ESTTA Tracking number: **ESTTA321593**
Filing date: **12/11/2009**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE TRADEMARK TRIAL AND APPEAL BOARD

Proceeding	91179897
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Date	12/11/2009
Attachments	PX43 of 87 - Part 1.pdf (8 pages)(611298 bytes) PX43 of 87 - Part 2.pdf (8 pages)(420017 bytes) PX43 of 87 - Part 3.pdf (8 pages)(425375 bytes) PX43 of 87 - Part 4.pdf (8 pages)(428229 bytes) PX43 of 87 - Part 5.pdf (8 pages)(551936 bytes) PX43 of 87 - Part 6.pdf (8 pages)(351712 bytes)

FOCUS NEWS

INFORMATION BUILDERS, INC. WINTER 1990

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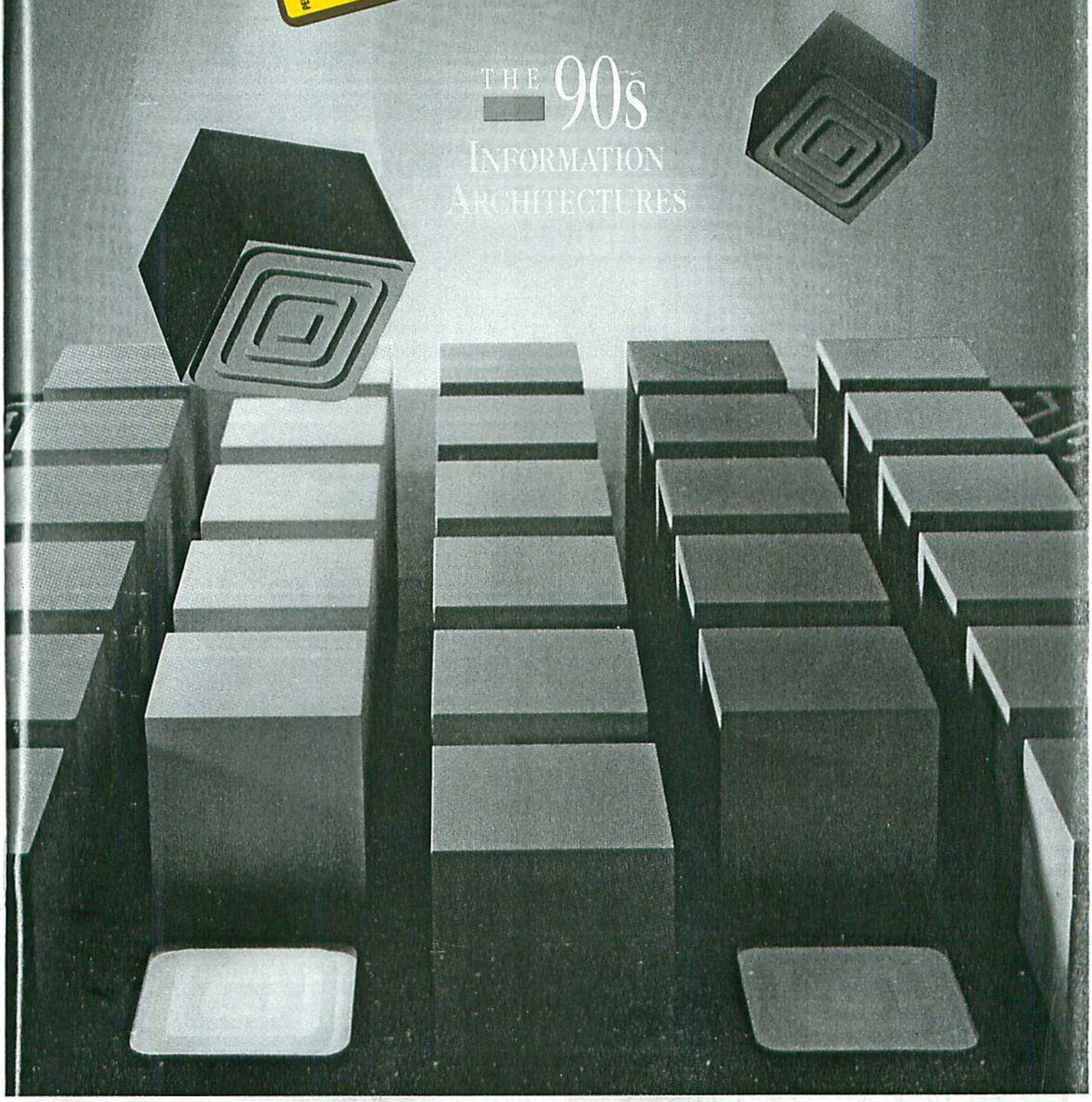

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"FOCMAN could not only do everything we wanted, it was by far the least expensive option for us."

Richard Merrall
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British Telecom

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Howard I. Cinman, *Product Manager*

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FOCMAN

The FOCUS Project Management System

FOCUS NEWS

WINTER 1990

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Building The Future

Five Technologies For the 90s

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FOCUS On Enterprise Systems

The systems of the 90s, it is clear, will be global in scope, even within smaller businesses. To implement these systems, in the context of historical developments in systems methodology, the role of FOCUS in an architecture founded on a common data model is clear. Its interoperability and conformance to standards provide the glue that puts it all together.

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FOC-CENSUS Results: Evolving Environments

A look at the FOCUS community of users demonstrates that heterogeneity is here to stay, in both hardware and software. From data architectures to mainframes and minis, the typical FOCUS shop is poised for the future.

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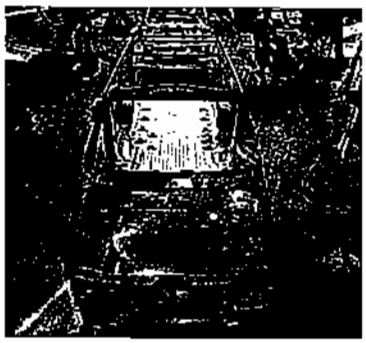

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Expert Systems

The Best Is Yet To Come

In the 80s, expert systems technology moved from academic experiments to full-fledged commercial applications. Today, the press of global events makes the benefits they can provide more critical than ever. A look at the past—and future—of expert systems, including LEVEL5 OBJECT.

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Betting The Company

Wagner & Teldon was enjoying explosive growth, but straining to manage it in a complex environment with obsolete technology. The solution? Run the whole business with PC/FOCUS-MultiUser.

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An American in Cannes

Attendees of FOCUS World and FUSE International in Cannes were treated to a dizzying array of renowned speakers, new technologies, and the charms of the Mediterranean. One reporter's look at a watershed event.

LET'S GET SERIOUS

The 90s are upon us, and while we will all be reading stories here and elsewhere that extol the wonders to come, I'd like to add a sobering note about the new challenges and responsibilities implicit in the developments we discuss in this issue. It's not too late for another New Years' resolution: *Let's get serious.*

Forty years of information technology (IT) are behind us. We have computerized manual processes and even created applications that would have been inconceivable without computers: today's financial markets would be impossible without on-line processing. We have moved from high priests robed in white behind glass doors to "power users" who jealously guard their prerogatives against the second coming of centralization. We have been through many waves: access methods, DBMSs, structured programming, the year of the LAN, downsizing, Information Centers, and others. With rare exceptions, the hot trends have been technology-centered, not business-centered. Many of the ones to come will share that characteristic.

Data is only potential information; information is potential knowledge; and knowledge is potential competitive advantage if it is used in a creative, flexible, and above all, accurate way.

TECHNOLOGY IS NOT ENOUGH

The FOCUS *News* is published by a computer software company, and our job is to deliver solutions. We are, by nature, devoted to technology; for fifteen years, our family of products has been shaped and guided by technology developments, and we have done some guiding and shaping of our own. Accordingly, in this issue, you will see a discussion of the critical technologies of the 90s by our president, Gerry Cohen. We also feature a brief look at distributed FOCUS and a discussion of the emergence of enterprise information architectures. Following this is an excerpt from the results of the recent FOC-CENSUS that demonstrates how the FOCUS community is already at the leading edge of implementing heterogeneous hardware and software architectures, and poised to take the next step by using the new features of FOCUS with their wide range of hardware and data. But it is central to the discussion that we realize why this matters: data is only potential information; information is potential knowledge; and knowledge is potential competitive advantage if it is used in a creative, flexible, and above all, accurate way.

Fourth generation languages began with a fairly simple goal, often expressed by Gerry Cohen: to replace COBOL. For a large, and growing, class of applications, they have been successful in improving the development process through rapid delivery of results. More than that—the 4GL has become an empowering tool that makes it possible for the users of data to get at it more easily. In one sense, that ease of access helps ensure the validity of the data, according to Ken Orr in *Structured Requirements Definition* (Ken Orr & Associates, 1981):

CONTINUED ON NEXT PAGE

FOCUS NEWS

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Published quarterly by Information Builders, Inc., New York, N.Y. 10001.

Subscriptions to the FOCUS *News* are available free of charge upon request.

Address manuscript submissions, story ideas, and correspondence to the Editor.

Information Builders, Inc. assumes no responsibility or liability for damages resulting from errors or misuse of information contained herein.

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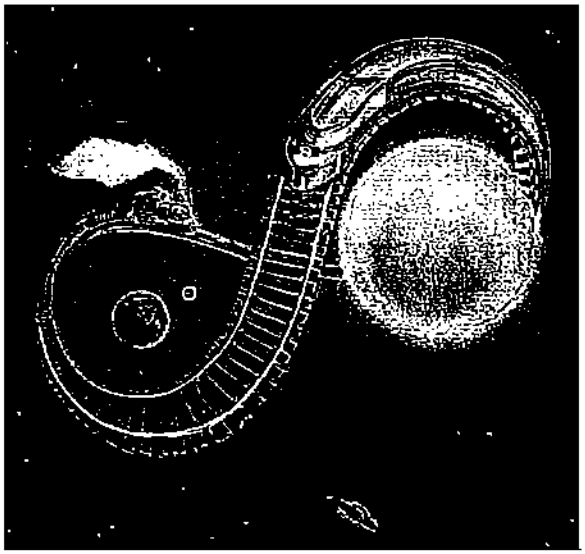

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"I downloaded 32 meg of mainframe data and created 117 spreadsheets in less than 5 minutes!" Mike Barret, Micro Systems Manager and FOCUS user, NUS Corp. Gaithersburg, Md.

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CONTINUED FROM PAGE 4

...systems theory can be used to show that data quality is directly related to data use, not to data collection, processing, or storage. Even if every precaution is taken in the collection, editing, and storage of data, if it is not used (or if it is infrequently used), the data will become increasingly inaccurate because, over time, there will be no feedback mechanism to ensure that it will be changed to reflect the real world.

THE RIGHT TOOLS

Let's get serious: We all know people who use the wrong tools and the wrong designs and who don't check their work. Nothing is more dangerous than a plausible number–if it's wrong. Inappropriate tools can have substantial impact as well; at a recent conference we saw a demonstration devoted to creating a presentation using expert systems software. It could have been done better, and in a fraction of the time, with an inexpensive product like Dan Bricklin's Demo Program. There is a dual problem here: users are being assigned large projects on the strength of their successes with Lotus 1-2-3 (or simple TABLE requests), and the software industry in general has taught its customers syntax, not systems design.

Let's get serious: the hardest work in a large-scale project should be done before the first line of code is written. Even a prototype-driven development methodology begins with requirements analysis and high-level design. The complex environments of the 90s will require serious investments in technical education to leverage the benefits of new technology appropriately. This must not be limited to syntax alone. IBM's incorporation of other vendor's methodologies into AD/CYCLE is evidence of the growing realization that this component of the process must be addressed professionally. The FOCUS *Systems Journal* has featured extensive discussions of methodology, data modelling and the like because we realize their importance as well. In a future issue of the *News*, we will cover the ways in which our integrated CASE tool, FACT, supports this growth into rigor.

We are still struggling with learning simple 1920 notions of statistical process control and inspection. The struggle will continue for many more years.... you target a specified level of, say, reliability, and design the system to meet that requirement.

- *Tom Gilb*
"Software Project Management in the 90s"
presented at FOCUS World

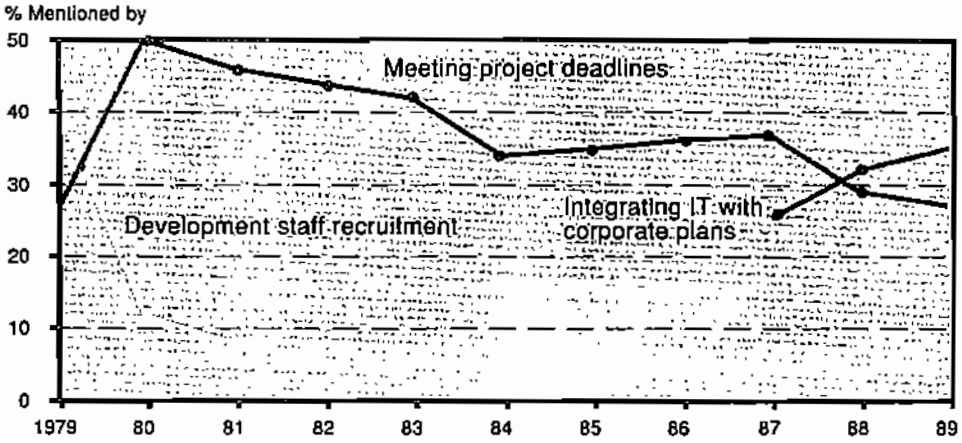
Let's get serious: the investment in hardware, software, and people is far too high to ignore the reasons why we are all here: to deliver systems that drive and support the business goals of our firms. In the 1989/90 *Information Technology Review*, published in the United Kingdom by Price Waterhouse, Professor Kit Grindley offers a startling piece of information based on the responses of 750 data processing managers surveyed quarterly since 1979.

Ten years ago the first survey was conducted. One question asked was "What is your main problem?" At first, they replied "Programmer recruitment," but soon changed to "Meeting project deadlines." And there it has remained ever since, in the number one position–the difficulty of developing computer systems in reasonable timescales. Until last year, that is. Suddenly, and coming from nowhere, a new worry moved into the top five in 1987. And in October of 1988, it overtook the deadlines problem....1988's main cause of grey hair in the dp department was "integrating IT with corporate strategy." For the first time, a technical concern with making the computer work has been ousted by a management concern with making it work for the company.

IBI provides tools. The tools of the 90s will enable more integration than ever before between systems and the businesses they support. With the new global view that has emerged–one IBI shares in with the opening of our European Development Center in Paris–it is incumbent upon us as systems professionals to see that our skills keep pace to permit us to deliver the applications of the 90s. Our own Professional Services division continues to broaden the scope of its educational offerings; so should you. We'll be glad to help.

Let's get serious. ◆

The Top IT Problem



Source: Price Waterhouse/Computing Opinion Surveys

"For the first time, a technical concern with making the computer work has been ousted by a management concern with making it work for the company."

FOCUS SOLUTION

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The FOCUS Solution is an integrated offering that includes hardware, software, consulting, support, and education.

- Distribute your FOCUS mainframe applications.
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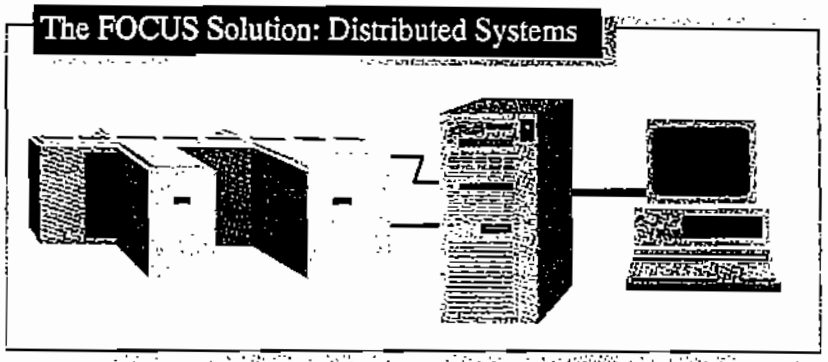

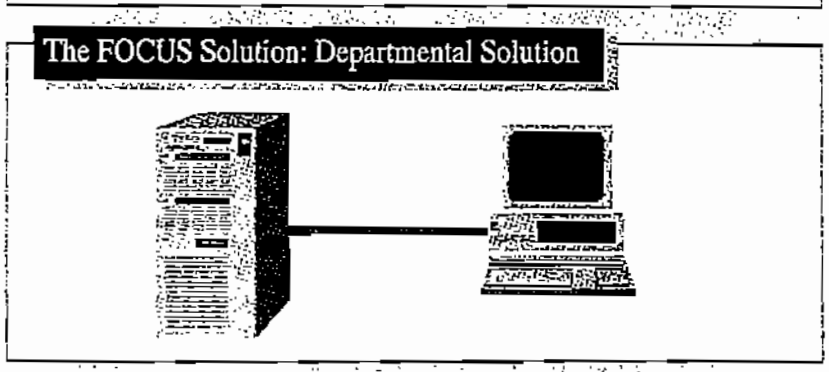

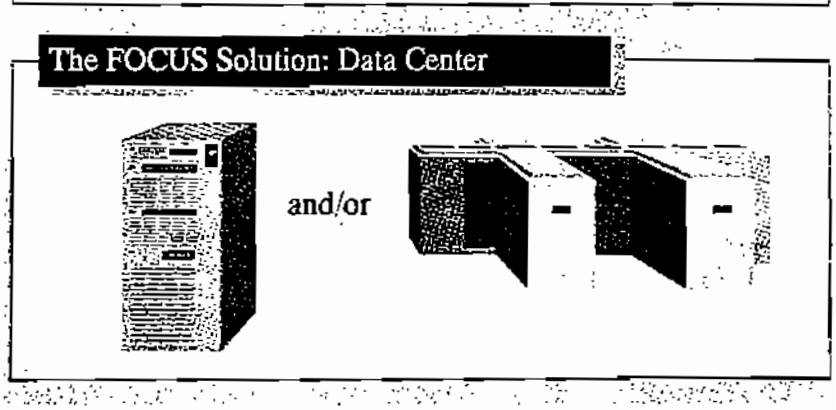

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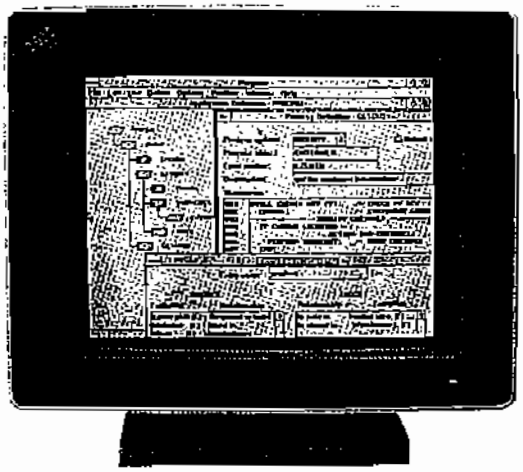
IBI Announces Support For IBM's AD/CYCLE, Repository

On September 19, IBM announced AD/Cycle™, their application development solution which incorporates tools for business modeling, analysis/design, producing applications, testing and maintenance. IBI, in a continuation of its role as a strategic SAA™ software partner, announced support for AD/Cycle and the data model used in the Repository.



IBM's AD/CYCLE features a complete spectrum of design, delivery, and testing tools for application developers.

Repository Manager/MVS, the first deliverable release of IBM's long-awaited "single point of control" for shared application development, supports the definition, collection, manipulation and control of application development information. Use of this facility will contribute to improved consistency in shared development. The model used by the repository defines and stores information in terms of entity-relationship models. By providing support for the model in FOCUS, IBI will make it easy to integrate FOCUS in the new environment IBM is delivering.

This commitment continues the support IBI is providing as an SAA-compliant vendor. The previous announcement of support for OFFICE VISION™ is another example of the continuing effort to provide ease of migration for FOCUS users to the IBM environments of the 90s. ◆

FOCUS Support For Digital's NAS

At Info '89, held in Manhattan on October 10, Information Builders announced its support for Digital Equipment Corporation's Network Application Support™ (NAS) and All-in-1 Business Intelligence strategy, and the creation of the FOCUS for NAS Support Program—a program to ensure that all FOCUS products will comply with Digital's NAS.

"IBI has recognized for several years that the foundations on which Digital's NAS are based—open systems, distributed processing across platforms and freedom of choice for users—is the direction of computing in the 90s," says Gerry Cohen. He believes that FOCUS is one of the most NAS-conformant products now available on the marketplace.

The IBI NAS Support Program's goal is to deliver complete FOCUS implementations to all targeted NAS environments. It will give FOCUS users the power to respond quickly to competitive challenges through faster access to information. "We applaud Digital for its aggressive and ambitious program and their delivery of products today," said Cohen.

Also under way at IBI are development projects for FOCUS in Macintosh and ULTRIX environments, with product features and availability to be announced.

The new VAX 9000 features a very high density chip architecture.

...and New VAX 9000

At Digital's press conference held in Boston on October 24, 1989, IBI announced support for the new VAX 9000 mainframe-class computer . The 9000 is available in configurations ranging in speed from 30 to 117 times that of the VAX-11/780. It features enhancements in memory performance and I/O, an integrated vector processor, and many other features.

"The availability of FOCUS for the VAX 9000 complements our plan to deliver NAS and All-in-1 Business Intelligence-compliant solutions," says Melissa Webster, vice president of Information Builders' VAX Divison. Speaking as the only 4GL vendor represented on the business panel at the event, Webster added that FOCUS will also allow Digital customers to protect their existing hardware investments, and give them the resources to implement more strategic, core applications on VAX machines.

FOCUS will provide VAX 9000 customers with a comprehensive set of application development and decision support tools in high-volume transaction processing environments. Gerry Cohen believes the new VAX 9000 will allow FOCUS users to develop "mission-critical VAX applications that require mainframe-level resources." ◆

FOCUS for Tandem Shown at ITUG, FOCUS World, System 89

In late 1988, Information Builders and Tandem Computers signed a joint marketing and development agreement to deliver FOCUS to Tandem's full range of hardware platforms. Tandem is a $1 billion company with more than 6,000 sites worldwide. FOCUS will provide the environment and tools

CONTINUED ON NEXT PAGE

necessary to harness Tandem's multi-processor capability and provide state-of-the-art OLIP (Online Information Processing). Every phase of the development has met its deadlines, and at press time, the Beta release of the product was ready for shipment.

The agreement made between the two companies was part of a new Strategic Tool Vendor (STV) program initiated by Tandem, which establishes workable relationships between Tandem and major software vendors. In addition, the agreement marked the first time that a name brand 4GL would run on Tandem's hardware, and the first time that IBI allowed a hardware vendor to market FOCUS. Dan Sheehan, director of the Tandem Division at IBI, points out that it

European Development Center, FOCUS for BULL Announced at FOCUS World

At a FOCUS World press conference, IBI announced the formation and opening

FOCUS World 89

of the first development center outside the United States. Headquartered in Paris, the European Development Center will create versions of IBI products for European hardware, adapt existing products for local

completed. In addition, a port to the DPX 2000 under the SPIX/UNIX operating systems is also part of the project.

Gerry Cohen noted, "We see great opportunities to utilize the high-quality development skills available in Europe, not only to develop our products for the European market, but also as a source of future product components for worldwide distribution. For example, we chose to base our FOCUS I-CASE tool, FACT, on the outstanding VSF (Virtual Software Factory) technology developed by Systematica Ltd. of Bournemouth in England."◆

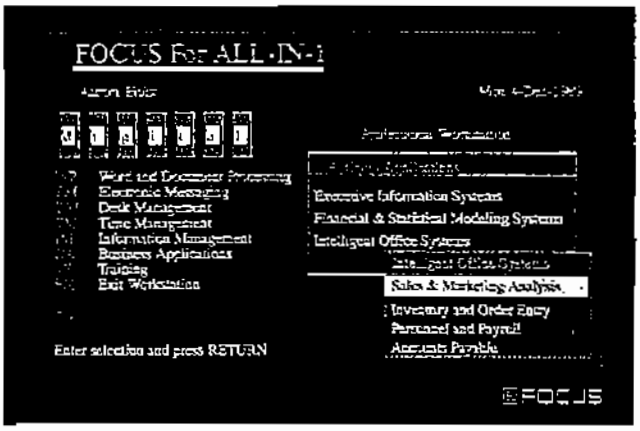
USERS.PRL Sees LEVEL5 OBJECT

Hundreds of LEVEL5 users came to Cocoa Beach, Florida to attend USERS.PRL. Excitement surrounded the demonstration of LEVEL5 OBJECT, the new product release which was demonstrated on the final day of the conference.

Alan Kay, Apple Fellow, keynoted the conference to rapt attention, and presentations were given by users from many industries and government sectors. ◆

FOCUS for Hewlett-Packard Delivery Announced at INTEREX

At the INTEREX user group conference, held in San Fran-



FOCUS For AS/400 Delivery Date Announcement

On September 5th, IBM announced a January 26, 1990 delivery date for the long awaited AS/400 C compiler. Based on IBM's announcement, the targeted delivery date of FOCUS for AS/400 is late 1st quarter 1990. FOCUS Release 5.5 reporting capabilities for the native AS/400 Database will be delivered. Contact your local IBI representative for more information and pricing. ◆

FOCUS For ALL-IN-1 Interface Is Announced

Information Builders, Inc. has announced the availability of the FOCUS for ALL-IN-1 Interface, which tightly integrates FOCUS, the leading fourth generation language, with Digital Equipment Corporation's ALL-IN-1 office automation product. The new interface combines the powerful application development, report generation, and database access facilities of FOCUS with ALL-IN-1's productivity services, which include calendar and time management, word processing, and electronic mail.

"The FOCUS 4GL, coupled with ALL-IN-1 delivers the most powerful integrated office environment available today-bringing together information and technology to create intelligent office systems," explains Melissa Webster, vice president of Information Builders' VAX Division. "The seamless integration of FOCUS and ALL-IN-1 creates a unique environment in which developers can build sophisticated applications in a fraction of the time required by traditional methods." ◆

LEVEL5 for FOCUS Now Available

This is an important year for LEVEL5 expert-systems software. In addition to the introduction of LEVEL5 OBJECT (currently in Beta test), IBI announces the integration of LEVEL5 inference-based technology into mainframe FOCUS. This synergy enables customers to add "intelligence" to existing applications and creates opportunities for new applications that can benefit from the combination of inference-based analysis, data management, and report writing. The embedded LEVEL5 module is accessed the way user written subroutines are today. In FOCUS 6.5, due later this year, the new CONSULT verb will further simplify access.

LEVEL5 for FOCUS is optimized to utilize fewer resources than a stand-alone LEVEL5 development system, while maintaining full functionality. In addition to passing and receiving values, developers can build knowledge bases that run without any screen interface or that automatically construct prompts to query a user for information. Developers can further design knowledge bases that remain memory resident for fast execution or that free memory upon execution.

In 1990 IBI will deliver LEVEL5 for FOCUS and LEVEL5 OBJECT on several hardware platforms. For more information, please call 800/444-4303. ◆

The "FOCUS Solution" Offered By IBI

As an authorized IBM Industry Remarketer of 9370 and 4381 hardware solutions, IBI is proud to offer the "FOCUS Solution" turn-key systems. If you are considering distributing your FOCUS application, implementing a departmental FOCUS to DB2 connection, or considering a totally new FOCUS application, let us show you the quickest and most cost effective way to bring those applications on-line.

For further information, please call Paul Magel in New York at (212) 736-4433, ext. 3052. ◆

FOCUS for SYBASE RELEASE 4.0

FOCUS, the only "front end" for SYBASE SQL Server being shipped for all environments, is now available for the new 4.0 release for VAX/VMS and UNIX processors. FOCUS offers SYBASE application developers and end users an integrated set of reporting, analysis, and data

CONTINUED ON NEXT PAGE

maintenance tools with a client/server architecture through an easy-to-use window environment.

FOCUS' SYBASE interface will support 4.0 features such as cascading triggers, disk mirroring, user-defined cache memory allocation, and referential integrity. Users have access to the tools directly from SYBASE tables. All FOCUS applications developed for 3.0 are compatible with 4.0 without conversion.

FOCUS provides 4GL facilities and transparent data access to SYBASE users, eliminating the need to know where the data is stored. FOCUS accesses SQL Server records directly, using optimized queries. Users can join SQL Server tables to DBMS, Rdb, ORACLE, Ingres, and FOCUS files in the VAX environment, and IBM - resident data such as DB2, SQL/DS, IMS, VSAM, ADABAS, IDMS, and Model 204 via FOCNET. The SQL Server interface is available for Pyramid Computers, the Sun-3 workstation under UNIX , and all UNIX processors to which SYBASE is porting, including IBM RT and the HP 9000. ◆

PC/FOCUS 4.0 Now Available For LANs

The latest release of PC/FOCUS is now available for every major local area network in use today. A powerful set of new features, including a WYSIWYG Report Painter for any TABLE request, SQL Translator, and a greatly enhanced Window Painter for application development, make it much easier to develop, run and maintain your FOCUS systems on LANs. Additionally, the memory usage in PC/FOCUS-MultiUser has been significantly reduced, allowing you to build much larger FOCUS applications on your LAN.

PC/FOCUS-MultiUser 4.0 is available in 4,8, and 16-user versions (larger systems available on request) for Novell, 3Com, and a host of other DOS-based networks. It provides multiuser access to all your data using the same Database Machine you are familiar with on midrange and mainframe FOCUS systems. ◆

FYI(BI)

PEOPLE AND PROJECTS INSIDE INFORMATION BUILDERS

THE SHOW TEAM

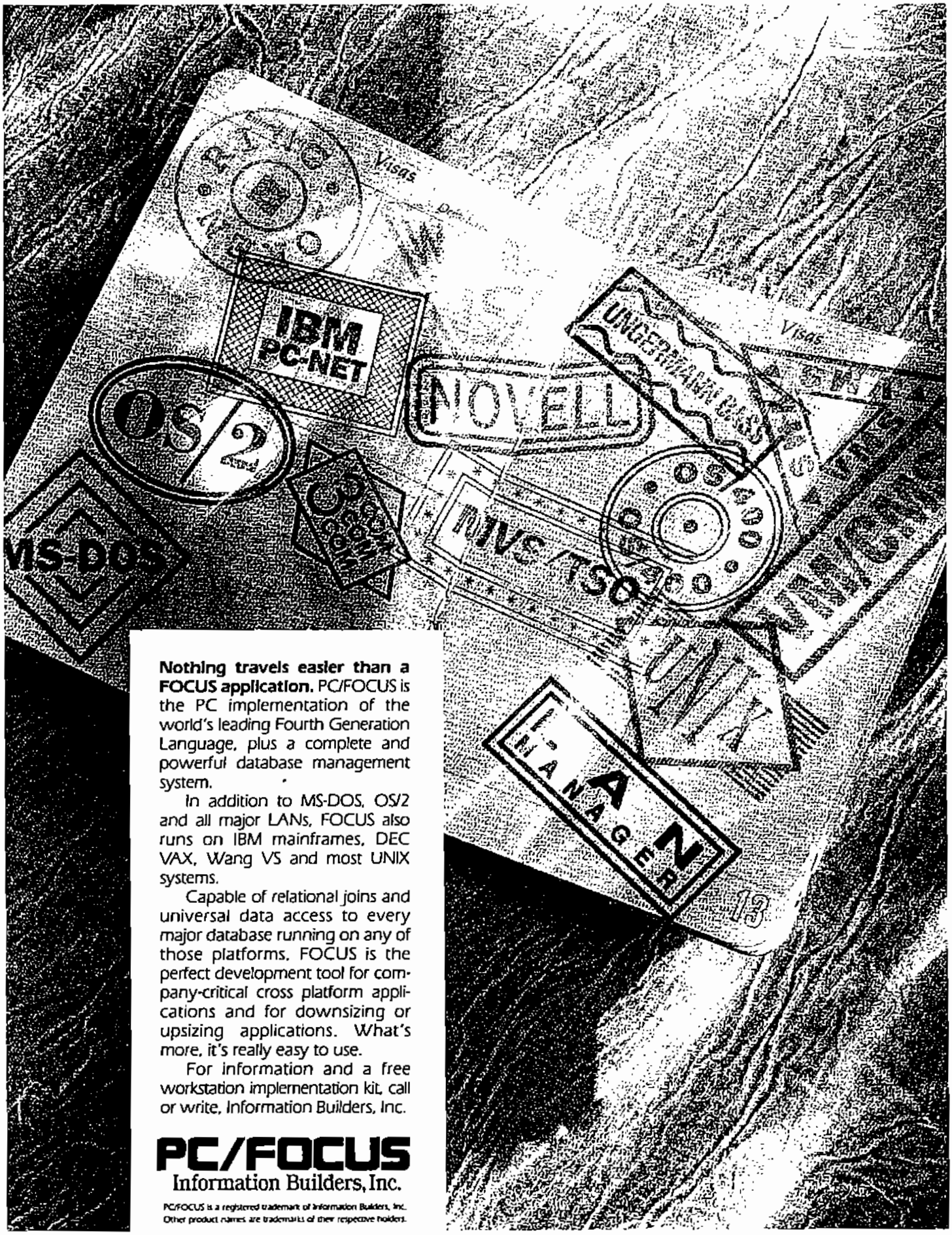
Information Builders exhibits at approximately 75 trade shows a year. There are currently five different exhibit properties that travel on a continuous basis from city to city. The largest exhibit, which fills a complete tractor trailor, weighs 12,000 lbs. and the smallest, which can be checked as baggage, 200 lbs. Many companies contract an exhibit design firm to create an image. At IBI, Jerry Inman, marketing promotions manager, designs all of the exhibits, from the floor to the 20 foot ceiling. Jerry has an able staff of three people to handle scheduling and coordination of these shows as well as the numerous FUSE-related activities IBI participates in.

The largest exhibit—IBI's "National Display" —consumes approximately 1600 square feet of a convention center. It takes 4 carpenters 60 man-hours to erect, 2 electricians to install 6000 watts of electricity to run twelve demonstrator areas and theaters, and 2 carpet workers to install the 1600 square foot carpet. An extensive staff is required to man this exhibits; as many as 25 people may be on the show floor at a major event such as COMDEX.

Jerry has many stories to tell about life on the road, and like most computer show people, has a favorite union story. "There is no question that Chicago and New York have the toughest unions," he says. "Once in Chicago, I was next to a hardware company, who foolishly decided to set up their own display without the assistance of the union. Now, union rules in Chicago state that if an exhibit can be installed in under one hour, no union help is required. A union foreman came over and told the hardware company that their booth would take more than an hour and strongly advised his union's help ($110 an hour overtime per man on Sunday).

The company neglected the advice and ventured forth on their own to erect the display. One hour and ten minutes later they were finished and went home for the day. The next morning, opening day, when the staff came in at 9:00 AM to open the show, much to their surprise they found their whole exhibit turned upside down with a note reading "Welcome to the Windy City."

Jerry hastens to point out that this is the exception, not the rule. Glitches are the order of the day; there are always lost hotel reservations, phone lines that don't work, and equipment that gets delivered to another state. Still, he enjoys the work: "After 10 years on the trade show circuit and one million miles logged, the adrenaline still pumps when I get on the plane and head for a DEXPO or COMDEX."



Nothing travels easier than a FOCUS application. PC/FOCUS is the PC implementation of the world's leading Fourth Generation Language, plus a complete and powerful database management system.

In addition to MS-DOS, OS/2 and all major LANs, FOCUS also runs on IBM mainframes, DEC VAX, Wang VS and most UNIX systems.

Capable of relational joins and universal data access to every major database running on any of those platforms, FOCUS is the perfect development tool for company-critical cross platform applications and for downsizing or upsizing applications. What's more, it's really easy to use.

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THE 90s
INFORMATION ARCHITECTURES

Five Technologies For the 90s

Building the Future

Many definitions of the fourth generation language have come along since IBI introduced FOCUS over 15 years ago. James Martin called the 4GL "a high level language that provides an integrated syntax with data definition, data maintenance, and data analysis yielding productivity gains of 10:1 over Cobol."[1] COBOL replacement has always been one of our targets. It had become apparent that with 3GLs, there would never be enough computer programmers in this world.

FOCUS provides large-scale leverage in productivity. Even more important, it is an enabling technology. It facilitates the effective use of new technologies as they emerge, and through the years, we have incorporated many revolutionary improvements in applications development. We were among the first products to offer timesharing and direct interfaces to security packages like ACF2 and RACF, for example.

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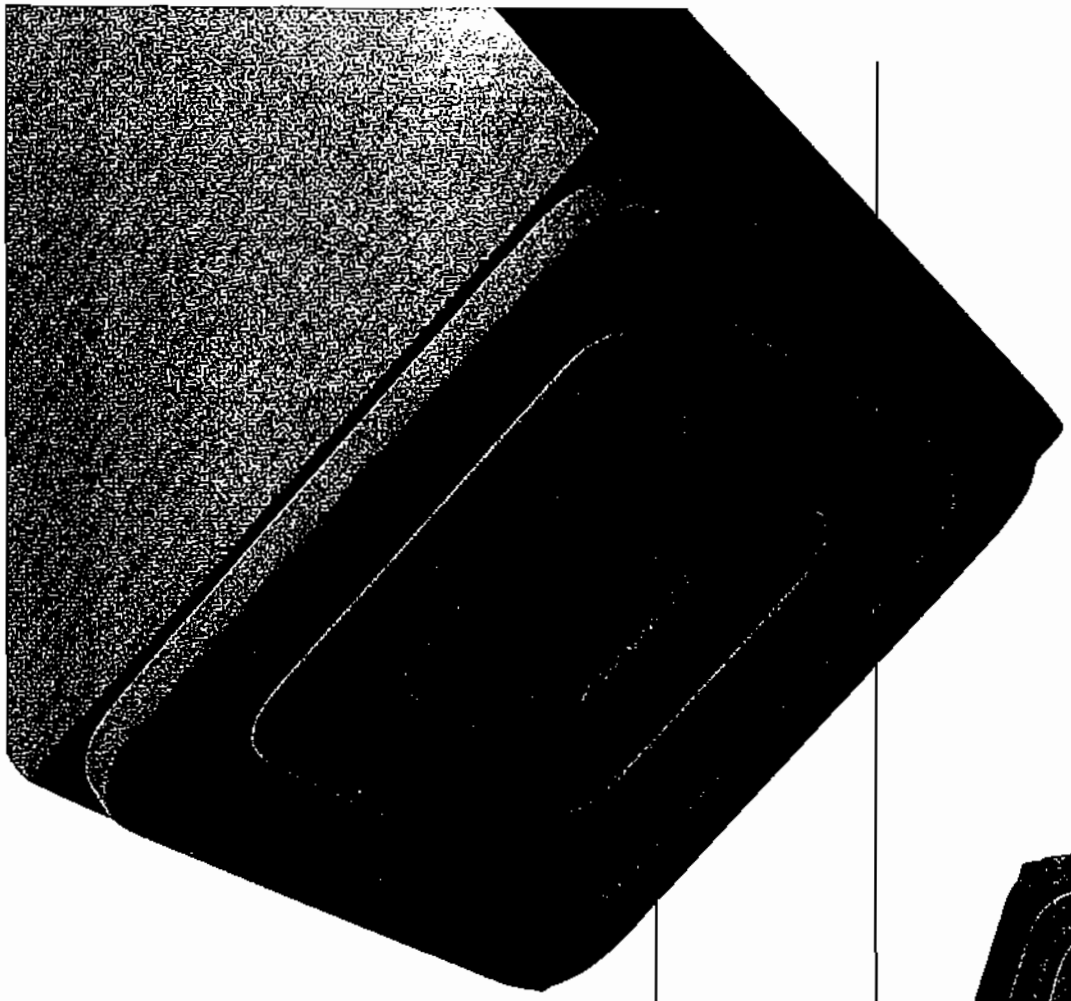
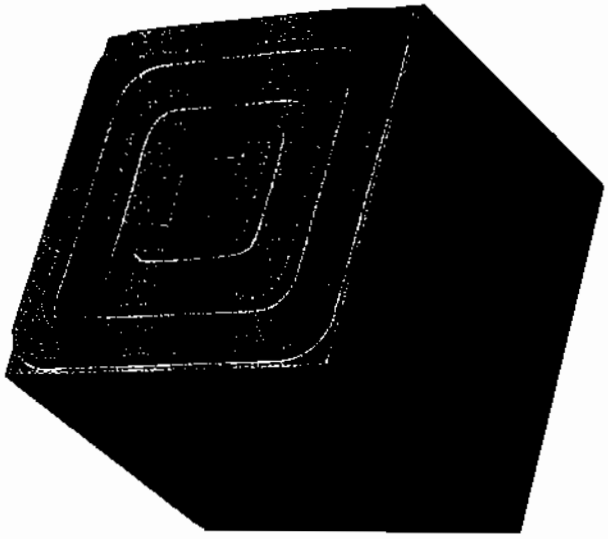
by Gerry Cohen

[1] *Application Development Without Programmers*, Prentice-Hall 1982





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Over the ensuing years, we pioneered full-screen data management in 1976 with FIDEL, and in the 80s we added the first fully functional micro 4GL, SQL support, FOCUS Vision for integrated images, an interface to DEC's CIT for telephone management, and others.

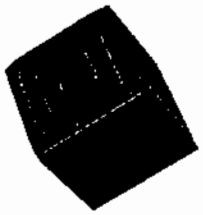
FOCUS' role as an implementer of new technologies will be key to delivering the promise of ever-faster application development and maintenance. To quantify this promise, we use the measure of *effectiveness*–we know from years of field experience that 4GLs are far more effective. They deliver applications faster and make the maintenance cycle far easier. Moreover, the conciseness and easily understood syntax of FOCUS is more accessible to business users and analysts. Short programs are easier to create and maintain as a result, even after the original author is no longer available. The effectiveness of maintenance, an often overlooked subject, is in fact a major 4GL benefit.

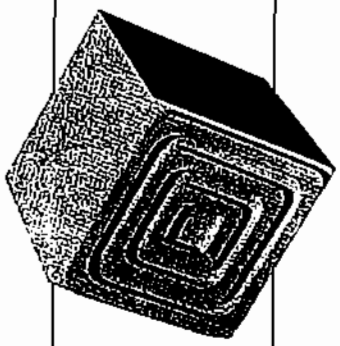
Five technologies

There are five major areas where the leveraging benefits of FOCUS' ability to integrate new technologies will be felt in the early 1990s: dis-

tributed computing, knowledge-based systems, CASE, application deployment and control tools, and image. In the past, 4GLs have provided the mortar between new technologies and traditional application development; as agents of change, they facilitate the incorporation of new technology into the overall systems picture.

When integrated with CASE and SQL and expert systems, for example, 4GLs will remain leading vehicles for the analysis of data, but extend their range to ever-larger projects. When graphic user interfaces, LANs, voice data systems, and object-oriented programming ideas are factored in as well, fourth generation languages will be a tremendous enabling force for enterprise-wide computing architectures. Software leverages these developments–making them useful in your organizations. An example is artificial intelligence, which in its first implementations required special languages and even incompatible special processors. These factors hindered its usefulness, since often the benefits and productivity gains of such approaches can only be realized within the context of existing systems and by using existing data.





Distributed Computing

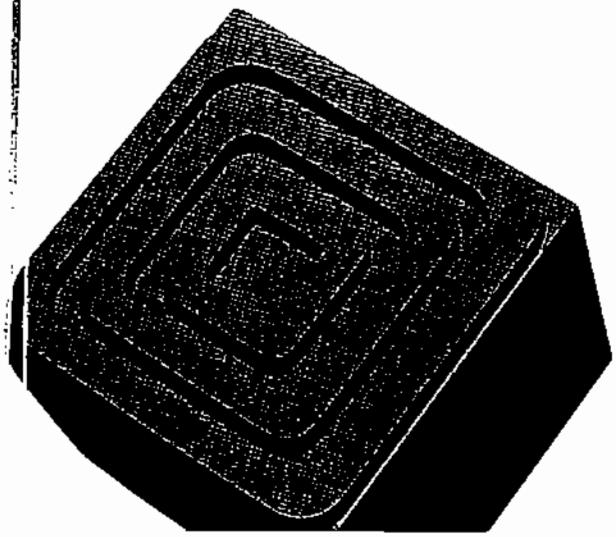
Client-server architecture is just the beginning of the architecture of the future. We are entering an era of distributed computing through what we call Cross Machine Object Execution (CMOE). An object, in this context, is an executable image of a process. That process may be relatively simple from the user's point of view, but providing a single-system image of a rich, heterogeneous hardware and software environment may be immensely complex at a more detailed level.

An example would be interfacing to different databases on different machines, like Rdb on one, VSAM on another, and DB2 on a third. That process has many variables–appropriate paths to the data for efficient operation, understanding interrelationships among the data elements for logical retrieval, and conversion to the desired intermediate format, just to name a few. But the difference implied by the words Cross Machine is that you can be on one machine (one node of an enterprise-wide network), and get your data or execute your object on some other machine. The single system image contains packets of information, and packets of executable processes that can be invoked, as you desire.

Updating data might not be just a simple matter of changing a value. It might require logging a record, cutting a security record, checking rules, and perhaps doing a series of other processes under the covers. Sometimes these are called stored procedures, sometimes object-oriented processes. The key concept is that the necessary logic and operations are encapsulated in a single, callable object that may be used as needed. *If they can be executed across the machine environment, computer programs are no longer bound by operation on one machine.* The operations can be defined in a table, so that application programmers may not even need to know where the operation will be executed.

This approach will give us the environment to design the processes appropriate for the configuration. The point is to allow designers to use available equipment and divide up processes in the network to maximize the speed of execution. Our plans for implementing this are shown on the next page.

FOCNET is already used across a number of links, including VM-to-MVS, VAX-to-IBM, micro-to-host, and several others. Our customers are already incorporating these links, as discussed further in our coverage of FOCCENSUS in this issue. We are engaged in a large project to implement more. We have adapted FOCUS to execute complete applications on relational engines from micro (SQL Server) to mini (Rdb, ORACLE) to mainframe (DB2, SQL/DS). In addition, we are continuing to deliver FOCUS on additional platforms, with IBM's AS/400, HP, Bull and Tandem machines being only the most recent.



Knowledge-Based Systems

The second technology that will take off in the 1990s is the integration of expert systems with database systems. Today, 4GL vendors provide information systems. In the early years those were data-based; now we also mean knowledge-based information systems. We see a combining of both knowledge- and data-based systems into one general uniform system

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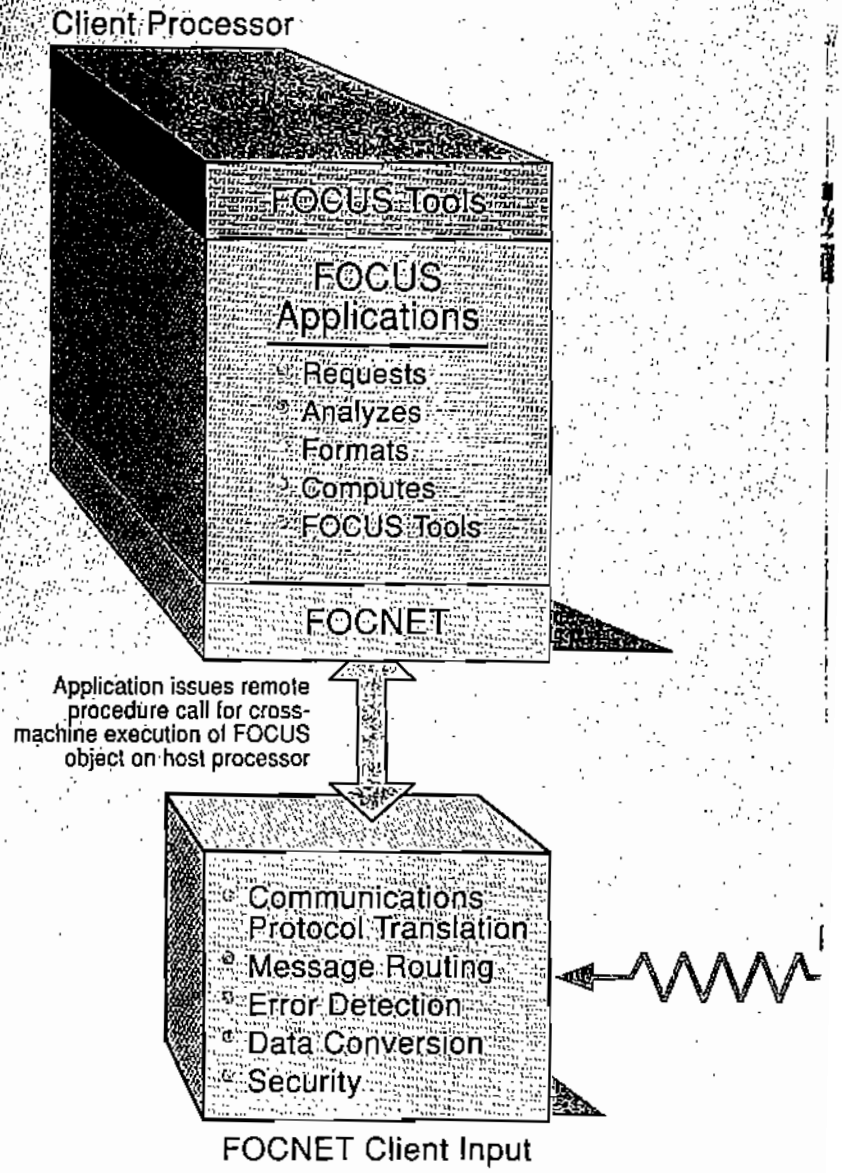
Distributed FOCUS: A Design for the 90s

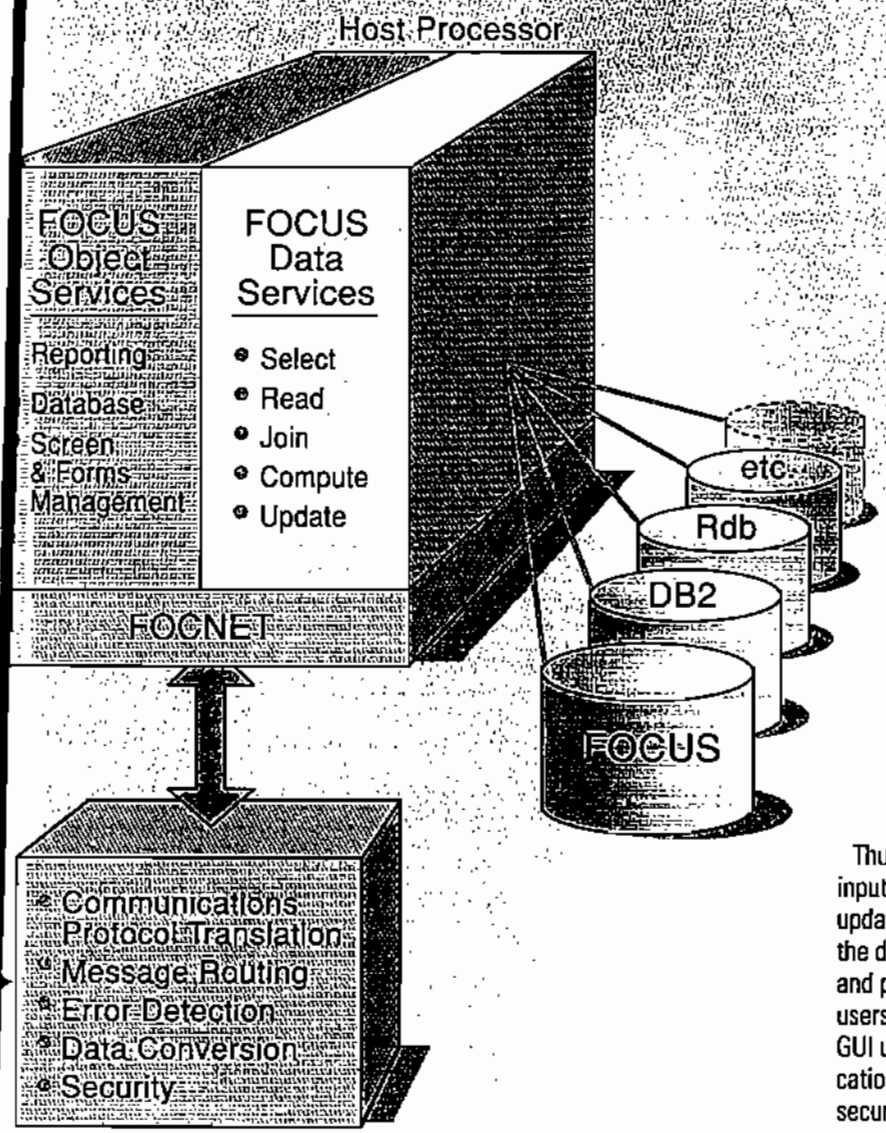
The plan for implementing a distributed FOCUS architecture builds on a decade of enabling technology. It utilizes the tested components of the FOCUS architecture, but through an object-oriented approach to implementation and a server-based configuration, facilitates cooperative processing and promotes application interoperability across networked computers.

- FOCUS data services allow applications and tools on client machines to utilize data in dozens of supported formats on other machines in the enterprise network, using FOCUS' unique DBMS interface facilities.
- FOCUS object services provide a mechanism for cross-machine object execution, triggering remote execution of application objects on target processors–in a manner transparent to end users. The object libraries can reside anywhere on the network. Using FOCUS, application developers can segment application processing to exploit advanced capabilities (or idle CPU cycles) on one or more networked processors.
- FOCNET connectivity services provide access to data and application-processing objects on other platforms.

Installing FOCUS and the appropriate service components on each participating processor enables an enterprise-wide distributed computing resource. Tailored user interfaces (such as Presentation Manager, Motif, or DECWindows) are provided for each operating environment. The combination of intelligent FOCUS servers and FOCNET connectivity technologies thus provides **transparent** cross-machine services for all FOCUS users. ◆



FOCNET servers, many of which have already been delivered, enable communication between FOCUS applications on client and server processors to seamlessly connect the platforms within an enterprise network. Through its transparent support for all major communication protocols, the modular architecture facilitates configuration of whatever connectivity solution is required, permitting easy upgrades when new communication technologies gain acceptance in the marketplace. The snap-in FOCNET components enable a wide range of platforms to communicate across a network, performing cross-platform data conversion, message routing, security authentication, multi-level error detection, and communication-protocol translation services between processors. For example, FOCNET translates NETBIOS to LU6.2 to provide transparent operation between networked PCs and attached System 370 processors, does DECnet/SNA network conversions for VAX-to-IBM operations, and supports TCP/IP communications between UNIX-based machines over Ethernet.



FOCNET Server Output

FOCUS object services support the performance of any processing function and can reside on any platform. Applications can be split along functional lines into independently executable objects and distributed for handling by several processors to optimize performance. The granularity of this capability is expected to extend even to individual CASEs of a MODIFY procedure.

Cross-machine execution of stored FOCUS application objects is accomplished via FOCNET in response to Remote Procedure Calls ("triggers") from client programs. The stored objects might define any of the following:

- Screens and Menus
- Record sorting
- Parsing/control sequences
- Data validation
- Calculations
- Business rules logic
- Application process logic
- Data update logic
- Record selection
- Security

Thus, developers can offload screen services and input validation to a user's workstation, while running update functions and sorting on the processor where the database resides. This approach reduces CPU and paging demands on the host, while providing users with the graphic capabilities and comfort of the GUI user tools. Throughout these client/server applications, data remains available to other users and security remains in effect for all.

FOCUS data services are provided by servers which reside with the data to provide access. They make it possible to take a single systems view of data regardless of the DBMS architecture in use (DB2, Rdb, IDMS, FOCUS, etc.), providing a consistent window into all the required information. Each server is individually optimized to make the most efficient use of the native access language required. Applications on client platforms determine the actual distribution of processing between client and host to optimize processing and minimize traffic on the network. The operation of the FOCUS data servers is controlled from client processors. The host-based data server sees only the information requests. This offloads client functions from host systems, facilitating better use of resources.

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which can do both, because each subsystem solves a different class of applications.

We are beginning to deliver a system where you can call for a consultation in an expert system from within a 4GL application. This will allow developers to perform functions which would be much more difficult to do in a single programming language, even in a very specialized one.

We have been selling LEVEL5 for about two and a half years, and we believe that there are probably more applications for expert systems, or at least for computerizing knowledge, than for computerizing data. One, the Building Regulations Advisor, actually took the fire code of an area and computerized the entire system of rules and regulations so when an architect comes with new plans, he can pre-design the building so it will be passed by the Fire Code. In its next release, LEVEL5 OBJECT, we will add revolutionary new features that will be discussed in great detail in an upcoming issue of the FOCUS *News*. Many of these were demonstrated to an enthusiastic group at the USERS.PRL meeting in November of 1989.

CASE FOR 4GLs

Another area that is very popular today is CASE tools. But CASE tools are also going through an evolution. People want code-generating tools, not just the business rules and description of the process. They want an *integrated* CASE tool, one that looks to the user like a seamless product, with the design mechanisms in front of the execution mechanisms; one that works with the Graphic User Interface (GUI); one that works on all different graphic systems, Presentation Manager, DEC Windows, New Wave, Motif, etc.

GUIs are one of those areas where we like standards so much that we have several of them. You have to work with them all. An integrated CASE tool allows you, particularly in a graphic user interface, to design systems independent of those issues. The importance of the integration is that it permits our users to design, test and run systems and system components together, not in separated environments. Our offering, FACT, will ultimately assist users to design, prototype, and test FOCUS and FOCUS-supported applications. Its delivery will be one of the highlights of our 1990 offerings, and the *News* will offer a thorough discussion in the near future.

APPLICATION DEPLOYMENT AND CONTROL

If you have a heterogeneous computer environment–a lot of different machines, multiple networks–you need another class of software that we call an application deployment tool. That software must keep track of where all the data is located, and the connection rules for the data. The tool sets up the application. As soon as the user gets on the machine, everything is set up and ready. The user doesn't have to remember anything, doesn't have to know where the files are, or what commands they have to issue. And this all has to be controlled centrally.

We are calling our tool ACE (Application Control Environment). In addition to the functions noted above, ACE will support an enterprise-wide view of computing resources, including non-FOCUS ones, through support for the information model used by IBM's recently announced Repository, a component of AD/CYCLE. And, of course, through our ability to utilize non-IBM platforms with other FOCUS versions and FOCNET connectivity servers, we will permit integration of other architectures with those supported by IBM.

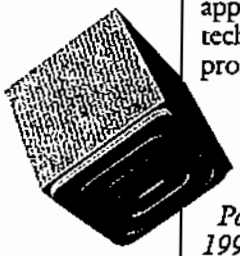
IMAGE TECHNOLOGY

Finally, we believe that image technology will be increasingly important as the 90s proceed. Once you are on a graphic terminal you can start thinking about using images in applications, and about designing applications that use image technology not just as an enhancement, but as a critical enabling technology.

We are receiving more requests for imaging technology involving the ability to merge database applications with pictures. In the same kind of request where you have the name and address, you can have the picture, or several pictures. The idea is to manipulate the pictures in the same language that you used to manipulate the data objects.

Now that we are moving to graphic terminals, these solutions are becoming much more possible. We have already delivered this technology on PCs, and an interface to Wang's WIIS image technology, and more vendors will offer these capabilities soon. The delivery of PM/FOCUS will afford our users with all of FOCUS' benefits in an environment that supports extended use of image and other graphic technologies. We are developing support for all the significant graphic user interfaces (GUIs) on the horizon. 4GLs will need to interact with image technology to keep pace.

The 90s will be a time of major change, with the emergence of full scale heterogeneous networks performing enterprise-wide processing. Managing the new architectures, the new applications they bring, and the new enabling technologies will be the task that delivers the promise of 4GLS. ◆



Portions of this story appeared in the January 1990 issue of Information Center magazine. Used by permission.

THE 90s
INFORMATION ARCHITECTURES

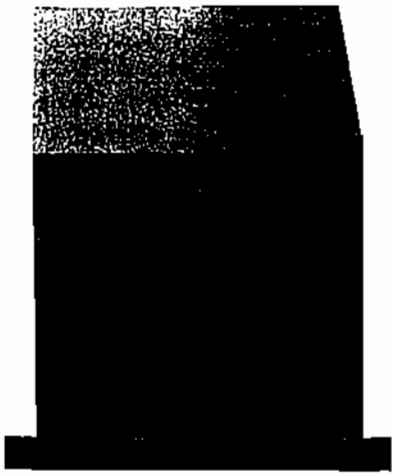
FOCUS On Enterprise Systems

by John Senor & Merv Adrian

The past 15 years have brought dramatic changes in the way business enterprises use information systems (IS). Rapid advances in hardware, communications, and system software technology have changed the very nature of business organizations–how firms are organized, managed, produce goods and services, and interact with their markets. Consumers have come to expect the higher quality and better service that technology now makes possible.

A good example of this is the story that appeared in *Computerworld* in the aftermath of the San Francisco earthquake. After stepping over a one-foot crack in the sidewalk, a banking customer was furious that the automatic teller didn't work. He expected that contingency plans could–*should*–be expected to handle small things like a 7 point earthquake. Instant access to cash in this fashion was just beginning to emerge 15 years ago; today, bank customers expect that it will be provided routinely.

The 1980s brought new technologies enabling the continued automation of business functions. In the 90s, the challenge is broader–further advances in technology, such as those discussed in Gerry Cohen's story on the preceding pages, will make it possible to tie these automated functions together into even more capable, enterprise-wide business systems. In the new environment, all data accumulated through automation has become a vital resource, perhaps the most necessary one of all. Information is now a strategic component, to be managed as a business asset and incorporated into the business plan in order to achieve competitive advantage, or simply keep pace.



One of the watchwords of this new environment will be enhanced availability–of computing resources to each workstation, of information for decision making and planning, and of knowledge of the business and its systems to information workers at every level, from systems professional to end user. This availability will enable corporations to make the better business decisions needed to expand into new markets, produce higher quality products, provide higher levels of service and control costs on a global basis.

WAVES OF CHANGE

Today's IS executive, in looking toward implementing the enterprise-wide systems of the future, faces difficult decisions. Even 20 years ago, ample justification was available for investing millions of dollars in what

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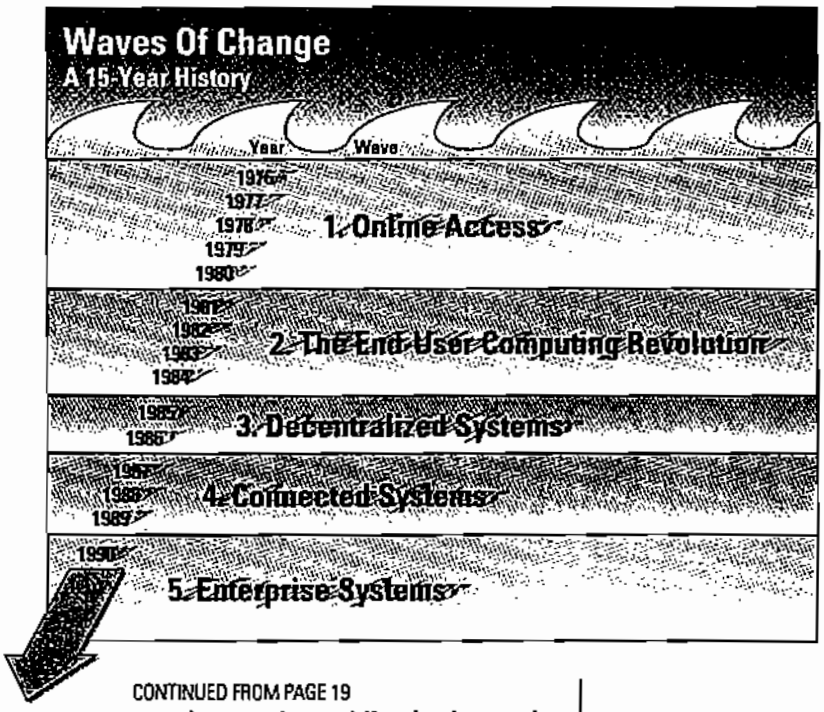

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turned out to be rapidly obsolete technology for supporting many users instead of single-threaded batch jobs – increased productivity and reduced costs made it economic. As hardware evolved, it became progressively easier to substitute new hardware from the same vendor for old; the "snap-in, snap-out" approach became widespread, and the term "plug-compatible" entered our vocabulary. This first wave of change centered on improving the ways in which hardware was tied together, and providing online access.

The same ease of advancement was not available for software, however. Billions of lines of applications software were created using technologies for programming that tied applications to specific operating environments and rigid data structures. One consequence of the large investments in programming and data, then, was that the future was constrained, even as near-term improvement was being enabled. As new technologies became available, they were added in layers, creating a complex legacy of static existing systems that would ultimately require migration strategies and major investments in maintenance programming in order to move forward with newer developments.

For example, there are today some 80 billion lines of COBOL code. They are relatively non-portable, and may be more or less well understood, documented, current to today's business requirements, and tuned for the technical environment they run in. Fully half of the data that businesses have accumulated over the last 25 years resides in data structures that are inaccessible to anyone other than a skilled professional programmer.

Progress is doing things better, not differently. Our tools of accounting, our marketing systems, our human resources systems – none of these can cope with the emerging rates of change. Indeed, their goal is often just the contrary: to spot and minimize deviation from past norms and trends, and to highlight exceptions...effectiveness of execution, of actually managing change [will become] the key competitive differentiator.

–Dr. Robb W. Wilmot, Chairman, OASiS, Organization and System Innovations, UK, at FOCUS World 1989.

ISLANDS OF TECHNOLOGY

In the second wave of change, desktop computers and the emergence of 4GLs resulted in the empowerment of end users. Business-knowledgeable employees developed their own solutions. In 1980, the end user revolution was beginning, confronting the issue of access to information, and poised to launch the explosion of personal computing. Individual productivity would skyrocket for a few years, until the problems of isolation and incompatibility of systems began to surface. Most businesses then found that they had established a vast number of "islands of technology," isolated systems whose applications and data were accessible only to select groups of users and were often incompatible with other systems. Simple file transfers were often the pinnacle of connectivity among these islands. In many cases, even that simple option was unavailable.

In large part, systems organizations became victims of their own success. The ability to produce measurable business return resulted in a demand for technology that outstripped the ability of IS to restrain users from unbridled technology expansion long enough to ensure that broad compatibility would be maintained.

To be sure, there were warnings. Some businesses came early to the notion of enterprise modelling; some single-sourced their hardware, and even software. It soon became clear, however, that pockets of technology were not only viable short-term approaches, but that they were often unique and indispensable. As technology advanced in specific areas, businesses were forced to acquire new solutions regardless of compatibility problems, simply to keep pace with competitors who had already done so.

Thus a third wave arrived, one in which decentralized systems grew up, often tying together many of the smaller "islands," and in the process often making many of them more rigorous, professional systems designed with the sort of standards that MIS would approve.

Nevertheless, the problem remained. Although the islands of technology were larger, even the enlightened firms who had attempted to take the global view found themselves, by the mid-1980s, dealing with the effects of still-incompatible systems, or related groups of applications that had grown up within functional units. It was not uncommon to find an information worker with a PC, a departmental system terminal, and a

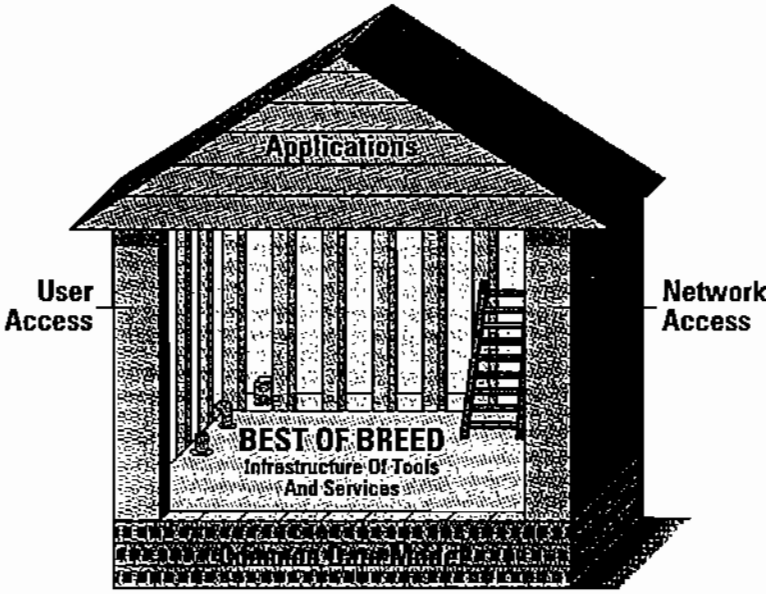
CHARTS BY HAYES COHEN

central system terminal all in her work space, each absolutely required for some important task. The cost of replicating this mix throughout the organization was typically matched by the burden of frustration and impeded productivity it engendered among those who used it.

Firms coped as best they could, often by establishing, sometimes for the second or third time, internal standards to govern the deployment of IS technology and mandate compatibility between competing vendor hardware architectures. But internal standards did not always solve all the problems. To begin with, they tended to favor the systems staff's existing expertise, and familiar technology. More of the same was the order of the day, not new approaches. Moreover, as it had done in the past, reliance on a single vendor's proprietary designs constrained evolution. Two encouraging developments resulted from these efforts, however: a growing, industry-wide realization of the importance of standards that all vendors would support; and recognition of the need for a conceptual model that would inform the development of future systems.

The fourth wave that emerged– one which emphasized connected systems, and the emergence in some pioneering firms of business modelling on an enterprise-wide basis – began with the attempt to tie together the local solutions. To implement these connections, businesses began to go "back to basics." Systems (both hardware and software) were still required to be compatible with the expertise of the organization, for both use and support. What was right for the group was probably the best solution for all, most of the time. But there was a new anomaly to be resolved–how to reconcile differing, and often locally appropriate, standards among the 44 million PCs, hundreds of thousands of departmental systems, and tens of thousands of mainframes installed?

Fortunately, there were at least a few clear winners in the various technology races; the majority of systems were built in the IBM mainframe environment, IBM-compatible PCs dominated their marketplace, and Digital led the pack in departmental processors. SQL-based database products were becoming the norm, although the dialects of SQL made compatibility a major issue. (And, of course, there remained huge amounts of data stored in older architectures such as VSAM–this remains true today.) Although communications standards were still immature, they were



clearly emerging, and the dominance of the leading hardware vendors' connectivity standards had some influence on how best to physically connect systems.

> Ironically, the need for flexibility in an increasingly complex environment requires systems to be made less complex...there are few greater liberating forces than the sharing of information.....On the warning side, implementation of the new integrated information technology-based systems is much more difficult than anyone dreamed.
>
> *–Tom Peters,* Thriving on Chaos, 1987

INDUSTRY STANDARDS AND THE " BEST OF BREED"

Systems planners, then, were confronted with a paradox–how to compose an environment founded on the "best of breed" when standards were only beginning to emerge. It was likely that the leading standards would support the chosen products, but who could be sure? Products in hardware and software markets alike rose and fell as the decade passed. Even the thriving micro marketplace's leaders had their losers, like PCjr or the Apple Lisa.

The appropriate combination of vendors was nevertheless critical. No vendor was offering a complete solution. Differentiation in the industry was again taking hold, as more niche products rose to dominate their spheres, often so much so that using anything else was simply not credible. Using non-PostScript laser printers for serious publishing tasks, to look at one example, made little sense, but few vendors were ready to incorporate PostScript technology into existing networks. Software components needed to be combined in flexible ways to create scalable, portable, applications that were consistent across multiple environments.

INFORMATION ARCHITECTURE

One other aspect of standards had also emerged by decade's end–the huge installed base of end user computing technology had irrevocably altered the role of these users. The business benefits accrued from the use of 4GLs, Information Centers, and the like had empowered the ultimate clients of information

systems, and they would never again settle for an environment they could not define themselves. Like our banking customer, their expectations had been raised by the rich tools they had grown used to.

Although it was possible to standardize how data was attached and accessed, the look and feel–and the personal tools available–would have to be an "open architecture" in future systems. At the same time, it could be expected that the centralized IBM environment would continue to be the standard in most organizations well into the future.

What was open to debate was everything in between. The departmental solutions of the mid- to late 80s made future systems planning difficult, at best. Industry standards organizations were rapidly arriving at a consensus that there was no consensus. Heterogeneity was to be the model for the future. Tools were required to protect the investment, using whatever standards had survived the decade, by providing information access and processing and by making these tasks consistent across the multiple "standard" environments.

THE FOUNDATION: A COMMON DATA MODEL

The need, then, is clear–developing an Information Architecture which will provide a framework of capability will be the fifth wave, the enterprise systems view. It must encompass heterogeneous systems and DBMS foundations, and permit the selection of interoperable tools which can serve as standards throughout the enterprise.

The real issue, it has emerged, was not limited to investment in new systems at all. Rather, the true challenge of the 90s will be integrating the vast investments made in existing–and largely incompatible–data structures. To protect that investment, the new tools must be able to work with the old as well as deliver the new, without requiring the need for replacement of systems that continue to deliver the functions they were designed to provide.

The investment in data remains even when the hardware and software change. Today, the world of data continues to be divided into two spheres: half resides in DBMS products of several varieties, including hierarchical, network and relational architectures; the remainder is in flat files and hardware vendor-proprietary structures like VSAM. Since the composition of business data is relatively static when compared to its uses (i.e., applications), and since the business use of data almost always involves combining data from different sources (files) in order to produce meaningful information, the challenge is often defined by the need to get at, combine, and maintain data in different structures, on different hardware, in different environments, at different locations.

This challenge is further complicated by the fact that the uses of data can only be partially predictable at any time. No matter how well a systems planner anticipates the use of data, or how well the designer optimizes the database design and construction to account for those expected uses, the unplanned will intrude. These unplanned uses often have necessitated duplication or extraction of unique cross-sections of data into separate files in order to satisfy *ad hoc* requirements. In the process, the original purpose of installing the DBMS has been lost; normalization and data integrity are subverted.

It is evident that the foundation of the enterprise system of the 90s must be a Common Data Model. Designing a facility to provide a common view of data, and access to it, for both applications and *ad hoc* use, that is, for both planned and unplanned uses, independent of data structure, type, and location, is of paramount importance. IBM's AD/CYCLE is pointed squarely at this issue, providing an underlying data model for SAA in the Repository.

Given the global decentralization of businesses and the distribution of their data, it seems unlikely that all the data will reside in one, or even several, databases. Rather, systems planners have recognized the need to anticipate heterogeneous, distributed data architectures and provide for the ability to view data logically from the tools used for application design and end user access as if it were stored in a central warehouse, or common model. Finally, it is critical in such an environment to provide control tools: to manage the networks, the users and security issues, the effective deployment of resources, and especially the integrity and consistency of applications.

TOOLS FOR THE ENTERPRISE

The appropriate design for the future must be aimed at providing enterprise solutions. These must have a number of well-integrated components, and provide compatible tools at all necessary levels. These tools must be:

- Portable
- Scalable
- Distributable

In 1980, the US Air Force Logistics Command had an estimated 200 in-house and 100 contractor person-years devoted to supporting software embedded in weapons systems. In 1989 the effort had increased to 2097 and 1027 person-years respectively. This reflects a recognition of the major benefits of software: it provides unique performance capabilities and strategic advantage because it can be continually adapted and extended. However, the continual adaptation and extension of software poses special logistic challenges not fully met by current practice.

-Nicholas Zvegintzov, Editor, Software Maintenance News, October 1989

- Interoperable
- Hardware/operating system independent
- DBMS-independent
- Capable of delivering solutions across the full development cycle, to create *complete* applications
- Able to access *all* data in the enterprise
- Equipped with management and control capabilities
- Open to the integration of new technologies
- Committed to conform to emerging standards

Few products can meet these requirements. Most have, at some point, become inextricably intertwined with a proprietary DBMS, hardware technology, or operating environment. They are simply not portable across systems and databases.

FOCUS: PREPARED FOR THE FUTURE

Information Builders pursued these issues on two fronts throughout the 80s. FOCUS has, throughout its history, been aimed at managing data in a variety of proprietary data formats. It has been ported, in recent years, to a variety of platforms; it was the first fully functional micro 4GL, and today is a leading product on platforms of all sizes and from most leading vendors. As the connectivity options available have expanded for the industry, FOCUS has kept pace with the delivery of the early phases of the FOCNET architecture. As the 90s begin, an infrastructure of tools to deliver access and applications for the future is well under way. The Distributed FOCUS design shown on pages 16-17 shows the evolving strategy for interoperable, distributed applications development.

Creating applications encompasses activities from design and modelling through the deployment of complete tested products. With FACT, IBI will deliver an integrated CASE tool that will enable developers to perform the earlier stages of design with a direct output of FOCUS code. ACE will add the deployment functions: the management of the environment, security, etc. And as Gerry Cohen points out beginning on page 13, the integration of new technologies has traditionally been one of FOCUS' most succesful strategies, and remains a key goal. We look at another of these technologies, expert systems, on page 28.

> We believe that SAA is not about software portability; its true focus is to create a single-system image behind intelligent workstations.
>
> *-H. Michael Braude,* Vice President & Director, Gartner Group

If the previous decades have taught us anything, it is that the future will be increasingly heterogeneous. A number of changes are implicit in this realization:

- The ability to access data through a common data model or foundation is a critical prerequisite; it is the foundation of an enterprise view of systems.
- Transparent data access–both planned and unplanned–is a requirement. Providing one or the other is done by many vendors; few support both. It is critical to present a single systems image.
- Tools must be portable, scalable, and interoperable in multiple vendor environments. "Growing" micro tools to larger scale is a suspect strategy, since the issues associated with large systems are not trivial, and may take years of experience to be adequately handled. At the same time, downsized mainframe tools that do not make effective use of intelligent workstations and their local graphic environments, and do not provide cooperative processing in order to offload cycles to the increasingly powerful desktop machines, are doomed to failure. The client-server model is an effective solution to this double bind.
- Tools must provide application and data integrity controls across all supported environments. Providing a scattershot set of poorly-integrated utilities is not sufficient; the product set must be seamless.

FOCUS enters the 90s with a clear view of these issues. With a decade of experience pioneering data access, cross-platform execution, desktop cooperative processing, and graphic interface support behind it, IBI is delivering integrated CASE technology with FACT, deployment and management tools with ACE, and support for the office environments, development cycles, and communications innovations of the future. Through aggressive efforts to conform to standards, including early delivery of SQL interfaces and cooperation with IBM on SAA and Digital on NAS, the family of FOCUS products has evolved into a comprehensive set of facilities that will be a key component in the construction of the enterprise information architectures of the 90s. ◆

THE 90s
INFORMATION ARCHITECTURES

FOC-CENSUS Results

Evolving Environments

The strategies outlined elsewhere in this issue present a vision for the future that is a response both to events and to requests from IBI's customers. But who is today's "typical" FOCUS user? Ask ten people and you might get twenty different answers–and they could all be right. What about the distribution of hardware platforms, of operating systems, or of external data used with FOCUS? The FOC-CENSUS survey, the largest, most comprehensive polling of customers ever undertaken by a software vendor, aims to provide the answers to these and other questions. The results may well surprise you.

As we look at the 90s, a surprising number of the key issues are already under consideration by today's FOCUS users. The growth of midrange computing, heterogeneous database architectures and the RDBMS are familiar concepts. The census showed many clients already well into strategic plans to integrate these developments into their own information systems.

This is not the first time IBI has polled its own customer base, says John McBride, project coordinator. "Our first census was in 1986, and was enormously successful. We plan to follow up every three years," he says. Some of that earlier information is used here to illustrate trends, and the latest survey was even more in-depth than the previous efforts. With a large mailing and a surprisingly high response rate for surveys of this kind, the information in FOC-CENSUS has a high degree of statistical validity. The results are used in a number of ways within IBI, including product planning, allocation of development resources, and the design of customer services.

Response-gathering was not exclusively numeric; several questions provided space for comments, and these also were faithfully transcribed and summarized for IBI management in a variety of text reports. It is worth noting that the survey response rate was somewhat higher among new FOCUS customers, giving the survey as a whole a strong flavor for what is most current. Some of the responses about environmental issues, then, give a surprising picture of the use of FOCUS today, as we shall see in the next few pages.

TABLE 1
Percent of respondents using various connectivity options

PC to Mainframe (VM & MVS)	42.5%
VAX to Mainframe	24.6%
PC to VAX	12.7%
VM to MVS (XM)	11.9%
PC to UNIX	3.1%
UNIX to Mainframe	1.5%

HARDWARE PLATFORMS & OPERATING SYSTEMS

Today, 61% of survey respondents use FOCUS on IBM and plug-compatibles, 29% on DEC VAX and MicroVAX machines, with Wang taking slightly more than 5% and UNIX slightly less than 4%. A comparison with 1986 is most illuminat-

ing (see Figure 1), demonstrating the explosive growth of FOCUS for VAX. Next year's plans are along the same lines–respondents' plans for hardware acquisition include 43% IBM, 40% DEC and 8% each for Wang and UNIX.

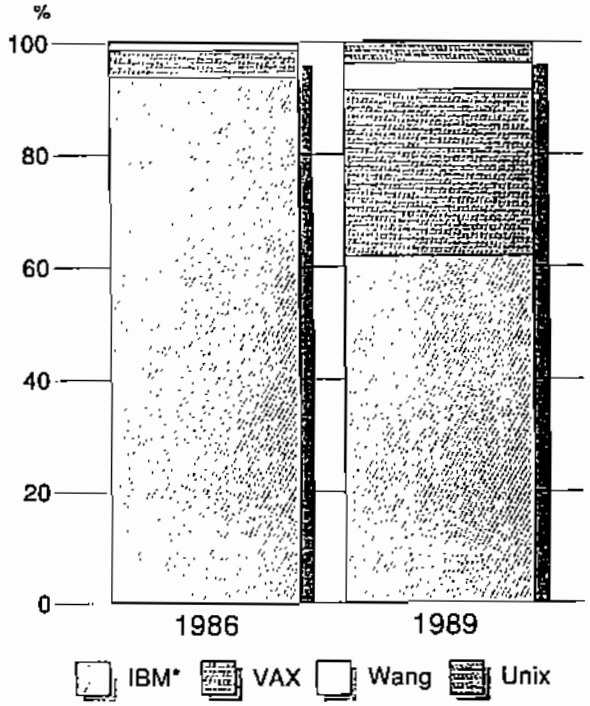
Is the typical IBM environment for FOCUS VM? No. Almost 62% of the sites are running under MVS or MVS/XA. A substantial portion of the applications in all environments are batch. Respondents with batch reporting applications amounted to 57%, and 32% reported some batch updating. These particular figures are not representative of an either/or comparison with online applications; the questions were not phrased in that way. All respondents used a mix of online and batch, but over 9% performed *all* reporting in batch and 14% did the same for transaction processing and update applications.

Micros play an important part in the mix for FOCUS users 46% use PC/FOCUS. Of these, two thirds were using XT and AT-class hardware, although their buying plans for the next twelve months dropped this to 40%. The growing numbers of PC/FOCUS for OS/2 users and the planned shipment of PM/FOCUS will certainly result in a higher proportion of 80386- and i486-based machines in the near future. Over 17% are already using OS/2; 22% have plans to use it in the next year. The release of PM/FOCUS will clearly have a substantial impact.

The Macintosh also figures prominently in our customers' plans–13% expect to purchase Macs in the next year, slightly up from the 11% now using Macs. With many users already owning Mac versions of LEVEL5, increasing numbers using Macs to talk to VAX and IBM hosts, and some FOCUS development now taking place for this exciting platform, there is clear growth ahead in the FOCUS community for the use of Apple's hardware.

Two hardware trends are clear: increasing numbers of multi-vendor shops, and more differentiation within a given vendor's product line. The general growth of desktop and

FIG. 1
Changing Computing Environments

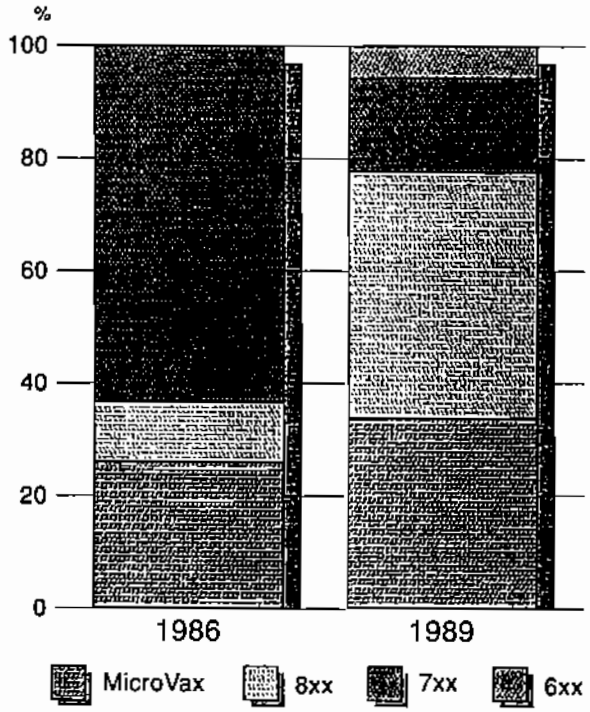


*and IBM compatibles

midrange computing is clear evidence of the latter. The ratio of IBM 3090 mainframes to the smaller 4300 series, for example, dropped from 70/30 to 60/35, with the 9370 picking up 5%. The release of FOCUS for AS/400 should dramatically affect the platform mix as well: IBM's 3X machines never had a version

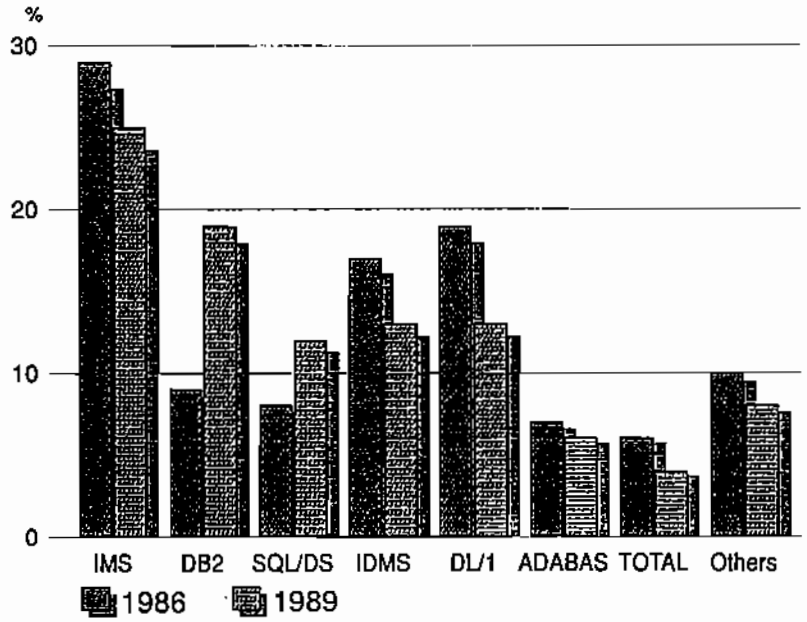
CONTINUED ON NEXT PAGE

FIG. 2
Digital CPUs Running FOCUS



CHARTS BY MARIA CICCHINO

FIG. 3
Distribution of Files/DBMSs Read By FOCUS*



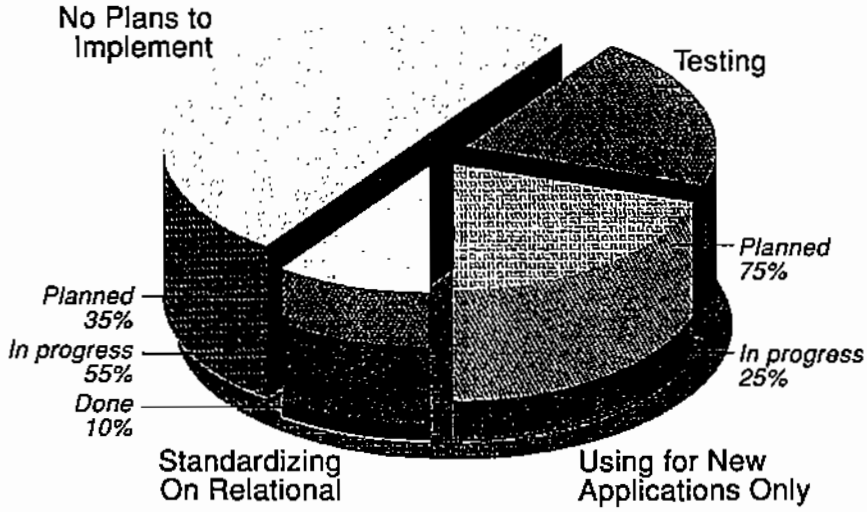
* Categories are not mutually exclusive; many sites use more than one interface. VSAM has been excluded.

CONTINUED FROM PAGE 25

of FOCUS, so the AS/400 represents a sizable new opportunity for midrange applications in IBM shops.

On the VAX side, the distribution of CPU models seems to follow Digital's rollout schedule (See Figure 2). Today, 44% of all FOCUS for VAX copies reside on 8000 series machines, where three years ago 58% were on the 700 series. The percentage of MicroVAX copies remains steady at 34%, and it can be expected that the recently-announced VAX 9000 high-end machines will be an outstanding FOCUS platform.

FIG. 4
Plans For Relational DBMS



The traditional market segments targeted by hardware vendors have changed dramatically, with IBM moving into compatible midrange systems, DEC and Tandem moving into mainframes with the 9000 series and the Cyclone respectively, and many vendors producing high-end desktop machines. Even within vendor lines, it is becoming difficult to draw the lines between categories: how is a LAN different from a mini, especially when a mini is the file server for the network?

CONNECTIVITY: POISED FOR TAKEOFF

As the notion of "enterprise networking" takes hold, FOCUS customers are already in the forefront. Today's connectivity scenarios show more connections in an increasingly heterogeneous environment. Table 1 presents the broad range of connected FOCUS users. The numbers show the substantial growth in existing heterogeneous CPU-to-CPU links since 1986. The developers of FOCNET correctly predicted the emergence of PC-to-VAX, VAX-to-IBM, and VM-to-MVS as key deliverables. With these links already in place, IBI provides an excellent solution for many enterprise networking needs.

The emergence of the fully fleshed out FOCNET connectivity architecture (discussed elsewhere in this issue) will fit well in these scenarios and provide more linkage opportunities, enabling broader and more controlled function. The pioneers of today will be able to enhance their existing connections, and will certainly be joined by many other sites as the connectivity server products are rolled out.

DATA ARCHITECTURES

Of the data architectures found in FOCUS shops, VSAM dominates IBM sites with 37.4%, while RMS is even more widespread in VAX environments with 44.6%. Excluding VSAM, IMS is the clear leader in 1989 among sites using FOCUS to access (read and read/write) non-FOCUS data in IBM shops. However, the move to relational DBMSs is clear in Figure 3–DB2 has risen from 8% to 19% and SQL/DS from 4% to 12%. Aside from the heavy decline in DL/1 and the moderate one in IDMS, most products have remained relatively stable.

In general, if a FOCUS site uses 10 copies of a particular DBMS, the FOCUS interface to it is being used with 5 of them. There are two exceptions: IMS, where the number is closer to 72%, and the IBM relational DBMS products, which have not yet reached the 50%

mark. The latter are expanding so rapidly, however, that they are expected to rival or surpass the proportion of IMS sites using the FOCUS interface.

FOCUS is typically used against the "production" DBMS after applications have been moved into general use, and many sites are just coming on-line. Many sites, however, are using FOCUS as a migration tool. In September 1988, the FOCUS *Systems Journal* ran a major story on this theme submitted by a major New York bank migrating from IMS to DB2. They found that FOCUS's ability to "bridge" the two products made the transition far simpler.

RDBMS DEVELOPMENTS

The implementation of relational strategy is even more clearly shown in Figure 4. Surprisingly, 52% of respondents said that they have no current plans to implement a relational one. FOCUS itself continues to be the database of choice for 40% of these shops, followed by IMS and IDMS. Of the remaining 48%, there are three broad categories:

- Those already testing or experimenting with RDBMS
- Those using an RDBMS for new applications
- Those who have standardized, or intend to on a relational strategy. (Of this group, 85% have not yet done so.)

DB2 is the clear leader here, with 46%, SQL/DS has 11% and Oracle 10%. A full 20% did not name a specific product.

FOCUS is being used by 50% of the RDBMS testers and implementers, either as a data bridge between existing databases (relational-to-relational or -to-non-relational), or as a conversion tool to translate existing data into relational format.

THE FUTURE: MORE HETEROGENEITY

As a whole, these statistics paint a picture of transition: from single-vendor solutions to multiple-vendor ones, from the data architectures of the 70s and 80s to RDBMSs, from "islands of computing" to interconnected nodes. The emergence of Distributed FOCUS will be a key factor for these pioneers in leveraging their investment and skills in the environments of the future.

In a future issue, we will revisit FOC-CENSUS for a look at types of FOCUS users and application profiles in the FOCUS community. ◆

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Expert Systems

The Best Is Yet To Come

Only ten years ago, companies were just waking to the commercial potential of expert systems. Now, as we enter the 90s, how should we measure their success? By market share, perhaps; competitive advantage; return on corporate investment; anecdotes illustrating real business successes; or the demonstrable acceptance of expert-systems software as a mainstream business tool. Collectively, these indicators make an effective barometer for their rising acceptance in business, industry, and government. However, it may well be our *expectations* for the technology's success during the 90s that justifies its role. The best is indeed yet to come.

The proof lies in the role expert systems will play in global business survival. As world events unfold, many businesses are awakening to the significance of having a strong global economic presence—and not without some trepidation. Even as they are invited to invest in new business opportunities in Eastern Europe and elsewhere, other countries are investing heavily in corporate America. While the US adjusts to its declining position in areas of manufacturing and refining, our leadership is being challenged in the arenas of technology and invention.

Will U.S. business prosper? A recent *Computerworld* Special Report on Information Systems in the 1990s suggests an opportunity for success for those companies prepared to handle a growing number of tasks quickly while coping with tighter financing, a dwindling supply of highly trained people, and the demands of a global economy. The common denominator here is information, and companies' ability to maximize information through technology—data management, networks, 4GLs, CASE, decision support tools, executive information systems, *and* expert systems–will be essential. Good judgments require the best information.

As companies strive to achieve more with fewer resources, they will need to leverage the knowledge and expertise of their best people. Expert systems are an effective vehicle for capturing what they know and how they use that knowledge. Information Builders' high expectations for expert systems as this enabling technology are reflected in its development program for LEVEL5 software.

"The 90s will see a transformation in the way we do business in a very conventional sense. Expert systems have already moved away from the esoteric and out of the R&D shops. In the 90s expect them to have a significant impact on core business and every part of business operations. The ability to capture, manipulate, monitor, and disseminate knowledge will make expert systems a mainstream component of the way business solves problems."

-*Tod Loofbourrow*, Foundation Technologies

Expert systems' potential contribution has not developed in a scientific vacuum. Like other information technologies, it has grown and changed, slowly gaining acceptance. Expert systems are one of the early commercial successes to come out of AI research. Stanford University's MYCIN, for analyzing bacterial infections and antibiotic treatment, and Digital Equipment Corporation/Carnegie Mellon University's XCON, for configuring VAX hardware, date to the mid 70s and early 80s respectively. These and other early projects were laboriously coded either in traditional third-generation or higher-level LISP languages. Application development required highly skilled knowledge engineers who could both capture specialized knowledge and turn it into a computer program. Because applications took years to complete and were very expensive to develop, they were considered high-risk options reserved for projects expected to deliver a significant return.

Expert-system shells have broadened the potential by putting application development within reach. Products like LEVEL5 have enabled individuals with specialized knowledge to create their own applications quickly. By the mid 80s, expert systems found proponents in a handful of people like Ed Mahler, head of E.I. du Pont's AI Program. Mahler advocates an approach that includes inexpensive, easy-to-use tools that are spread widely across a company. He documents the typical return on investment, even for small applications, at 10 to 1—and with far fewer risks.

PRACTICAL PROPAGATION

Many companies are following suit, although using different strategies for introducing the technology. Johnson & Johnson's Baby Products Co. has had great success with their work in expert systems, most of which are small 200-to-300-rule applications. They have more than 20 systems in various phases of development and use, several of which are deployed on the manufacturing floor. FMC Corporation has also made a significant commitment, encouraging divisions to take responsibility for developing many of the simpler applications they need.

The national conventions of the American Association for Artificial Intelligence (AAAI) reflect the growing acceptance of

CONTINUED ON NEXT PAGE

PHOTO FROM IMAGE BANK

CONTINUED FROM PAGE 29

expert systems and accompanying changes in the market. Since 1984, AAAI has progressed from a symposium of academics, to a marketplace for venture capitalists, to a showplace for Fortune 500 management and DP professionals. As many smaller companies have disappeared in the inevitable industry shakeout, an increasing number of commercial applications have risen from their ashes. In 1989 virtually every vendor showcased applications created by customers and VARs. This move away from technology and toward business solutions suggests a maturing industry in which thoughts of creating or protecting a competitive edge by being an early adopter are giving way to wider acceptance of this enabling software as just another sharp arrow in DP's quiver.

"Corporations today are realizing that advanced information technology is critical to business success and more importantly is critical to changing business requirements. As such, the combination of technologies—whether high-powered conventional tools or more leading-edge technologies—will comprise the information systems of the 90s. Information systems groups have recognized that AI techniques are both real and feasible to co-exist and add value to the technologies they are already using."

John Popolizio, Director, Artificial Intelligence Research Service, New Science Associates

THE 90S: JOINING THE MAINSTREAM

While some of the applications of the 90s will be standalone systems, many more will fit into the mainstream computing environment, making expert systems part of virtually all application development. Expert-systems applications that are part of the core business will become more strategic than standalone applications. The fact that vendors are converging on the mainframe market confirms both the importance of going against existing data and the importance that MIS and DP managers are giving to expert systems. Knowledge bases are being built into existing applications — from the incorporation of consultation procedures built into reporting systems to "smart" front ends for commercial software.

The task before vendors now becomes the delivery of tools that enable companies to leverage knowledge and expertise wherever it resides, and deploy it wherever it is needed.

To this end, Information Builders' strategy for the 90s is to deliver powerful tools that are easy to use, cross multiple operating systems and hardware platforms, and provide access to corporate data. LEVEL5 OBJECT and LEVEL5 for FOCUS satisfy these requirements.

LEVEL5 OBJECT: A NEW GENERATION OF EXPERT SYSTEM TOOLS

Those familiar with AI buzzwords will recognize in LEVEL5 OBJECT all the functionality of a powerful hybrid tool. LEVEL5 can process information in a variety of ways: backward chaining, forward chaining, parallel inference processing, dynamic agendas, rules, blackboard techniques, and full object manipulation.

Capturing and modeling knowledge in rules is relatively straight-forward. Rules alone are not enough, however, as MIS/DP groups stretch the capabilities of expert sytems, integrating them with large volumes of external data, graphics, sophisticated mathematical analysis, and even with other software. Object-oriented programming (OOP) becomes a powerful paradigm for building and managing these complex relationships.

OOP requires one universal data structure (the object) organized hierarchically in classes. Each object in a class has a unique description, set of procedures, and pointers (if it inherits a subset of data or procedures from a parent). Encapsulation in objects makes code reusable, enabling programmers to design more flexible systems faster and with lower maintenance requirements.

LEVEL5 has been redesigned in keeping with the increasing need for object-oriented programming in today's DP environments. The editor, visual windowing systems, displays, database interfaces, inference engines, knowledge bases, devices, files, and timers are all built-in objects. Called System Classes, they contain a rich array of built-in logic, tools, and default instances that are ideal for prototyping. A novice or first-time user will find that System Classes simplify the task of building a knowledge base. In the hands of the experienced developer, System Classes are useful templates for creating new object classes.

But power without user access would be unacceptable; capturing and coding expertise must be easy. With LEVEL5 OBJECT, an easy to use product is even more convenient. The window-driven graphical user interface, graphical knowledge tree, and many automated and default procedures enable virtually anyone to build a knowledge base. The user interface takes full advantage of SAA-compliant pull-down menus, dialog boxes, check boxes, and radio buttons. A toolbox enables developers to build these same display facilities into their own applications. The knowledge tree editor is a visual programming environment that enables developers to graphically diagram a knowledge base, much as they would design a flowchart on paper. Goals, rules, Demons, and facts all have distinct icons. The knowledge tree is more than a debugging aid; it is a CASE facility in that the graphical representation is automatically converted into binary code.

INTEGRATING CORPORATE DATA

LEVEL5 has the ability to read and write to files directly without a special language. Production Rule Language (PRL) reads database schemas and recognizes each field as a fact. Through the direct LEVEL5 interface to FOCUS on IBM mainframes and VAX/VMS systems, customers have additional access to any of the file types available to FOCUS on those platforms.

Using object-oriented database management techniques, developers build and maintain powerful applications that are able to access large, heterogeneous data structures.

By committing much of the underlying complexity of data access to System Classes, developers can control end-user access and make the process of sourcing attribute values from databases virtually transparent. In addition to simplifying procedures, handling databases as objects gives developers increased control over data manipulation — including SQL support and pattern matching—and the ability to dynamically bind new databases without modifying existing code. Programmed pattern matching enables an application to look for some set of object instances whose attribute values match a predefined pattern. Objects simplify this process, since the attribute values that satisfy the predefined pattern can all be described in a single module.

With LEVEL5 for FOCUS the inference-based technology can be embedded directly in FOCUS. Through the use of the CONSULT verb, FOCUS applications will be able to pass values to a LEVEL5 knowledge base and have LEVEL5 return the conclusions of a consultation back to FOCUS. The ability to ask the end user a few questions and perform some simple inferencing can substantially reduce the size of a result set. By winnowing out extraneous data, the resulting report becomes more pertinent, providing better information and making the application a true decision-support tool.

Combining multiple software strategies in a single application or system is increasingly important in business computing. Recognizing the large user communities of both FOCUS and LEVEL5, IBI believes that a synergy between the two products provides customers with more than a technological achievement. It will give them a tool engineered for the business environment of the 90s.

MEETING THE CHALLENGE: EXPERT SYSTEMS IN THE 90s

In their book *Expert Systems* (Wiley Press, 1985), Paul Harmon and David King projected a second revolution for the expert-systems industry — widespread usage. Some time around the year 2000, they predict, corporations will maximize expert-systems usage via networks and powerful natural language interfaces. But it will take more than technological breakthroughs; expert systems must be generally accepted.

The technology has made significant strides in the last ten years. Inferencing techniques, objects, user interfaces, and data access are only the means. Now, the responsibility for the ultimate success of expert systems is the task of application developers and users throughout business, industry, and government. While leading industry indicators suggest progress in this direction, the potential of expert systems can only be fulfilled if we accept this challenge in the 1990s. ◆

-Kendra Bonnett

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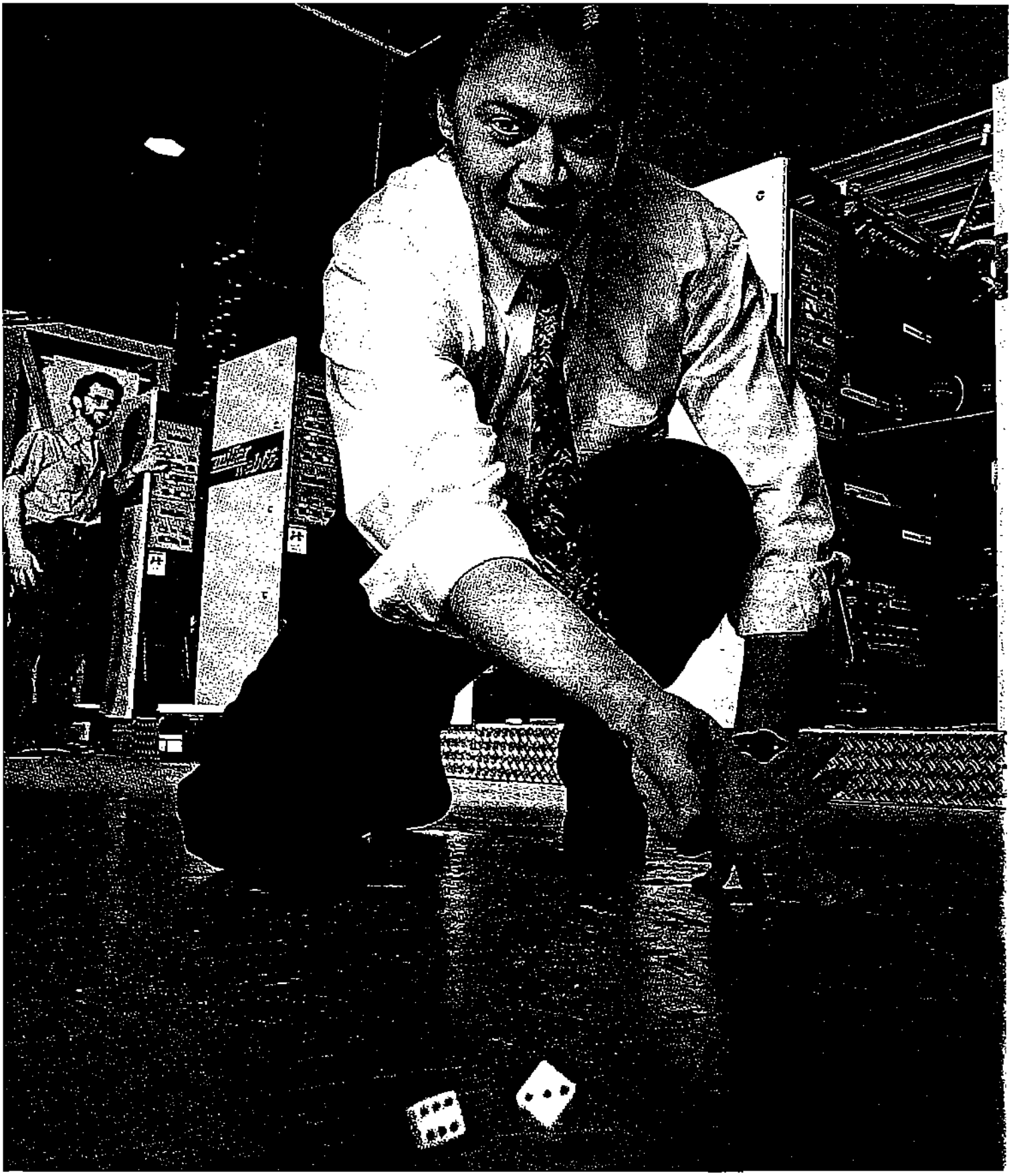
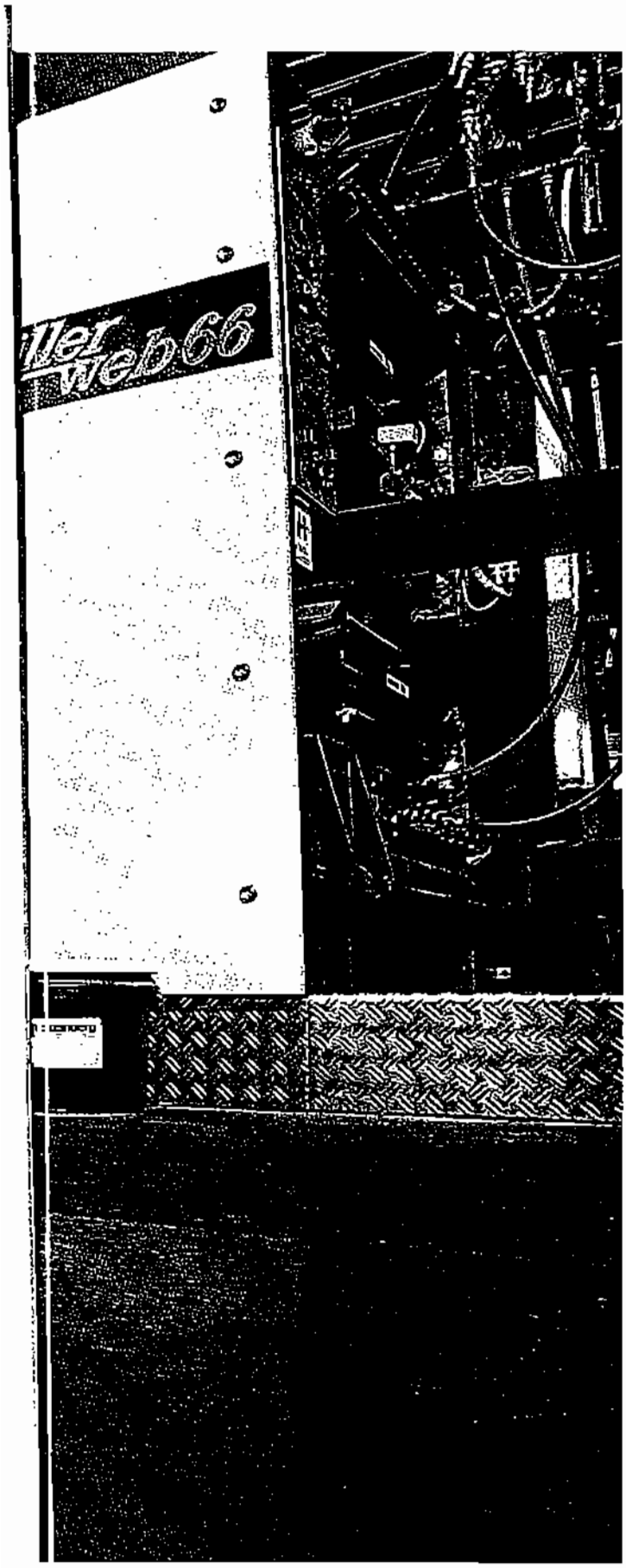


PHOTOGRAPHY BY JOHN TERENCE TURNER



Betting *the* Company

PC/FOCUS-MultiUser helps Wagner & Teldon grow to up to 500 orders a day with an integrated LAN-based system, replacing an overburdened minicomputer with low cost hardware and software.

Supporting the growth of a dynamic, expanding company is an exciting role for information technology. Sometimes, lack of support can make the difference between success and failure. In the best case, systems support becomes the enabling technology that leads to realization of an entrepreneur's dream. Implementing technology in manufacturing, where capital resources can be strained, requires vision, creativity, and often a willingness to gamble to achieve advantage. Wagner & Teldon, a printing company specializing in calendars, is a case in point.

Today, W&T is a major player in the advertising calendar market in its native British Columbia; they sell over 1 million calendars there alone–more than one calendar per household. Many realtors in BC, and through the rest of Canada and the United States, obtain advertising calendars from Wagner & Teldon. The firm has also penetrated the credit union market very well, and a variety of other small and large businesses throughout North America are customers.

The specialty advertising market is a substantial one – over $4 billion in 1988, according to Cate Brennan, manager of external communications for Specialty Advertising Association International, headquartered in Irving, Texas. Advertising calendars were the backbone of the industry in the first half of the century, according to *The Counselor*, a leading trade journal. In recent years, they have slipped to fourth place, behind wearables, writing instruments and business-related products, but are holding their own. Brennan adds, "There are over fifteen thousand products in the specialty advertising market, but calendars hold 10% ." Wagner & Teldon's unique die-cut

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If you service the customer well, you can count on more than five repeats."

To break in, Wagner gambled on sample mailings.

We emphasized that we want to use the latest, low-cost micro technology ... any information you'd want is available."

CONTINUED FROM PAGE 33

window (produced on a custom-made machine) in the center of the calendar, and its creation of customizable, unique local and regional products, are dramatically different approaches that have generated substantial volumes of new business for the firm. Calendars remain a mainstay of the specialty advertising industry because "it delivers the message 365 days a year."

CREATING THE MARKET

Originally, Wagner & Teldon imported and produced calendars exclusively for retail, typically book and stationery stores, as well as a small amount of advertising calendar business. Company president Volker Wagner joined his father's business in 1980. Over the next year, he learned the business, which at that time did none of its own printing. "At times, there were three of us," he says. "My father, my wife Elke, and me. We got our first computer, and Elke put in long hours getting that side of the business in order. In 1982, we shifted our emphasis to the advertising market. We got a contract from the Greater Vancouver Real Estate Board for 500 orders, and things began to take off." Until now, the emphasis had been on scenic, upscale product, including imported materials. The new ventures were a gamble; the firm had to create samples, have them printed, and begin selling them into a market that differed greatly from their retail base.

W&T found that they were able to compete with older firms by using its innovative ideas like regional calendars and customized imprinting, and the firm realized a rapid expansion in sales. They did their own calendar imprinting while still farming out general printing, die cutting and binding of the end product. On a personal level, Wagner gambled too–he took on the role of President in 1983, tying his personal fortunes firmly to those of the company.

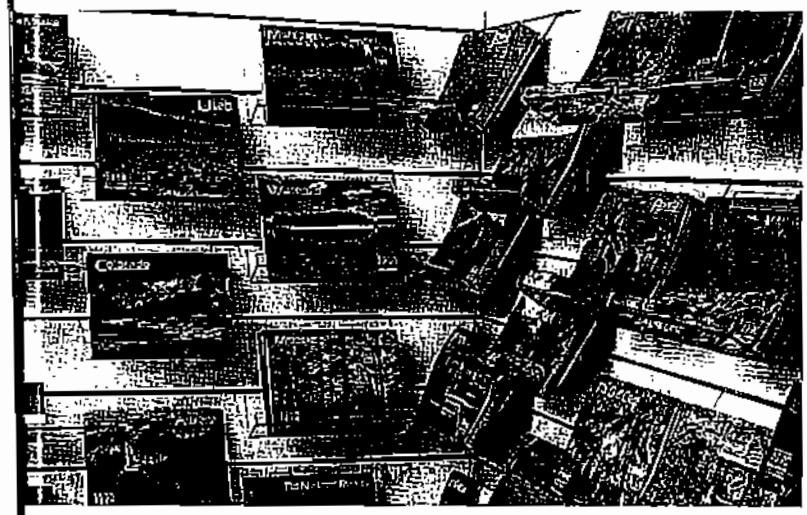
Recognizing its opportunity, the firm moved aggressively; more products and staff were added, and by 1984 regional calendars for all of Canada had been created. They began to field a direct sales force to market the products.

At about this time, Jörg Wagner, a lawyer, joined the firm. Mr. Wagner senior, semi-retired, and together his two sons conceived the business plan needed to expand into their own printing operation. The older product line was essentially flat, and they wanted to take more risks, seeking new market segments. Printing their own product would make this more achievable. "Jörg's role was critical," says Wagner. "He provided many of the manufacturing ideas, and we installed our first press in May of 1985."

The first attempt at printing was not as successful as hoped; the secondhand press purchased was inexpensive, and the results showed it. Again, it was time to gamble–if quality results were to be achieved, the firm would have to take financial risks to obtain better equipment. In January 1986 they installed a $1.4 million Miller 6-color sheet-fed press, and created their first U.S. state calendars on a trial basis. "We printed 12,500 for the state of Washington," says Wagner. "In 1989, we sold 200,000." That result was spectacular, of course, but others did well also; in the very first year, response to trial mailings for marketing purposes was sufficient to break even on the expense of printing the samples blind. And that meant success: the first sale is the critical step. "If you service the customer well, you can count on more than five repeats," Wagner notes. The strategy of getting favored supplier status from industry groups, real estate boards, etc. was also pursued.

COPING WITH SUCCESS

By late 1988, business growth was so explosive that



The creation of customizable, unique, local and regional products has generated substantial volumes of business.

the business' resources were becoming increasingly strained. In addition to direct sales, the firm began to add distributors, greatly adding to the complexity of the billing, shipping, and production issues. They did more direct mail marketing, spending upwards of $50,000 to send some 800,000 pieces out to potential customers.

The firm moved to new quarters in Richmond, British Columbia in 1989 and acquired a new Miller web press, which provided a 6-fold increase in printing capacity, with the ability to print both sides of a sheet simultaneously, add coating during the run, and do folding on the press itself. They also installed a customized die cutting machine, which was online by September. With this advanced equipment, it became economical to provide specialized calendars at very competitive prices in quantities as low as 100.

But there was another problem: the growth had overwhelmed the capacity of the Centurion minicomputer which had been bought in 1980 for handling retail orders. The six PC-compatible machines acquired in late 1987 to handle the advertising calendar business had succeeded beyond expectations–the bulk of business was already in this new market. Coordinating the activities had rapidly become the bottleneck.

The majority of the calendar business is, of course, in the later part of the year; typically, the production and shipping parts of the business peak from August to December. With thousands of orders moving through the plant, it became critical to manage and integrate all the information needed to schedule and coordinate design, production, shipping, and invoicing. Simple order entry had become significant; on the Centurion, adding a new customer was very time-consuming. Today, 200 orders a day are routinely processed, with peaks of 500.

Order entry had been processed using PC/FOCUS on the micros already installed, and many of the inter-system issues that had arisen called out for a more global role for the business systems. One example was the time problem–order entry and shipping may be separated by months. Orders may be received in February for shipment in, say, November.

The simple approach would be to just solve the immediate problem. But the entrepreneur looks for ways to *improve* business with technology as well. One of Wagner's "bets" was to adopt and expand an incentive pricing scheme. Customers could reduce their bill through a variety of scheduling schemes that simplified W&T's production scheduling and shipping plans, as well as by paying at appropriate times. The gamble was whether the firm's systems would be able to handle the increased complexity.

SOLUTION: PC/FOCUS MultiUser

At this point, Wagner turned to Herb Spencer of Spencer-Pacific Systems, Inc. (SPSI). Dr. Spencer recommended a totally revamped approach; "It was clear that W&T need a fully integrated approach. We agreed in February 1989 to develop a comprehensive system and have it operational by August." The agreed-upon system was to handle all aspects of the business: Order Entry, Order Tracking, Inventory Control, Shipping, Billing, Cash Control, Receivables, and Sales Analysis. This was indeed "betting the company"; Wagner was gambling that a system could be delivered to run virtually the entire business, and that it could be put in place during peak season.

SPSI determined that the optimal approach was to use PC/FOCUS MultiUser. A critical factor in the decision was the ease of development: "We created over 400 programs in 4 months using only 2 programmers," says Dr. Spencer. "FOCUS provides a development environment that permits rapid prototyping, and the network aspects are completely transparent." The comprehensiveness of the design was a good test of Dr. Spencer's approach to systems development, which includes a data modeling methodology that was described in *Extending the Entity-Relationship Model*, FOCUS *Systems Journal*, May 1988.

The system today stores 25,000 addresses, and in early October had over 20,000 order lines. Orders are monitored through the systems with dockets, used at various points in the design and production process to track various stages of manufacture and shipping. The tracking is done

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The growth overwhelmed the Centurion minicomputer... today, peaks of 500 orders a day can be processed.

CONTINUED FROM PAGE 35

with a bar code scanner; some 200,000 scans are expected by yearend, and when FOCUS *News* visited the plant, over 75,000 had already been entered.

Part of the system's complexity is attributable to the interactions among order, ship-to, and bill-to addresses. These may all be different, and the order must be linked to the appropriate logo files for printing, as well as to a variety of options on each order. In the case of sales through distributors, the customer must be linked to the distributor as well. A single order for 10,000 calendars can easily involve 100 different ship-to locations, logos, and shipping labels (which are generated automatically.)

With FOCUS we can get all the information we need to run this business whenever we need it–without having to make huge investments in traditional computerized solutions."

All this information is critical to production and shipping, and the accounting needs are very different in terms of data organization. Moreover, sales analysts might want another view of the data entirely. "Our biggest marketing advantage can come when we can track which previous customers have not ordered and alert the appropriate distributor. By making their job simpler, we can get more business."

KEY ISSUES: COST AND RELIABILITY

A key decision factor was cost. "The fact that we could implement a system like this on seven superfast, low-cost 80386-based clone machines linked in to the older machines already in place was a major factor," says Wagner. "We told SPSI that we wanted all the users to have access to all the data all the time. We emphasized that we want to use the latest low-cost micro technology to service our growth. Herb was able to do everything I asked him to do; any information you'd want to get out is available." The new equipment was brought in for less than $60,000.

A robust system is critical for W&T's business, because the volume of individual orders during the 4-month peak period is in excess of 70,000, involving over 20,000 customers, consumers, and shipping locations.

"This is a production environment," Dr. Spencer adds. "FOCUS' background in mainframe- and mini-based mission-critical systems for over 15 years clearly differentiates it from the other micro-based solutions we looked at. Micro software vendors are new to this sort of system–its transaction processing requirements, access for multiple users, version control, development tools, etc. FOCUS has a long history of proven effectiveness in that area. We have been pushing the product to the limits of our network operating system platform in the current release; the new version for OS/2 will substantially improve performance for us through its improved use of memory that we already have but were unable to tap. OS/2's removal of memory-based limits and ability to multitask will let us develop more sophisticated designs that are not constrained by DOS memory limitations."

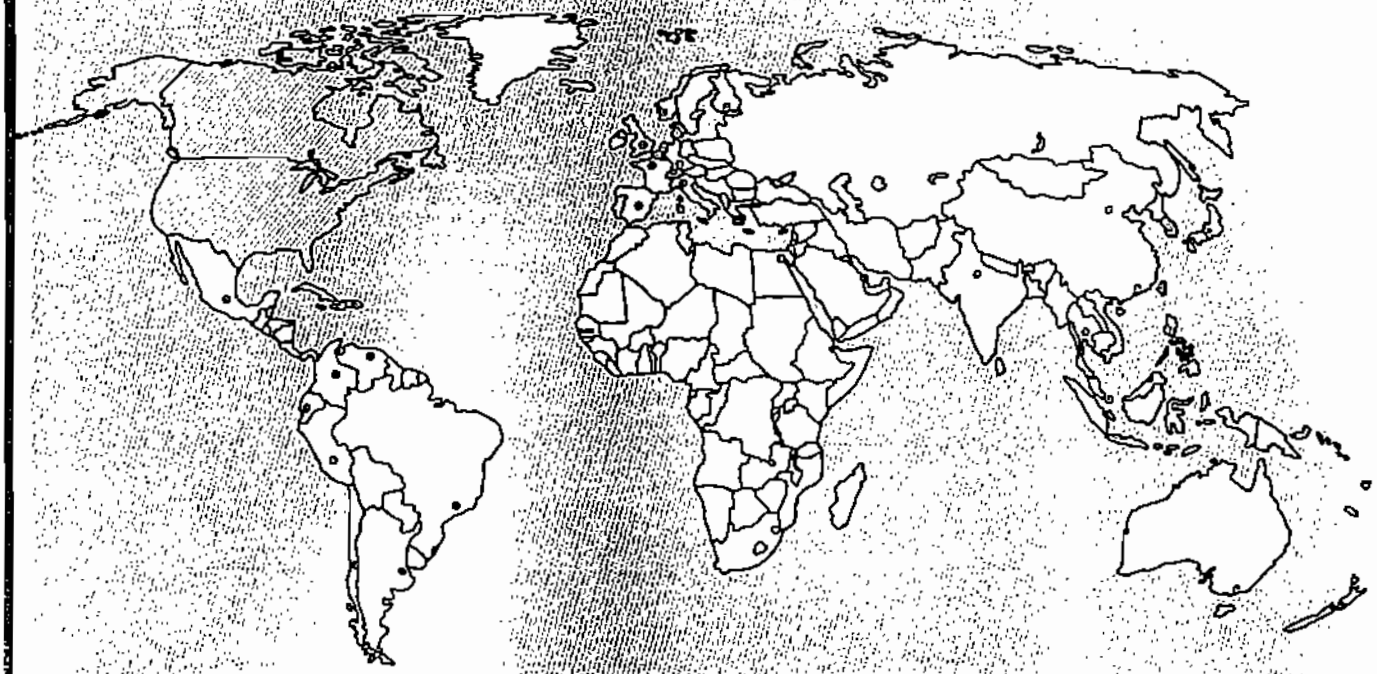
In addition to the brute force issues of handling large transaction volumes, FOCUS is being used in a number of inventive ways. For example, a customized interface was created in assembly language to create and read bar codes. These are created uniquely for each individual order, and used to track work either at terminals or at low cost scanner sites along the production line, enabling tighter control of materials in process.

In the future, Wagner hopes to use the new system for more analytical tasks that will allow him to continue to evolve new ideas for promoting and selling the company's products. He is eager to put Dr. Spencer to work on some of these plans, now that feasibility has been demonstrated and the reliability of the system has been tested. "As you get more sophisticated, accuracy becomes critical because so many things are driven by the system," he says.

Putting up such a vital system rapidly, while production was going on, was a huge risk. Moreover, the use of low-cost software and hardware added substantially to the uncertainty. Wagner never looked back. The decision to scrap the increasingly overburdened mini for a LAN-based system was made with eyes open, and has paid great dividends. The firm has tripled in size in the past three years, employing over 100 people at peak times, and the new systems provide a platform for the continuation of that growth. "With FOCUS, we can get all the information we need to run this business whenever we need it–without having to make huge investments in traditional computerized solutions," Wagner says today. "It was a big bet, but it has paid off beyond my expectations." ◆

Overseas Affiliates and Agents

The following cities and telephone numbers will help you find IB products and services in the countries listed.



Argentina
Ditra S.A.
Buenos Aires 54-1-23-5206

Australia
FOCUS Technologies Pty. Ltd.
Windsor 61-3-525-2099

Belgium
Information Builders (Belgium) S.A.
Brussels 322-735-9060

Brazil
SCI
Sao Paulo 55-11-2890099

China
Beijing Polytechnic Univ.
Beijing
784884, 784631-474

Colombia
Colinversiones S.A.
Bogota 57-1-286-03-11

Chile
Comtech
Santiago 56-2-725201

Denmark
Cybernetics Int'l AP
Frederiksburg 45-1-377122

Ecuador
S.A.E.
Guayaquil 593-4-32-6555

Egypt
Standardata
Cairo 20-2-670039

Finland
Inforan OY
Helsinki 358-0-3455744

France
Information Builders France S.A.
Paris 33-14-620-0242

Germany
Roland Berger & Partner GmbH
Munich 49-89-9223008

Hong Kong
Computer Power
Hong Kong
852-5-254-567

India
Pace Education/NIIT
New Delhi 91-11-608864

Indonesia
Sumber Daya Informatika
Jakarta 62-21-596701

Israel
Advanced Technology Ltd.
Tel Aviv 972-3-5483555

Italy
Software Technology
Milan 39-2-66982255

Japan
K.K. Ashisuto
Tokyo 81-3-4370654

Korea
Jigu Assist
Seoul 82-2-237-3660

Mexico
Productividad Functional
Mexico City 905-272-3660

Netherlands
Information Builders Int'l B.V.
Amsterdam 31-20-475151

New Zealand
Computer Power Ltd.
Wellington 64-4-852-534

Norway
Datus A/S
Stavanger 47-4-677755

Peru
Infogest S.A.
Lima 51-14-245592

Philippines
Mega Data Corporation
Makati, Metro Manila
63-2-818-3290

Puerto Rico
Systems Experience Int'l, Inc.
Rio Piedras 809-765-0270

Singapore
CP Systems Pte. Ltd.
Singapore 65-225-2922

Spain
Information Builders Iberica S.A.
Madrid 34-1-5938012

Sweden
Cybernetics Int'l AB
Stockholm 46-8-7530125

Switzerland
Information Builders Switzerland AG
Zurich 41-1-918-2838

Taiwan, ROC
Galaxy Software Services
Taipei 886-2-507-9778

Thailand
CP Systems Pte. Ltd.
Bangkok 66-2-2539903-4

United Kingdom
Information Builders (UK) Ltd.
London 44-1-9036111

Venezuela
Beke Santos Software
Caracas 58-2-729971

An American in Cannes

In two parallel events, FUSE International and FOCUS World, Cannes found itself transformed into a multi-host environment. Chris Bell, President of FUSE International, hosted FUSE. Gerry Cohen, IBI President, and Peter Scawen, Managing Director of IBI UK hosted FOCUS World. And, of course, there was ...

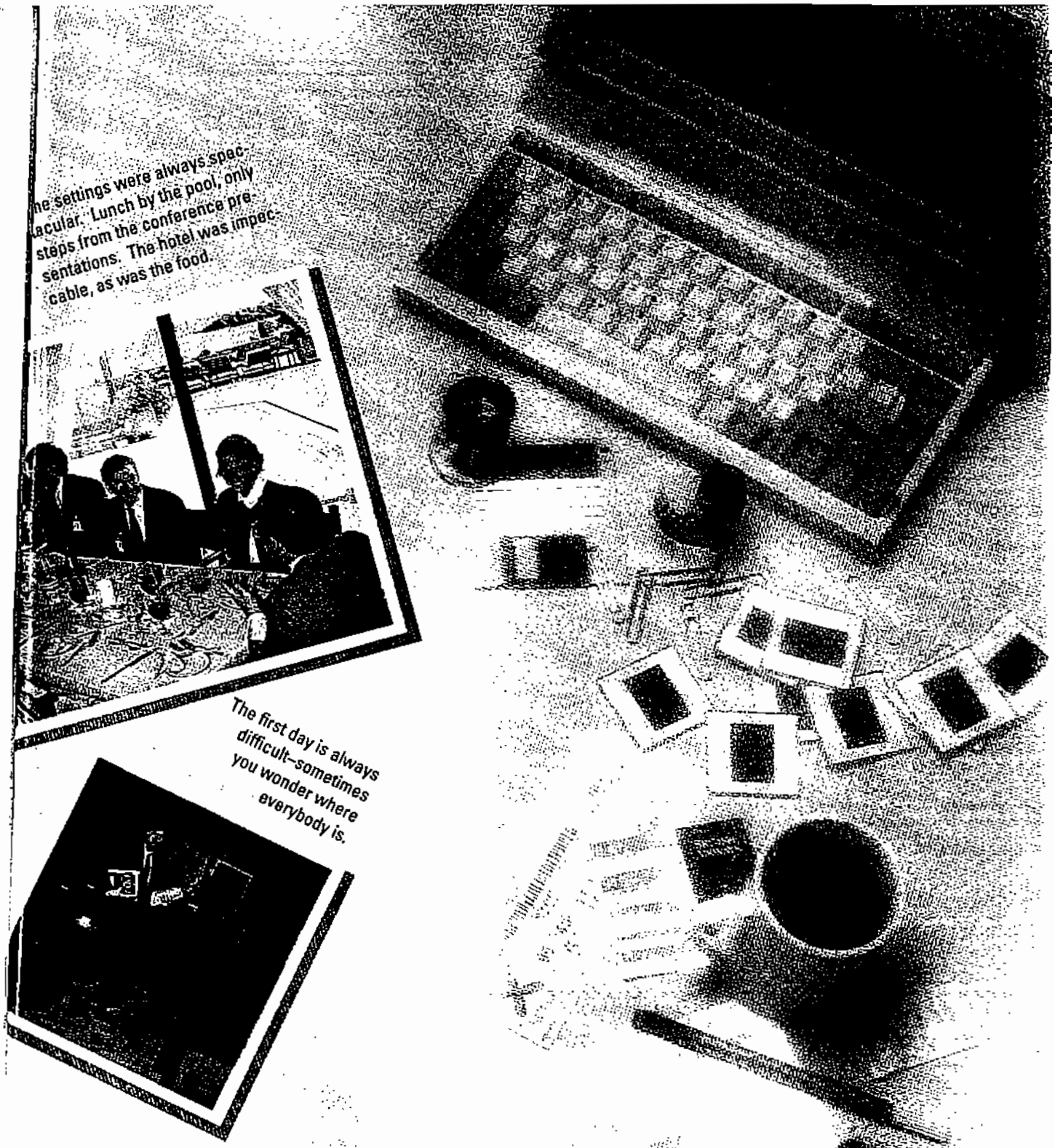
John Friedline of IBM, 1988 FUSE speaker, has assumed responsibility for SAA in Europe. He brought FOCUS World attendees up to date on new developments in IBM's strategies, including OFFICE VISION and AD/CYCLE, noting IBI's role as an SAA Development Partner.

Mark Adams, Editor, *Software Management* (UK) acted as Chairman of FOCUS World, fielding questions, posing provocative ones of his own, and keeping everyone on schedule (no easy task).

A number of hardware vendors, including Digital, Tandem, Sun, Xerox and others, joined the software vendors and consultants in the exhibit area.

Peter Scawen introduced IB Europe and the new European Development Center and Marketing and Support Center.

BACKGROUND PHOTOS BY FRANK PELUSO



he settings were always spec-
tacular. Lunch by the pool, only
steps from the conference pre-
sentations. The hotel was impec-
cable, as was the food.

The first day is always
difficult–sometimes
you wonder where
everybody is.

In a major press conference, representatives of the European press heard Gerry Cohen announce the Distributed FOCUS strategy for the 90s (see story in this issue.)

"It is no accident," noted Tim Benthall, Vice President of the International Division, "that we chose to make these announcements at FUSE International. IBI is a global company, and our new organizational structure, including the new Australian joint venture, FOCUS Technologies, is a recognition of that."

Christopher Stone, President of the Object Management Group discussed standards for object - oriented programming.

Kit Grindley of Price Waterhouse regaled the FOCUS World crowd with penetrating insights drawn from his *Information Technology Survey 1989-90*, available from Price Waterhouse, 32 London Bridge St., London SE1 9SY.

Like all heterogeneous environments, the conferences supported multiple languages. Translations were available into French and English. Several British attendees repeated the oft-heard assertion that the U.S and U.K. are two countries divided by a common language.

Like all conferences, this one ran on coffee; the pool was a nice touch, though.

Tandem held a worldwide teleconference for the rollout of its Cyclone machine. Through the satellite downlink, some of us also got our first news about the California earthquake. The global information network was also well represented in the hotel via CNN International.

"Ask Gerry" is always a highlight. Here he explains exactly where the franc stops.

The first time I saw this sign, I thought it was a score. At the end of the conferences, the English were still ahead. Actually, this sign listed the channels for simultaneous translation.

It was hard to leave this place; FUSE events are always like that, of course, but this was unique. The success of FOCUS World and the preceding Top Gun School added a flavor of their own, broadening the scope in many ways. The presence of other vendors, notably Tandem's teleconference, the announcement of a strategy for the 90s, the imminence of 1992 and the restructuring of the European Community, all added to the mix. FUSE events are always a celebration of how far we have all come, but this was also something more: an exciting glimpse into the future with our friends. 'Till next year!

- By Merv Adrian

In this edition of TECH CORNER, we feature a number of frequently-asked questions and their answers. Several different FOCUS environments are covered. Our thanks to the various specialists from the HotLine who submitted them.

MAINFRAME/FOCUS

Q: In VM, how do I automatically execute a FOCEXEC from VM when I invoke FOCUS? I don't want to put it in PROFILE.

A: Instead of typing `FOCUS` from CMS, type `FOCUS IN` *filename filetype filemode* You can also type `FOCUS ?` to display the FOCUS EXEC options. *Note*: No Dialogue Manager commands can be used, since the commands are taken as if issued interactively.

-Alton McDonald

Q: In MVS batch, can you use Dialogue Manager variables? I am getting an error saying that the commands are not recognized.

A: To use Dialogue Manager statements in MVS batch, you should place all commands into a FOCEXEC. After the `SYSIN DD *` statement, put `EX` *fexname.*

-Gina Suozzi

PC/FOCUS

Q: How do I route output to and from devices such as a file or printer?

A: A FILEDEF can be used to temporarily change the assignment of system devices such as OFFLINE and SYSPRINT. You can also use this technique to read data in from devices other than the keyboard or disk by issuing a FILEDEF for SYSIN. For example:
`FILEDEF` *filename* `DISK COM1:`
will enable information to be FIXFORMed from a bar code scanner defined as the serial port.

-Bill Engfer

FOCUS VAX/VMS

Q: How do I send my FOCUS session output to a file?

A: `FILEDEF SYSPRINT DISK` *filename.ext.*
Then run the desired fex or commands. To capture TABLE output, first
`SET SCREEN=OFF`
To reset session output to the screen, issue
`FILEDEF SYSPRINT TERM.`

-Cindy Compert

UNIX/FOCUS

Q: In SU, is there a way to redirect messages to a file?

A: Yes. When you bring up the sink, use redirection to route the output as follows:
`NOHUP SINKMACHINE` *sinkid password*
`ECHO >` *filename* `&`
`NOHUP` forces the sink to keep executing even after the user who started the sink logs out. *sinkid* is the unique name for the sink. *password* is the password to bring down the sink, and `>` *filename* will redirect output to the file identified. By default, output will be sent to `NOHUP.OUT` in the current user directory.

-Maryanne Cotrone

WANG/FOCUS

Q: How do I submit a background task to run FOCUS?

A: There are two ways of submitting a background task:
1. From within FOCUS issue `VS SUBMIT` *procedurename.*
2. From the Command Processor, hit PF12 (SUBMIT PROCEDURE).

A sample procedure follows:

```
SET INVOL=volume
RUN FOCUSPGM in foclib on focvol
ENTER INPUT=focinp,
   LIBRARY=fexlibraryname,
   VOLUME=volume
ENTER OUTPUT=focout,LIBRARY=outlib,
   VOLUME=volume
RETURN
```

INVOL points to the default volume containing usage constants for the session. All temporary libraries will also be created on this volume. *foclib* is the library containing the FOCUS software, while *focvol* is the volume. INPUT points to *focinp*, the input FOCEXEC to be executed. This fex should include a FIN statement. Note that all dialogue manager statements should be placed in a separate FOCEXEC executed from focinp. *focout* is the output filename for all session output.

-Daisy Rivera

Trade Show Schedule
Jan.-June 1990

JANUARY

IRDS and IBM Approaches
Repository Conference
Toronto .....January 15-17

Uniforum
Washington, D.C. .....January 23-25

FEBRUARY

Helpdesk Conference
Orlando .....February 11-14

SUN Expo East
Washington, D.C....February 26-28

MARCH

IEEE Artificial Intelligence Application
Santa Barbara .....March 5-9

Interex Computing Management Symposium
Las Vegas .....March 12-14

IDMS Users Conference
Seattle .....March 18-22

DB EXPO
San Francisco .....March 27-29

APRIL

DATABASE '90
Toronto .....April 2-4

SAA World
Boston .....April 9-11

Object Oriented Symposium
San Francisco.....April 17-19

MAY

AAAI
Washington, D.C. .....May 1-3

CUMREC
Buffalo .....May 6-9

DEXPO - South
New Orleans .....May 8-10

Government Tech
Sacramento .....May 16-18

JUNE

IRDS and IBM Approaches
Repository Conference
Boston .....June 11-13

PC Expo
New York.....June 19-21

DEXPO - East
Boston .....June 26-28

DATABASE WORLD
Santa Clara.....June 26-28

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DB2 And SQL/DS Courses for FOCUS Users...

IBI, demonstrating a major commitment to IBM's RDBMS technology, offers numerous courses for developers who utilize DB2, SQL/DS and/or their FOCUS interfaces.

Marty Slagowitz, Vice President of Professional Services, says "Over 20% of FOCUS sites have installed DB2 or SQL/DS. This has resulted in their increasing use of FOCUS as a front end for application development . In response, we've developed training to address the requirements of two groups: FOCUS professionals who need to learn about DB2 and SQL/DS and DB2 and SQL/DS professionals who need to learn about FOCUS."

"Over 20% of FOCUS sites have installed DB2 or SQL/DS... we've developed training for FOCUS professionals who need to learn about SQL and SQL professionals who need to learn about FOCUS."

Introduction to DB2 and SQL/DS (Course 400) provides a solid foundation. This 3-day non-FOCUS class covers relational theory, normalizing data, defining tables, maintaining and retrieving DB2 and SQL/DS data, referential integrity, implementing views and security, locking, and optimization. Professionals who want a summary of key concepts may prefer to attend the one-day **Overview of DB2 and SQL/DS**, Top Gun Workshop.

FOCUS users who have mastered DB2 basics will benefit from the Top Gun Workshop **DB2 and SQL/DS Interface with FOCUS**. This all-day session concentrates on database design to enhance interface MODIFY and retrieval efficiencies. The tradeoffs involved are also covered. This same material is also presented in two afternoon electives at the FOCUS Top Gun School. ◆

..And DB2 Users

IBI features 2 hands-on courses that introduce SQL professionals to FOCUS. **Basic FOCUS Series for Relational DBMS Users** (Course 105/107), for users with no prior FOCUS experience, provides the skills needed to set up the environment and to create, maintain and report from DB2 and SQL/DS tables using FOCUS. In **FOCUS Efficiencies for Relational DBMS Users** (Course 115), students learn how to write efficient relational applications using FOCUS.

Save **10% on both 105/107 and 115** by taking them within six weeks at an IBI site or in five consecutive days at a client site. ◆

Top Gun Workshops To Expand in 90s

Where do you turn for training on the latest FOCUS advancements or a leading edge technical topic? For 1500 people in 1989, the answer was the Top Gun Workshops. IBI is expanding the popular series to include 14 one-day workshops and an increased schedule of dates and locations throughout North America and Europe. Four made their debut at the most recent Top Gun School: **Introduction to CASE, Overview of DB2 and SQL/DS, Debugging WANG VS FOCUS Applications** and **FOCUS for UNIX**. Plans are also underway for workshops covering distributed processing and SQL Server. ◆

Top Gun and FUSE – A Winning Combination

In 1989, IBI was invited by 10 local FUSE groups to hold Top Gun Workshops in conjunction with their meetings. The joint ventures have proved successful.

Mike Errico, President of SWFUSE, writes, "I would like to thank the Top Gun instructors for their cooperation and assistance in making our June meeting a great success. They complemented our speakers. We more than doubled our previous meeting attendance."

In 1990, IBI will continue working with local FUSE groups to sponsor these joint events and make Top Gun Workshop speakers and key IBI personnel available for FUSE presentations and to participate in FUSE meetings. ◆

Consortium TOP GUN Schools For High Performance

IBI is pleased to announce Consortium Top Gun Schools. Save travel time and related expenses by assembling 150 students in your local area, and Top Gun will come to you! This exciting new option allows you to substantially reduce the costs of a complete Top Gun program, and bring it to your local area. For details, contact Top Gun Administration at (212) 736-4433 ext. 4316.

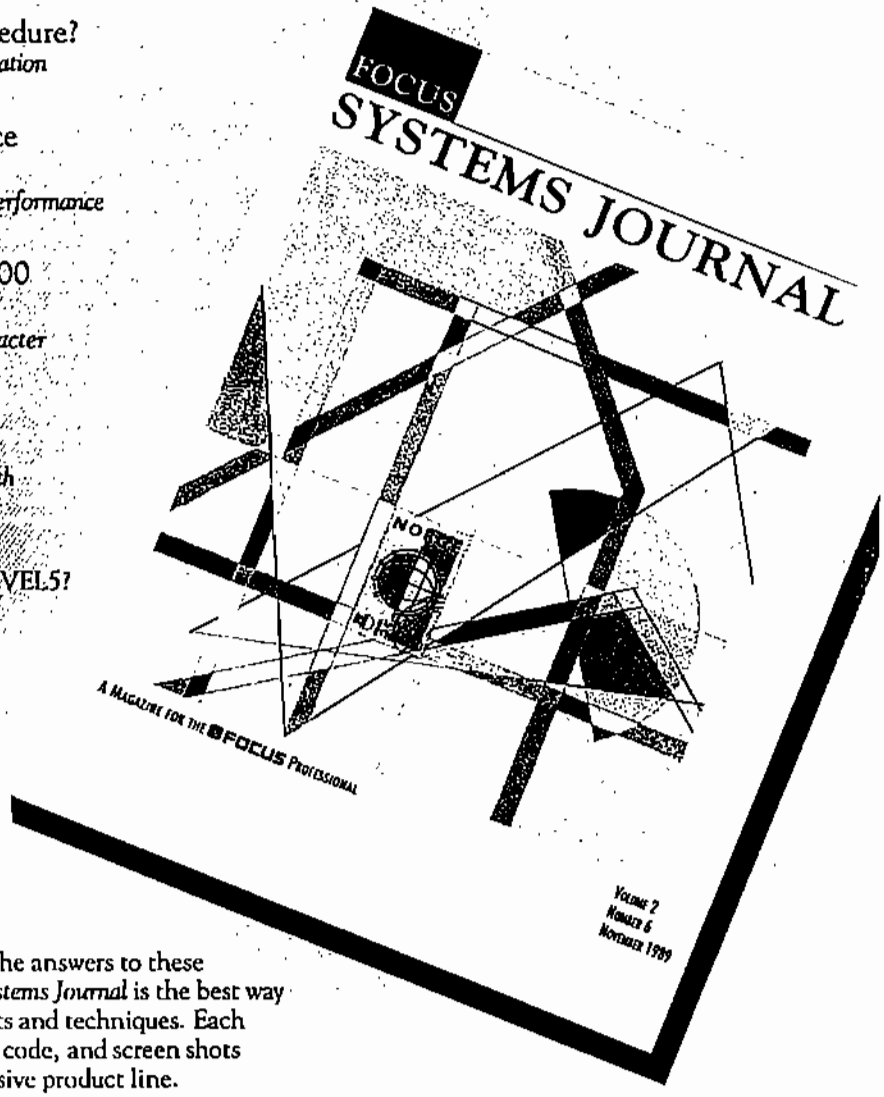
Pick the Brain of an Expert System

What makes expert systems technology so special? Find out for yourself at IBI's one-day LEVEL5 workshop. At this introductory session, you'll learn to identify business solutions that are best solved by a knowledge base. You'll then build an expert system while working as part of a team.

When you're ready to implement an expert system, **Basic LEVEL5** (Course 700), a three-day class, covers how to create and maintain a LEVEL5 system, determine goals, write rules, combine knowledge bases

CONTINUED ON NEXT PAGE

- The difference between an active and an inactive field during a MODIFY procedure?
  (Volume 2, Number 5, *Activation And Deactivation* by Vickie Cooper)
- How to use the Host Language Interface (HLI) effectively?
  (Volume 2, Number 6, *HLI: Pain, Power and Performance* by Mark Rankovic)
- How to overcome the limitation of 6,500 characters in a TABLE heading?
  (Volume 2, Number 5, *Beyond The 6500-Character Heading* by Steven Murphy)
- When DB2 or SQL/DS optimization is automatically disabled?
  (Volume 2, Number 4, *Performance Tuning With The FOCUS to DB2 and SQL/DS Interface* by David Bland)
- How to open FOCUS databases from LEVEL5?
  (Volume 2, Number 2, *Integrating LEVEL5 With FOCUS* by Don Barker and Dan Cooper)



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CONTINUED FROM PAGE 44

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Top Gun Introduction to CASE Workshop

Computer Aided Software Engineering (CASE) is a critical new technology. We expect CASE to work hand-in-hand with FOCUS to produce unheard-of levels of productivity. This one-day workshop features: what CASE is, its functions, how it is applied and supported, management functions, payback issues and their impact on your application design procedures. ◆

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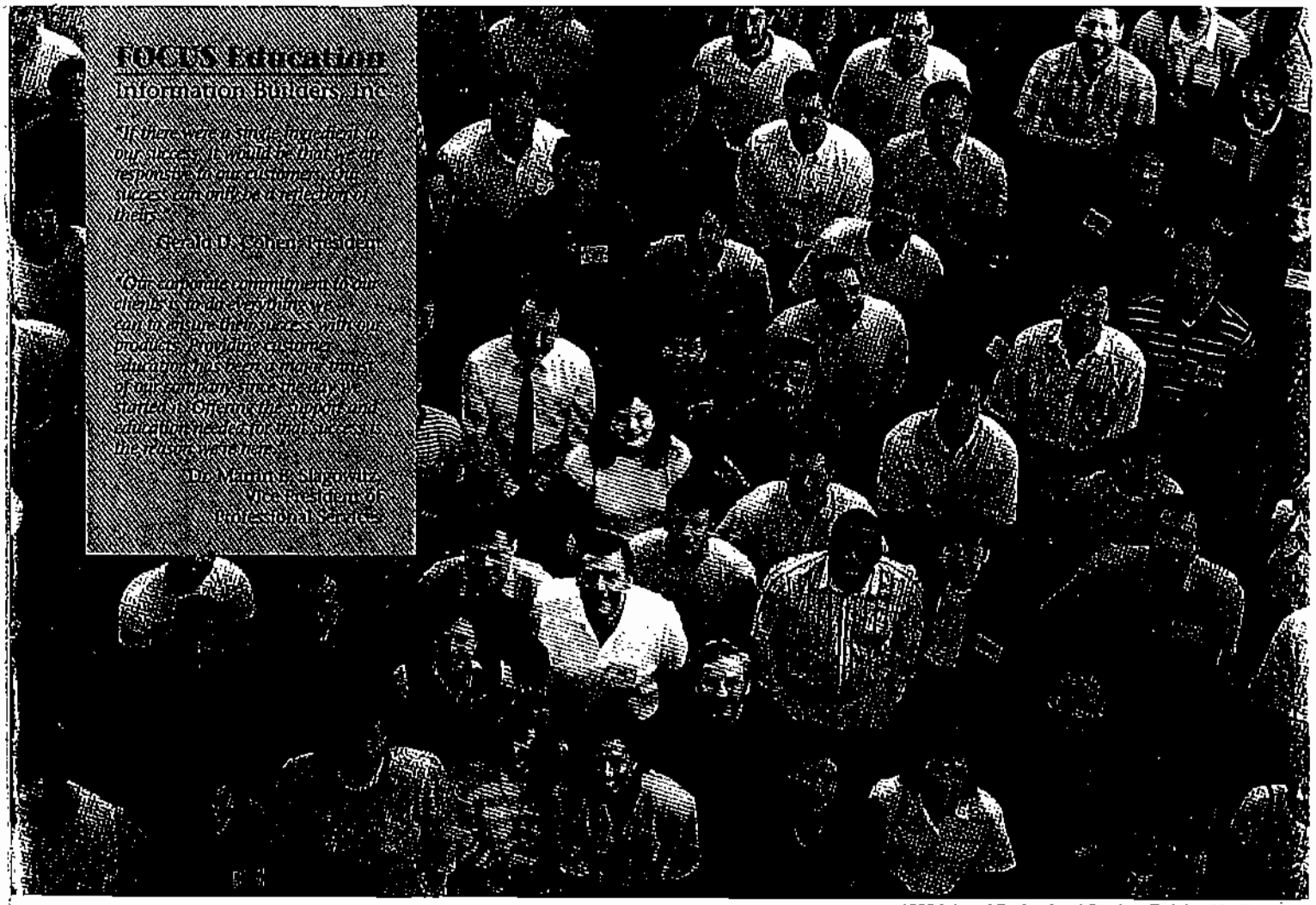
For details, dates, and locations, contact the Education Administrator at your local IBI branch office.

You may also contact Top Gun Administration at (212) 736-4433 ext. 4316.



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