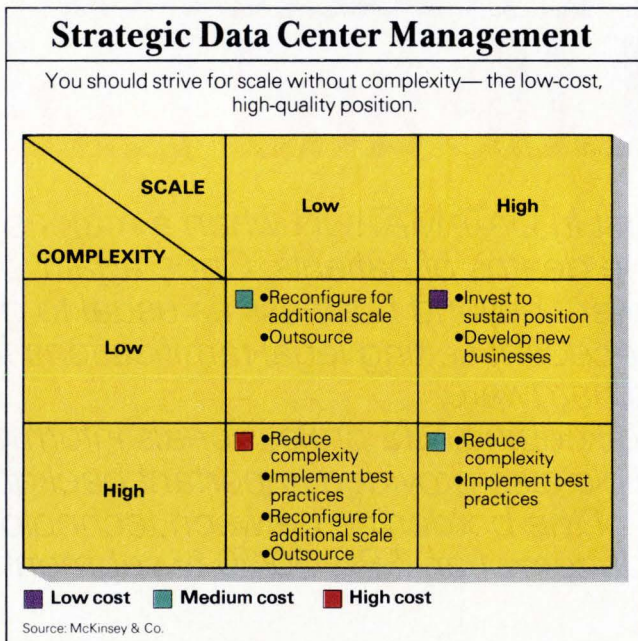
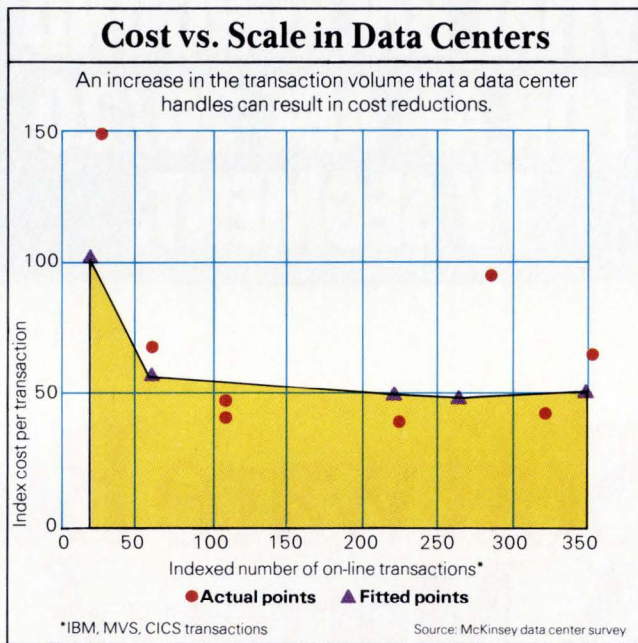
The top data centers in our sample backed up their direction and vision with concrete plans that are specific enough to give managers a clear idea of what they need to do next, how things fit together, and how they can support the efforts of others in the organization. The plans cover such issues as equipment modernization, pay scale revision, and data center consolidation. Plans that delineate actions and assign responsibilities, resources, and deadlines are bolstered by a sense of individual and group accountability that is enforced by top management.

Managers Are Accountable

Senior executives at companies with the best data center practices are acutely aware of the facility's performance and they do not hesitate to hold managers accountable for results. This accountability is made possible by four key practices. First, top executives repeatedly enunciate major themes, making it clear that good performance consists of realizing the theme, which usually relates to the means for achieving cost and service targets.

Second, senior executives take part in capital expenditure decisions, like acquiring a new mainframe. Without treading on the initiative of subordinates, they understand and approve the rationale for such acquisitions. At one multibillion-dollar securities firm, expenditures as low as \$250,000 must get ceo approval.

Third, executives in organizations with the most effective data centers invariably have good data on performance, costs, and service quality readily available. Usually, they can get this information by simply reaching into their desks. Thus, we call this litmus test of the quality of a data center's IS operation the "lower right-hand drawer test." Executives in less capable firms usually have to ask staff people for even the most basic budget information.



is shared throughout the organization. In many cases, this vision is expressed in simple goal statements such as, "to be on the leading edge in providing the best services at the cheapest cost." What gives such statements life and meaning is their repetition and implementation at every

Fourth, top performing data centers use various forms of service agreements to institutionalize and specify provider and user expectations and responsibilities. The pacts, which nurture a performance-driven culture, help companies measure and monitor performance and develop timely tracking systems and feedback channels.

Automation is another critical success factor for data centers. While no data center in our sample has actually achieved a lights out operation, some are closing in on that goal by simultaneously automating repetitive operations and raising the skill level of employees.

Efforts to convert low-skilled jobs into higher, knowledge worker positions go hand in hand with automation activities. In one case, a commercial bank changed its worker mix from 80% clerical and 20% skilled to 30% clerical and 70% skilled. The transformation, which took place over six years in the '80s, resulted in a 30% reduction in head count.

The People Factor

These people considerations lead into the next data center building block, which is developing human resources. In the most successful data centers, we found a strong emphasis on people. This attitude manifests itself in consistent, thoughtfully executed policies and procedures in the following areas:

Selection. Choosing the managerial cadre of the data center usually involves key executives. The criteria are strict, the offers few. The IS department at one Hartford, Conn., insurance company considers English majors as well as more traditional candidates from the sciences for management positions. "We want managers who can learn; we don't want any computer science rejects," explains one executive.

Training. Both formal and informal training continues at all levels of tenure. It takes the form of rotational assignments, classroom work, and apprenticeships. In some data centers, the apprentice program is highly structured. In fact, it lasts two years in one data center we talked to.

Promotion and career development. Both of these areas should be carefully thought out. Although they vary from firm to firm, the definition of the various career paths and the criteria for promotion should be constant. In several companies, fast-trackers are promoted to cross-functional troubleshooting groups where they can gain broad exposure and valuable experience.

Incentive policies. The best data centers make these policies very explicit. Most use

monetary programs, which include merit-based bonus pools.

The final critical success factor requires a data center to be closely aligned with the company's business interests and users. The data centers with the best track records for cost and quality are the ones that are plugged in the tightest to their corporations. To ensure that tight fit, some firms have created steering committees that are composed of top-level executives from various business units in the company. These groups are charged with stating clear expectations of the information function and making explicit decisions on cost and capability tradeoffs.

The inclusion of IS managers in the company's strategic planning and capital budgeting process is another way to keep the information function moving in tandem with the larger business interest.

□ TRANSACTION COSTS RUN TWICE AS HIGH IN POORLY PERFORMING DATA CENTERS.

This participation is done at either the corporate, business unit, or product/market level. At a minimum, it helps data center executives understand why their capital projects sometimes get turned down.

We find that IS executives with the broadest company exposure are the most competent at leading their organizations in ways that best support the business. They gain this exposure through reporting relationships and rotational assignments that are aimed at bringing them into the loop on overall business developments.

Another hallmark of a top-rated data center is its cooperation with users and providers—cooperation that enhances quality and reliability from the user's perspective and lowers the total cost of doing business. Organizations foster this teamwork through procedures and structures. For example, user/provider committees at both policy and working levels work together to define system specifications and performance standards. These committees are particularly effective in establishing applications functionality and technical architectures for applications developers. Also, by involving IS representatives early in the product development cycle, companies can dramatically reduce applications development time and lower their operating expenses.

We also observed considerable benefit

in provider-user collaboration in retooling the applications infrastructure. A joint effort over a period of years can renew and rebuild the production infrastructure. That reconstruction effort should be undertaken with an eye toward long-term flexibility and systems efficiency.

When planning to adopt the best practices in your own data center, two considerations will help guide you. First of all, it's important to remember that your IS organization cannot unilaterally implement all of the best practices discussed. Some IS departments, for example, need to work with other operating units like marketing groups, systems developers, or finance.

Second, not all best practices have the same impact or timing. The renewal of an applications portfolio and the renovation of systems architectures, for instance, are both high-impact actions. But they are both complex to execute and depend on extensive cooperation across functional lines. As a result, it will take several years before the benefits of these two actions accrue. On the other hand, best practices that have lower payoffs such as capacity planning and sourcing policy revisions are high-probability early wins because they are quicker to implement and don't demand lengthy intracompany negotiations.

Farsighted, disciplined data center managers can also reshape their organizations for the long term. The best data centers are driven from within to continuously improve. That attitude reflects the patient, consistent efforts of data center managers who think of their role as that of leading people, not running processors.

Once you examine the complexity and scale of your data centers, you can then decide the strategic direction to take (see "Strategic Data Center Management"). In some cases, you may choose reconfiguration, in others, reduction of complexity. Where you cannot gain scale or reduce complexity, you may have little choice but to go outside to facilities managers. Where you can secure scale without complexity—the low-cost, high-quality position—you will be able to advance your company's fortunes by forging whole new processing business opportunities, opportunities that are built on the foundation of your data centers' superior performance.

At New York-based management consulting firm McKinsey & Co. Inc., Michael Fleischer is an associate and Sameer Patel is an information technology and systems specialist. Also collaborating on this article were Mike Graff, a principal, and Will Lansing, an associate at McKinsey.

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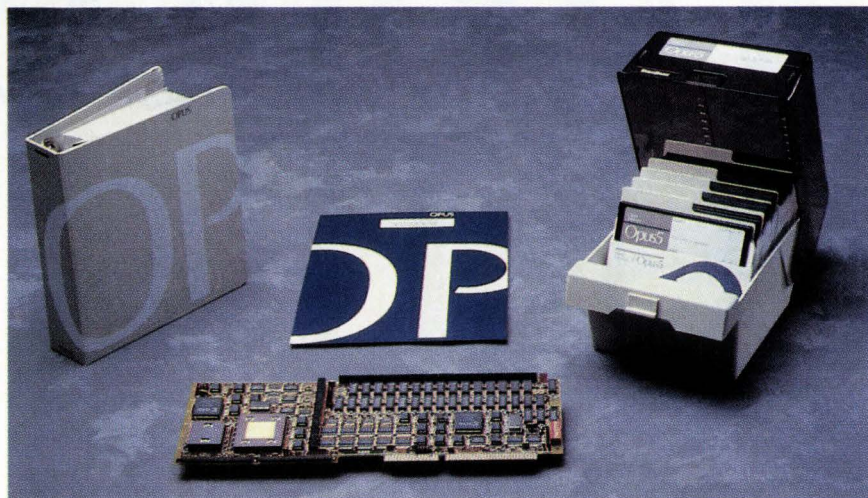
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SYSTEMS

Coprocessor Boards Can Boost Performance

Opus Systems' Unix products offer up to 10MIPS on PCs.

BY ERIC BRAND



OPUS SYSTEMS' new 32-bit Unix coprocessors operate at 25MHz and 30MHz.

While the idea of having a mainframe sitting on your lap might be a little daunting, the newest products in the Personal Mainframe family from Opus Systems could do just that and cause you no pain. The 260PM and 270PM are 32-bit Unix coprocessor boards; they're designed to reside in IBM PCs, XT's, AT's, and PS/2 Model 30s or 35s as I/O processors and subsystems for the basis of high-powered workstations and multiuser systems.

The 260PM operates at 25MHz and at a speed of 8.5MIPS, according to its manufacturer. The 270PM, which operates at 30MHz, is claimed to reach 10MIPS. Opus Systems says that when a 270PM is added to a 25MHz, cached 386-based system (5MIPS), the result is a 15MIPS, dual-processing workstation.

The product family is aimed at oems interested in juicing up PC-based workstations and multiuser systems. Target applications, requiring high performance and a stable and powerful software development environment, include CAD/CAM/CAE, expert and natural language AI systems, and computer servers, says the company.

The 260PM and 270PM, based on the 32532 processor from National Semicon-

ductor, provide simultaneous use of MS/DOS and Unix System V, with from 4MB to 20MB of physical memory in a 4GB virtual address space. The 260PM is already shipping, with a base price of \$6,995; the 270PM, which is not yet available, is not yet shipping, and has not been priced. OPUS SYSTEMS, Cupertino, Calif. **Circle 236**

Xerox Unveils Two High-Output Laser Printers

Two new laser printing systems are out from Xerox Corp., and the company says the products will enable host mainframes, minis, workstations, and networked micros to produce publications and other documents, incorporating graphics, forms, logos, and signatures.

The 4650 Professional Printing System and the 4090 Laser Printing System both incorporate, according to Xerox, a high degree of "printer intelligence" through a system controller, two 170MB hard disks (with incremental options for two 170MB disks or two 380MB disks), about 1MB of memory devoted to graphics processing, and libraries of forms and fonts (64Mb, expandable optionally to 128Mb). Both

systems can do two-sided printing, and in both vertical and horizontal orientation.

The 4650 is Xerox's first to feature a resolution of 600 spots per inch. It can print at up to 50 pages per minute. The 4090 has four input trays, which can feed different paper sizes or stocks. It prints at up to 92ppm, and has a resolution of 300 dots per inch.

The 4650 becomes available next spring and will be priced at \$171,000. The 4090 is available now, and is priced at \$190,000. XEROX CORP., El Segundo, Calif. **Circle 237**

Apple Debuts New Micros and Operating System

Apple Computer Inc. has announced the IIC Plus and Macintosh IIX micros, and the IIGS System Software 4.0.

The Apple IIC Plus has an internal disk drive for 3½-inch 800KB floppy disks, five times the storage capability of earlier IIC models, according to Apple. A 65C02 microprocessor provides 128KB of internal memory. New features also include a choice of operating speeds, 1MHz or 4MHz, an internal power supply, and a slide volume control.

The Macintosh IIX uses Motorola's 68030 chip and 68882 math coprocessor. Running at 16MHz, they provide up to a 15% performance improvement over the Mac II, according to Apple. The IIX also uses a 3½-inch 1.44MB floppy disk drive that can read and write to MS/DOS and Apple II formats.

The Apple IIGS System Software 4.0 includes the first 16-bit operating system for the standalone Apple IIGS, says Apple. The software takes better advantage of the 65C816 microprocessor, according to the company, which speeds up boot, disk access, and program launch times.

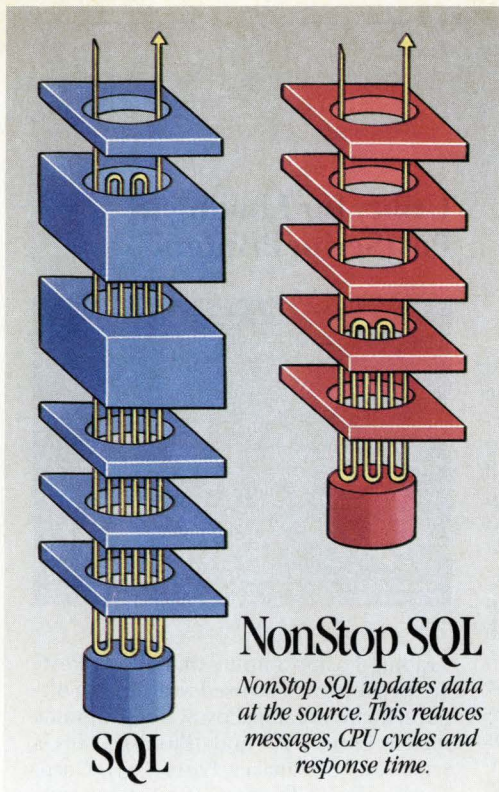
The IIC Plus is priced at \$675; the IIX ranges between \$7,769 and \$9,369; and the IIGS OS is priced at \$39. APPLE COMPUTER INC., Cupertino, Calif. **Circle 238**

NCR's New POS System for Distributed Processing

A new point-of-sale and transaction processing system for food, drug, and general retail establishments is available from NCR Corp. The NCR 2127 Retail System is comprised of the 2127 POS terminals, the Tower computer platform, and Ultra software. A key feature is the Oracle relational database and tool set, according to the company, allowing the system to be modified and

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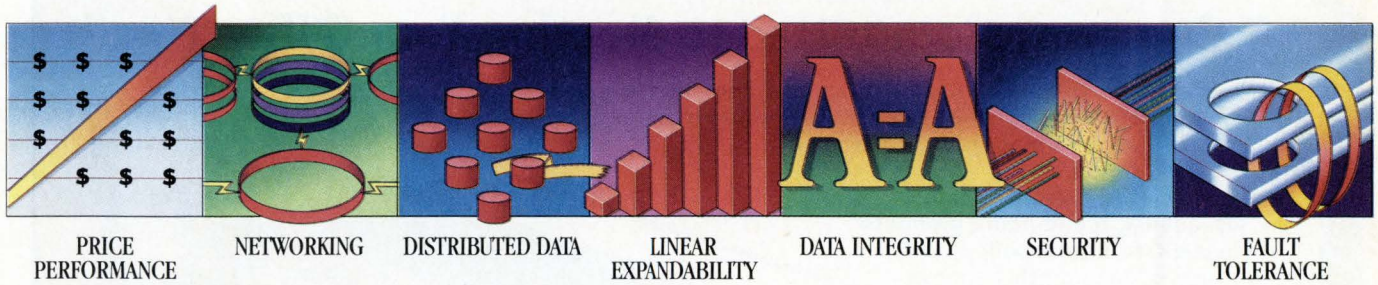
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NEW PRODUCTS

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By making use of intelligent terminals, the system does distributed processing,



offloading processing from the in-store processor and allowing retailers to access POS information while handling back-office applications on the in-store system.

A typical 12-lane configuration has a price tag of \$90,000. NCR CORP., Dayton, Ohio.

Circle 239

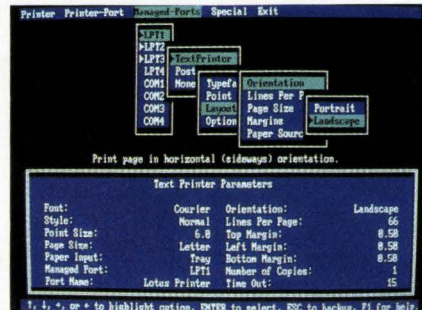
SOFTWARE

Conversational English Data Access

Natural Language Inc. has announced version 3.0 of Natural Language and the NLI Connector. Natural Language, formerly called NLI DataTalker, provides conversational English data access and analysis to relational database management systems. Transparent access to distributed data held in different vendors' databases (including Oracle, Ingres, Rdb, Sybase, and Informix) on different machine architectures is provided through the company's NLI Gateway.

The NLI Connector is an interactive knowledge-based tool used to teach Natural Language the additional relationships and concepts required by a specific database application. It is priced from \$10,000 to \$65,000. Natural Language runs from \$5,000 to \$35,000. NLI Gateway is priced from \$7,000 to \$35,000. NATURAL LANGUAGE INC., Berkeley, Calif. Circle 240

Utility for Linking to PostScript Printers



Trading Post is a utility that allows PostScript printers to be used with any PC software, including non-PostScript programs such as Lotus 1-2-3 and dBase III. This is according to its maker, Laser Tools Corp. Trading Post allows one PostScript printer to be used as if it were two printers on two separate printer ports, says Laser Tools. The product dedicates one DOS printer port to software that speaks Post-

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companies' market positions and help shut out their competition, mission-critical applications are becoming the top priority of companies of all sizes and in all industries.

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- and shut out their competition by interconnecting their customers' computers to their own.

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Together, Business Research Group and Datamation Magazine present a two-day conference on Mission-Critical applications, bringing together companies that have implemented these systems, the vendors, integrators and VARs that have developed these systems, and companies that are considering the implementation of Mission-Critical applications to support their business objectives. This conference is essential for both end-users and information technology vendors wanting to exploit the new opportunities created by Mission-Critical applications.

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ISSUE DATE	AD CLOSING DATE	SPECIAL REPORTS	SOFTWARE/SERVICES	SYSTEMS	COMMUNICATIONS	MANAGEMENT
January 1	Dec. 1, '88	IBM				
January 15	Dec. 15, '88	Technology Forecast		RISC	Telecomm. Operations	
February 1	Jan. 2		Transaction Control Systems	OLTP		PCs in IS
February 15	Jan. 16		OS/2 vs. Unix	Security		Product Development
March 1	Feb. 1	DEC		IBM-DEC Connectivity	T-1 Multiplexors	
March 15	Feb. 15		PC-DBMSs	386-Based PCs		Corporate Profile
April 1	Mar. 1	Budget Survey		Weapon Systems	EDI	
April 15	Mar. 15	Connectivity Survey	Expert System Integration	Document Image Processing	Voice Messaging	
May 1	Mar. 31	Companies to Watch	OS/2 on IBM Compatibles			Corporate Profile
May 15	Apr. 14	Large Scale Systems Survey	Operating Systems Evolution			Decentralization
June 1	May 1		Object Oriented Programming (OOPs)	Macintosh in IS	LANs	
June 15	May 15	Application Software Survey		High Performance Computing		Corporate Profile
June 21	May 22	DATAMATION 100				
July 1	June 1	CASE	Non-IBM Operating Systems		Building Corporate Networks	Designing Corporate Computing Architectures
July 15	June 15		On-Line Information Services		Modems	Corporate Profile
August 1	June 30		Graphical User Interfaces	UPS		Multinational IS Operations
August 15	July 14		High-Level Languages	Storage		
September 1	Aug. 1	User Role In Standard Setting		Proprietary Systems		Open Systems Economics
September 15	Aug. 15	Best Computer Science Universities Hall of Fame	DBMSs			
October 1	Sept. 1	Salary Survey			Network Management	Government Computer Research
October 15	Sept. 15	Managing Your Vendor—Part 1		High-End Output Devices		Factory Automation
November 1	Sept. 29	Managing Your Vendor—Part 2	Disaster Avoidance		Electronic Mail	Corporate Profile
November 15	Oct. 13	Mini-Micro Spending Survey	Software Development Standards			Office Automation
November 21	Oct. 20	Industry-by-Industry Spending Survey and Profiles				
December 1	Nov. 1			Electronic Publishing		IS Executives in the 1990's
December 15	Nov. 15	User Group Directory				

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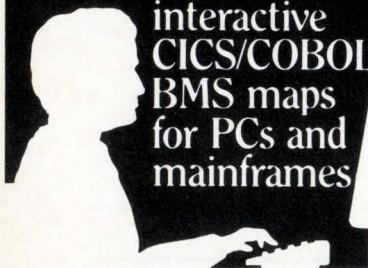
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		NCGA, April 16-20, Philadelphia	
		Connect, April 18-20, Boston	
Far East Operations	Cahners Advertising Performance Study		Closes: Apr. 21
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Executive Information Systems		PC Expo, June 20-22, New York	
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Worldwide Workstation Trends		Unix Expo, Nov. 1-3, New York	
	Cahners Advertising Performance Study		
Multilingual Software		Comdex Fall, Nov. 13-17, Las Vegas	Closes: Oct. 20
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CIRCLE 45 ON READER CARD

NEW PRODUCTS

Script and one to programs lacking Post-Script support. It runs on any IBM PC with DOS 2.0 or higher, requires 9KB of RAM, and is priced at \$79. LASER TOOLS CORP., Berkeley, Calif. **Circle 241**

MAX/SPF Maximizes TSO/ISPF Productivity

Integrity Solutions Inc. has announced MAX/SPF, a programmer productivity tool. It is screen-driven, ISPF-based software touted to increase the operation and functionality of the TSO/ISPF environment by allowing for faster navigation and easier access to datasets and PDS members. Its manufacturer says MAX/SPF allows users to maintain customized menus of dataset names, utilize TSO/ISPF dataset functions without typing a dataset or member name, and brings traditional ISPF, full-screen edit and browse capabilities to VSAM files. MAX/SPF licenses for \$6,000, including one year of maintenance. INTEGRITY SOLUTIONS INC., Littleton, Colo. **Circle 242**

Foreign Exchange System for Front and Back Office

A new foreign exchange system is one of the very few that combines both front and back office processing capabilities, according to Money Management Systems Inc., its vendor. Money Management says that IMEX II (International Monetary Exchange II) allows users to record and process spot trades and forward trades in any currency while still maintaining the relationship to whatever currency is chosen as the home currency. The system also produces more than three dozen reports.

IMEX II, which is compatible with the DEC VAX family of computers, will soon be integrated with Money Management's automated fixed income securities trading system, MoneyMarket II. This will allow for the sharing of database information between the two. Pricing for IMEX II starts at \$150,00. MONEY MANAGEMENT SYSTEMS INC., Waltham, Mass. **Circle 255**

COMMUNICATIONS

IBM Intros Multivendor Telecom Products

Big Blue, by its own count, has put 50 new and enhanced telecommunications products on the market to facilitate operation and management of computer networks

and to communicate with non-IBM nets. New multivendor communications products include the following:

The Open Systems Message Exchange (OSME) program, which includes the X.400 PROFS Connection and X.400 DISOSS Connection, for use with OSME to connect IBM office systems with other OSI X.400 e-mail systems (\$15,800 to \$43,000);

The OSI/Communications Subsystem, which connects IBM systems with others using comparable OSI protocols, and provides OSI network management capability (\$9,510 for a 10-processor group to \$116,100 for a 50-processor group, plus a monthly license charge);

OSI/File Services, which provides transfer and management of electronic files between IBM and non-IBM systems using comparable OSI protocols (\$6,090 for a 10-processor group to \$72,900 for a 50-processor group, plus a monthly license charge);

TCP/IP for MVS, allowing MVS users to communicate with other systems that use TCP/IP protocols (\$30,240 to \$46,060, plus a monthly license charge); and

8232 LAN Channel Station, connecting System/370s to IBM and non-IBM local area networks (\$8,275 to \$16,725).

New operation and management products include the Transmission Network Manager, based on the PS/2, which provides a central control point for monitoring and controlling proprietary networks (\$24,000 to \$34,000).

IBM's new 7820 Terminal Adapter allows ISDN customers to connect IBM systems, controllers, terminals, and other devices to ISDN transmission lines. It includes two 64,000bps channels that can carry data, plus one for connection control and signaling (\$500 to \$1,500). IBM CORP., Rye Brook, N.Y. **Circle 243**

Net Management Systems: From Fujitsu

Fujitsu America's Data Communications Div. has introduced the FMS 1000, a network management system targeted for datacom nets with from 20 to 200 modems. Consisting of a dedicated controller, a Network System Processor (NSP), and the LN series of leased-line, synchronous modems, the FMS 1000 can configure, poll, diagnose, report, and present alarm information on a modem net, claims its vendor.

Modems in the network communicate with the controller by way of the network interface adapter (NIA), a proprietary

front-end processor built into the NSP. The FMS 1000 system, including controller, NIA, flat-screen monitor, and printer, retails for \$7,995. The modems range in price between \$1,295 and \$6,995. FUJITSU AMERICA INC., San Jose. **Circle 244**

... And from NEC

The Network Control and Management System/Personal Computer (NCMS/PC) 386 is a network management system, which, according to its manufacturer, NEC America Inc., monitors dial, digital, and analog lines; provides a cost-effective interface for IBM NetView users; and offers interactive diagnostic capabilities.

The foundation for the NCMS/PC 386 is a NEC PowerMate 386, a MultiSync high-resolution color monitor, and a Pinwriter model P5300 dot matrix printer. Pricing for the system ranges from \$16,000 to \$49,000. NEC AMERICA INC., San Jose. **Circle 245**

Fiber-Optic Backbone System

An Ethernet-based, fiber-optic backbone system is available from Integrated Photonics Inc. The Aztec 150 is an optical backbone bridge designed for integrating multiple, widely dispersed Ethernet subnets.

The product features a linear/ring topology that eliminates the need for repeaters or active hubs, according to the vendor. Users are therefore free to install cabling as they would ordinary coax or can take advantage of the ring topology in anticipation of future FDDI upgrades. Integrated Photonics further says that more than 100 Aztec 150s can be implemented on a single fiber bus with collision detection managed by its Digital Detection Method. The product can support an area of 8km with nodal spacing as great as 2km, and can interface to Ethernet subnets of any physical medium, including thick or thin coax, twisted pair, or fiber cabling. Conforming to the IEEE 802.3 standard, it costs \$4,750. INTEGRATED PHOTONICS INC., New Brunswick, N.J. **Circle 246**

Reprints of all DATAMATION articles are available. There is a 500-copy minimum order. Details may be obtained by telephoning the Reprints Department, (312) 635-8800.

BRIEFS

Compaq Computer Corp., Houston, has introduced the Deskpro 386/20e, a **32-bit 386-based PC**. A 1.2MB diskette drive, 1MB RAM version costs \$5,199; a 40MB fixed disk drive version costs \$6,599; a 110MB fixed disk drive version costs \$7,999. **Circle 247**

Hewlett-Packard Co., Palo Alto, has begun shipping the HP 9000 Model 370, a **33MHz, MC68030-based workstation**. It costs \$3,500. **Circle 248**

Amperif Corp., Chatsworth, Calif., makes the Model 9200 **Mass Storage System for the Unisys 1100/200** mainframe market, allowing access of any combination of high-speed disk, cache disk, and solid-state disk. It's priced between \$175,000 and \$547,300, depending on configuration. **Circle 249**

Galil Motion Control Inc., Palo Alto, has introduced **CAD-to-DMC software**, which translates an AutoCAD or equivalent DXF file into servo motion. CAD-to-DMC, which costs \$1,500, links PC-based CAD software with the vendor's DMC-620 Two-Axis Servo Controller, which costs \$1,495. **Circle 250**

Unibase Systems Inc., Park City, Utah, has announced version 2.0 of its TextWare, a **text retrieval and indexing package** that provides compatibility with WordPerfect, WordStar, and Volkswriter. The PC version is \$495; the five-user LAN version is \$995. **Circle 251**

ACS Network Systems, Concord, Calif., has made available release 3.0 of its EDI/36, EDI/38, and EDI/4XX software packages, which provide **electronic data interchange translation and communication functions for IBM Systems 3/X and AS/400s**. The products range from \$5,700 to \$18,000. **Circle 252**

Pick Systems, Irvine, Calif., announces the R83 2.2 version of the **Pick PC System for IBM PS/2 and 386-based PC systems**. Upgrades for existing PC R83 users are priced at \$200. **Circle 253**

Data Race Inc., San Antonio, has announced a **family of modems** touted to be able to replace several datacom devices and offering a variety of PC workstation connectivity options. The MasterModem internal modem card is \$995; the external package is \$1,345. **Circle 254**

NOVEMBER

International Conference on 5th Generation Computer Systems '88
Nov. 28-Dec. 2, Tokyo. Contact Hideo Aiso, Keio Univ., 3-14-1 Hiyoshi Kohoku-ku, Yokohama, 223 Japan, (004) 63-1141.

OSI Product Integration Conference
Nov. 29-Dec. 2, McLean, Va. Contact Bill Horst, Corporation for Open Systems (COS), 1750 Old Meadow Rd., Suite 400, McLean, VA 22102-4306, (703) 883-2730.

Engineering Workstations Conference
Nov. 29-Dec. 2, Los Angeles. Contact Engineering Workstations Conference, P.O. Box 3727, Santa Monica, CA 90403, (213) 450-0500

Cause88
Nov. 29-Dec. 2, Nashville. Contact Cause88, 737 29th St., Boulder, CO 80303, (303) 449-4430.

DECEMBER

AEC Expo
Dec. 7-9, New York. Contact Expoconsul International Inc., 3 Independence Way, Princeton, NJ 08540, (609) 987-9400.

International Conference on Computer Vision
Dec. 12-15, Tarpon Springs, Fla. Contact Ruzena Bajcsy, Computer & Information Science Dept., University of Pennsylvania, 200 S. 33rd St., Philadelphia, PA 19104-6389, (215) 898-6222.

4th Aerospace Computer Security Conference
Dec. 12-16, Orlando, Fla. Contact Marshall Abrams, 1820 Dolley Madison Blvd., McLean, VA 22102, (703) 883-6938.

EDI Systems Conference
Dec. 13-14, Washington, D.C. Contact TDCC/EDIA, 1101 17th St., N.W., Suite 712, Washington, DC 20036-4775, (202) 293-5514.

International Computer Science Conference '88
Dec. 19-21, Hong Kong. Contact Dr. Kam Wing Ng, Dept. of Computer Science, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong, (852)-0-695-2724.



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IBM The Bigger Picture

Challenging Times Require Changes In IS Thinking

Information technology can create competitive advantage of and by itself. Most chief information officers are willing to take on the challenges presented by systems discontinuities. Systems integrators threaten MIS departments. High-quality data centers incur high costs.

These are some of the IS myths dispelled by McKinsey & Co. in its four-part DATAMATION series, "The Challenges of Information Technology," which concludes with this issue's article on data center management (p. 89). The realities, as the management consulting firm points out in the series, are that information technology isn't a silver bullet; few CIOs are gutsy enough to rearchitect their organizations' systems; integrators are MIS's partners, not predators; and the best data centers manage their dollars as neatly as their data.

Such doses of reality are needed medicine for today's IS executives. Most seem to suffer from an acute case of IS schizophrenia—torn between the needs of business and the limitations of technology—to the point of inertia. The ultimate cure for this confusion, the firm says, lies in collaboration: IS types must work smarter and faster with their business peers, their suppliers (including integrators), and within their own ranks if their organizations are to survive. More important, perhaps, the McKinsey consultants go beyond just delivering the message. They actually suggest some means for going about the task.

First, IS execs must help their CEOs and departmental peers understand that IS investments alone are not going to make their organizations winners. Most outlays for systems and software are enough to keep organizations in the game by lowering costs or improving services. IS execs should be given the latitude to execute such tactical technology-based improvements without interference or second-guessing.

Second, the entire team must come to realize that big wins via technology require vision and commitment. CEOs, agency heads, provosts, and other institutional leaders must have a clear sense of what makes their organizations stronger than competitors today and what will spell the difference tomorrow. They must share the vision with their IS execs, encouraging them to apply technology to core organizational strengths. IS execs, in turn, must

take the lead in making sure the entire organization is committed to the kinds of organizational changes and long-term investments required by such applications.

Third, IS execs need to approach their suppliers in new ways. They should be much more aggressive in soliciting rival bids on projects, following the government's lead in IS procurement. They should look for more off-the-shelf solutions to short-term, nonstrategic problems, husbanding their IS resources for major systems undertakings. And they should treat systems integrators as friends, not foes, recognizing that the best user-integrator engagements are built on cooperation between MIS departments and integrators.

Fourth, IS execs must make sure their own houses are in order before they assume new challenges. They have to share the CEO's vision with the systems analysts, database administrators, and other IS employees. They have to ensure that the existing systems configurations are optimum for their organizations. They have to insist on timely information that will allow them to monitor the performance of IS assets continually.

The sooner IS execs grasp the meaning of the message conveyed in this series, the sooner they will recognize the privileged position in which they find themselves. No group of professionals is in a better position to transform their organizations into world-class competitors. They, not information technologies, can be the catalysts for change—perhaps the biggest challenge of all.

—Tim Mead, Editor-in-Chief

A Golden Opportunity For CA and Users

Computer Associates' acquisition of Applied Data Research has sent shivers down the spines of some ADR users who are wondering what the future, under a CA umbrella, will hold for them. What will support and service be like? Will CA invest as much in development of products as ADR, under Ameritech, had? What will communications with CA management be like? The shivers come as much from the newness of the situation as they do from the differences in CA's approach to the software business.

But CA's emphasis, as chairman Charles Wang told a group of his software peers at a meeting in Dallas recently, is on the busi-

ness of software. "Success," he told them, "has less to do with unique technology than [with] the ability to deal with business realities." Wang and other CA executives made their philosophy clear at another recent gathering, this time in Atlanta at the Cadre meeting of ADR users. They stated that their number one priority for the ADR customer base was service and support, or what CA executive vice president for planning David Tory described as "stabilization of product." CA promised that it would do a prompt review of ADR research projects, with some of them certain to meet the axe. One already on hold is a CASE-like product called Depictor (see Look Ahead, p. 13).

CA's review of ADR research projects is no doubt justified, and we found it to be open, honest, and even refreshing in what it told Cadre members. But there was a perception, call it a concern, among some users—perhaps only a minority—about CA's commitment to technological development. Their concerns involve the level of CA's R&D commitment and whether it is good for them and the industry in general, as well as the frequency of software updates and maintenance releases by CA.

ADR users had gotten used to a level of R&D spending that was much higher than at some other software companies, including CA. Nevertheless, we feel it is important for both ADR users and the entire U.S. software industry to have a continued dedication to expanding the boundaries of software technology, even if it includes research for research's sake. In particular, we think it important for CA, the world's largest software company, to be a leading force in this important effort.

CA has a golden opportunity right now at this early juncture to reassure the ADR customer base about its commitment to technology and to clear up any misperceptions that may exist. From our discussions with users at Cadre, they believe what CA says about service and support, but they are taking a wait-and-see attitude about development and existing product directions. The window is open for CA to allay these fears. How communications are dealt with and how decisions are made will establish a pattern for years to come.

Given CA's propensity for acquisition, many user organizations, particularly those not in the CA fold, will be watching carefully. Successful communications and a clear commitment to technology now, could, in the event of another CA acquisition, provide that extra little measure of warmth to stop the shivers of some future group of users before they start.

—David R. Brousell, Executive Editor

Career Opportunities

DATAMATION

1988 Editorial Calendar and Planning Guide

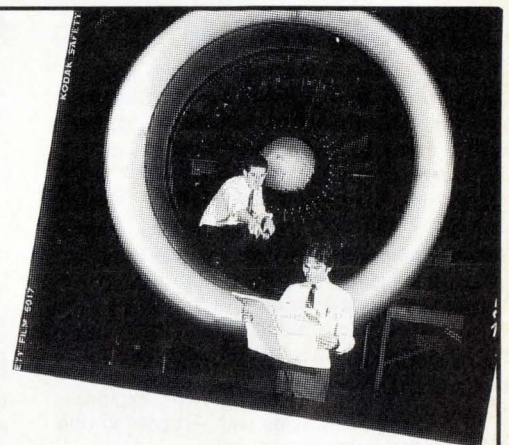
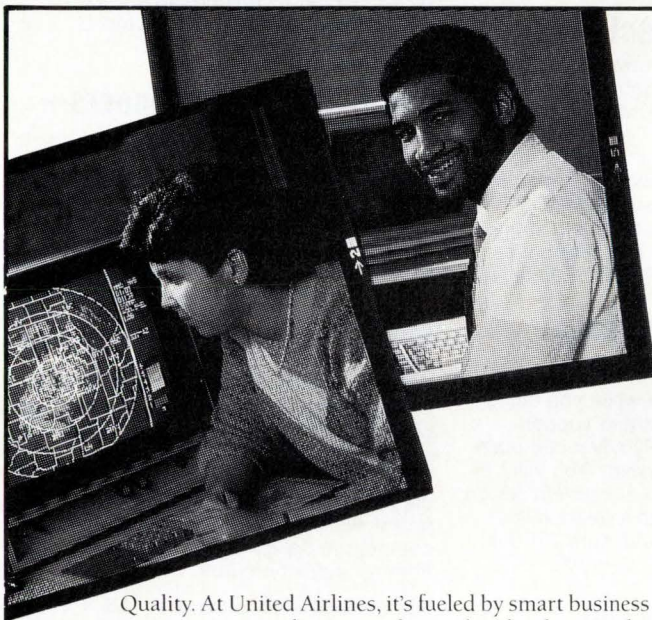
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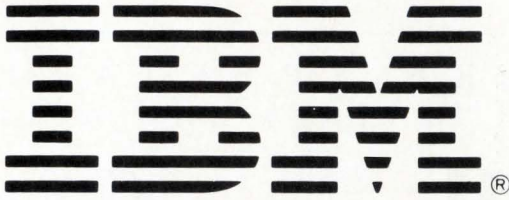
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