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BURROUGHS/SPERRY COMPETITIVE STRATEGIES: LOOKING AT THE MERGER

Alan Bertman
DTN 251-1888
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To appreciate the historical perspective of Burroughs and Sperry, the BUNCH philosophy must be examined. At one time, mainframes were about the only available way to automate. Hardware was expensive and too costly to warrant different machines for special tasks. The most economical approach was to share general-purpose machines among various tasks. Computer users shared their mainframe resources, even if the mainframes did not precisely fit their management needs.

The computer companies competed with each other for new business in a market being penetrated for the first time. Mainframe product cycles typically spanned seven years or more.

Semiconductor technology changed the industry. Less expensive and more powerful machines emerged. The idea of distributed processing was born, and departmental and workstation computing offered alternatives to the mainframe. Mainframes still had their place, but computing concepts changed and opportunities arose for customers to approach data processing in different ways.

New vendors emerged, markets for minicomputers sprang up, and the BUNCH found themselves facing competitors offering both special and general-purpose machines. The resulting factor -- the BUNCH firms have repositioned themselves according to their own perceptions of the marketplace.

SPERRY CORPORATE STRATEGY: NO LONGER JUST A MAINFRAME COMPANY

When Sperry finally said "I do" on May 27, 1986 to Burroughs Corporation's $76.20-per-share merger proposal, the real search for a product fit was just beginning. Industry analysts range from skeptical to guardedly optimistic; neither company will currently spell out future plans. But while one plus one may equal something less than two, and since the future is difficult (at best) to predict, what will happen is largely dependent on the past (i.e., in part the historical development of both companies, the markets and the products).

To understand why Burroughs bought Sperry, it is important to review Sperry's corporate direction, which is frequently used interchangeably with the term "new mind-set." Myrddin L. Jones, vice president of business strategy for Sperry's Information Systems Group, described the new mind-set as Sperry's greatest asset. "It's the reversal of the old mainframe mentality, which Sperry, incidentally, wasn't unique in."

According to Jones, Sperry was embarking on a strategy to "pursue standards and coexistence with other companies' products and technologies...are no longer luxuries, they are nesessities." President Joseph Kroger emphasized

the systems integration strategy -- also part of the new Sperry 'mind-set' (i.e., corporate direction).

Kroger's idea was to focus on addressing a wider market than Sperry has done in the past and "be able to take large-scale projects involving diverse components from many sources, integrate them effectively and offer the customer a total-solution system."

President Joseph Kroger and chairman Gerald Probst started revamping Sperry as a whole in order to effectively implement the 'systems integration strategy.' The revamp included centralizing headquarters operations at the Blue Bell site and Sperry's effort to spin off business ventures outside of the information processing niche. Last year, Sperry divested itself of the farm equipment operation in New Holland, Pennsylvania. The farm operation contributed $715 million to Sperry's revenues (this sale would later, in part, become Sperry's undoing because of the potential wind-fall cash reserve that can now help a potential suitor defray some of the merger's incurred costs).

Marketing Strategy

With Joseph Kroger and Gerald Probst's new corporate mind-set (i.e., systems integration strategy) replacing its newly defunct mainframe mentality, Sperry began to adopt a philosophy of acquiescence in relation to IBM, whereas a few decades ago their posture was one of defiant challenge. This was a survival tactic on the company's part because they were hoping this approach would first, help Sperry maintain its existing mainframe user base, and second, Sperry was finally accepting the fact that in the commercial marketplace it can no longer pin their corporate hopes on large-system sales to new customers.

To attract new customers, Sperry chose UNIX to become, in Kroger's words, "part of the system integration strategy...involving diverse components from many sources, integrating them effectively...offering a total-solution system."

Today Sperry is attempting to come back, hoping to capture the bulk of the money their customers spend on information systems products. The comeback started three years ago when Sperry decided it was necessary to augment their 1100 series mainframe line. They began by adding personal computers. Sperry, which had previously built everything they sold, did not have the manufacturing capabilities for the new products so they began buying and reselling equipment from original-equipment manufacturers. Eventually Sperry was buying products from over 200 other vendors (mainly micro and minicomputers) to fill in existing gaps in their product lines.

Not only was Sperry buying and reselling their micro and minicomputer product lines but they committed themselves to the UNIX operating system, offering it on virtually all their processors. The UNIX-based products, coupled with the ability to provide technology and products customers want -- regardless of whether Sperry builds them or not -- "are the two launching pads," according to president Joseph Kroger. The two launching pads indicate Sperry is no longer to be considered just a mainframe company.

Monetarily this marketing direction translated into Sperry's Information Systems Group sales climbing 22% over the previous year (according to last

year's annual report). Revenue from the commercial computer systems and equipment amounted to $2.8 billion of Sperry's $5.6 billion in revenue. Some 60% of Sperry's operating profit came from computers.

From Sperry's perspective, they believe customers do not see anything wrong with selling products built by someone else. According to Dwaine Osman, vice president and general manager of the Sperry's Group Americas Division, Sperry does not have to concentrate on building all their own products but "provide Sperry support and service, which customers see as a premium." According to Osman, this is also part of the Sperry Integration Strategy.

Neal Waddington, director of the system group's Microsystem and Communications Development Group claims, "we're not committed to an OEM stragegy per se, but we are committed to a product strategy that brings the latest technology to our customers."

Offering a relatively new family of micro/minicomputers, software and peripherals from other vendors does not lessen the importance of Sperry's own mainframe line, which they still make. Sperry's main strength is as one of the leading information technology suppliers to the U.S. Government -- supporting an installed base of 18,000 users.

Sperry projects their mainframe growth to climb at 10%-15% annually. However, these figures are based on one key factor: Sperry is assuming that their customers will migrate from the micros and minis, which they do not build, to their mainframe line. Currently mainframe sales account for only 55% of Sperry's computer sales, down from 73% two years ago.

Jumping on the UNIX bandwagon to augment the 1100 mainframe series in the hope of trying to recapture marketshare is difficult at best. Especially in light of the fact that Sperry does not design or manufacture anything in the mid to low-range systems market.

Sperry's 'reversal' or re-thinking of their mainframe mentality -- or in Sperry terms as part of their 'systems integration strategy' -- means the company has attracted users who were previously not interested in their products because their mainframe prices were too high. Now Sperry can offer two families of computers (System 5000 and 7000) starting at $50,000 as a low-end system, instead of just offering an 1100 series mainframe starting at $500,000.

Based on Sperry's plan of migrating the customer from micros and minis to mainframes is the main reason why they are using UNIX as a common operating system across all their products. Sperry believes UNIX will allow them to acquire new products and bring these products to market faster than if the company were using their own proprietary operating system.

Product Strategy

Sperry's Information Systems Group has future plans to reduce the dependence on mainframe products while further developing the micro and minicomputer product lines, such as the 5000 and 7000 families. This means further commitment to expanding the company's communications capabilities which include: downplaying their once-promoted alternative to SNA (known as DCA or Distributed Communications Architecture), and committing to seeing their non-mainframe products work using the offerings of other hardware (NCR,

Arete, Computer Consoles Inc. and Mitsubishi) and software developers (Audratron Systems, DBSI Information System Inc. and Oracle Corporation).

Sperry is wagering their future on the fact that more applications will become available for their UNIX-based minicomputers. The company views three areas as a justification for UNIX: first, IBM's move to offer UNIX on their 370 mainframe line; second, the commitment of AT&T Information Systems to UNIX-based products; and last, to protect their own installed base of government customers. Since UNIX generally means portability, federal bids now specify that UNIX be offered as an option.

The question, however, is not really one of portability, but will UNIX suppport actually provide a long-term solution for Sperry (and Burroughs)? If the UNIX products are kept separate and distinct from Sperry's 1100 series mainframe, then two lines of development must be supported. And second, if the UNIX line proves more successful than the 1100 series, then Sperry would be forced to focus their energies toward UNIX at the expense of their traditional products. This would result in users with Sperry's proprietary products being placed in a dead-end situation. At this point the end user would most likely switch to another vendor's product line.

According to the Gartner Group, "The ability of a BUNCH supplier to retain existing customers and garner new business would be based on its ability to provide a significantly better UNIX engine." In Sperry's case this has not been accomplished because they are not offering unique technological solutions (i.e., hardware and software). Consequently, Sperry has not provided any significant reason for customers to stay with them.

"Historically, Sperry has done a good job in its selected market segments," says Michael Geran, analyst at E.F. Hutton. "Whether it can regain its past eminence is a very debatable question." Some industry observers believe that Sperry's initial foray into personal computers (one year ago), along with what Kroger calls the "second PC-oriented project, the 5000 and 7000 UNIX-based families" was too late arriving into the 'sub-mainframe' marketplace. Analysts believe this lateness is still characterized by the nature of Sperry's conservative mainframe thinking.

Selling Strategy

Since Sperry is not assuming they can displace IBM from the corporate data processing center, they are assuming they can find customers who need their systems and applications. Sperry is concentrating on the niche markets, in which they have traditionally done well.

Such application marketing segments include manufacturing and distribution, the airlines, transportation companies, the federal government, public and private schools, and the regional Bell operating companies.

Sperry is trying to maintain their existing market share of 18,000 users by enhancing the 1100 mainframe line. Joseph Kroger told their largest user group that "by 1990 Sperry will have significantly upgraded the 1100/90 system." Kroeger also promised that in four years Sperry will have a new entry-level system delivered, will have installed the follow-on to the 1100/70, and will be ready to announce a new powerful high end to the 1100/90, code-named 'Mercury.'

However, even the yet-to-be-announced high end of the 1100 product line -- Mercury -- will be developed by an OEM. Sperry is now turning to Hitachi for technology assistance. Through Hitachi, Sperry can significantly enhance memory and logic capability and increase performance while reducing development costs. The M680, Hitachi's most powerful general-purpose system, has three times the power of the 1100/91 (7.5 MIPS).

While Sperry's main strength is their 1100 series user base, their main weakness is their application software. Users Sperry may find the most difficult to keep are those planning to acquire applications rather than develop them. In these accounts Digital has an inherent advantage because of the wealth of applications (i.e., layered products) that run on the systems.

Studies show that on the average, there is a two to three-year backlog of applications which need to be developed in a company that is relying on their own MIS staff. The two to three-year backlog only takes into account the amount of time needed to begin working on an existing development project -- not the development time itself.

Sperry has always counted on the fact that users of their larger computer systems have a greater tendency to internally develop their applications. Therefore, they try to concentrate on targeting customers who develop their own unique applications where third-party applications are generally non-existent. One example of this is large federal government agencies such as the IRS, which has unique application requirements and must undertake years of customized development efforts.

Sperry's Systems Integration Group (one of Burroughs main reasons for buying Sperry) is composed of hardware and software specialists responsible for working with customers who need to build unique applications from ground zero. Burroughs lacks this type of expertise. In addition to customers with unique application requirements, Sperry concentrates on selling software development tools like Mapper, a Fourth Generation Programming Language.

BURROUGHS CORPORATE STRATEGY; BLUMENTHAL BATTLES TO MAKE BURROUGHS NUMBER 2

At Burroughs corporate headquarters in Detroit, BUNCH is a dirty word. Burroughs does not consider themselves in the same league as NCR, CDC, Honeywell, and up until a few months ago, even Sperry. The other BUNCH companies historically have derived significant portions of their business from non-computer sales, while Burroughs claims to make 90% of its $5 billion in revenue from sales of mainframes, workstations and their Memorex division's disk drives.

According to Fred Meier, vice president of Corporate Program Management, who last summer was put in charge of a reorganization that merged Burroughs' workstation and mainframe lines, "I'd have to say that if we are in the BUNCH, we're the leader." Meier views Burroughs as a head-to-head competitor with IBM, Digital, Hewlett Packard, NCR, CDC and Honeywell. And in Burroughs parlance, "the co-existence arena" is the term Burroughs calls competing with IBM and other vendors while attempting to hold onto their user base of 40,000.

When W. Michael Blumenthal left the Carter Administration to head up the Detroit-based Burroughs, his primary goal was to "be the most serious alternative to IBM...we've been quiet for too long." Despite his tough talk and efforts over the past six years, which culminated with the purchase of Sperry, Burroughs' chances of regaining their past status is far from assured. The company still has some weak spots in their product line (mainly networking) and the new management team is far from settled.

Since the former treasury secretary began his tenure at Burroughs, the company has been focusing on six specific markets: finance, manufacturing, government, health care, education and hotels. Arthur D. Little Inc. credits Blumenthal with making some progress in correcting the trouble he inherited: namely streamlining product planning and development, closing money-losing plants, tightening financial controls and emphasizing manufacturing quality.

Industry observers wonder whether Burroughs will be able to make strong inroads and go beyond their large base of 40,000 customers. Burroughs is firmly entrenched in the banking market due its financial software. Although the factor of migration by Burroughs customers to IBM in the banking area is less than in other markets, other types of users have migrated to IBM recently. For example, such large user organizations as American Hospital Supply and the Federal Immigration and Naturalization Service have left Burroughs.

Marketing and Product Strategies

When Blumenthal arrived at Burroughs, the company had five separate incompatible mainframe lines and poor financial earnings. Before Blumenthal came on board, Burroughs had to face the Sisyphean task of maintaining separate, incompatible computer families -- among them the B1900, 3900, 4900 and 7900. (A recent example of the costly result of maintaining separate incompatible architectures is Burroughs dropping support for the operating system on the older B1900 family; customers are now facing a conversion to the A Series.)

To Blumenthal's credit however, his main contribution to Burroughs has been the development of the A series of mainframes -- a single upwardly compatible line. The A series, designed as 48-bit systems, allow customers an upward migration growth path using the same applications software and peripherals up to the 28 MIP A15.

With the A series mainframe, Blumenthal's plan is to maintain their existing customers by adding larger and more powerful mainframes and attract new customers by selling specific vertical-market applications (e.g., banking, hospitals, wholesaling and manufacturing).

Although Burroughs has an expertise in transaction processing, with a network that allows 1,200 banks in 42 countries to conduct business, Burroughs Network Architecture is still playing catch up to Digital.

In a recent major setback (as recently as February 1986) Burroughs closed their Boulder Colorado facility, dismissing 140 networking engineers who had been working on a plan to offer a single solution for distributed data processing. The solution would have featured high-speed LANs on fiber-optic cable, a brand-new architecture, and an operating system that sped voice,

images and data to remote workstations. The problem was the new system was only compatible with Burroughs operating systems.

The plan relied too heavily on proprietary Burroughs designs while ignoring industry standards. A design effort that began in 1983 was disbanded. According to Burroughs spokesman Roy Beers, director of Burroughs Advanced Research Group, "we found the advanced development efforts in Boulder in competition with each other for several segments of the DP market place in which Burroughs is a key player." The company claims the work will go on, although it will be redirected.

Redirected or not, Burroughs users have been looking for greater links between Burroughs Networking Architecture and SNA compatibility in general. Burroughs users have been waiting for the ability to send files from Burroughs to IBM using the LU 6.2 protocol.

In response, Burroughs recently announced (August) a connection to DISOSS through a personal computer emulator for its low-end systems -- the B25 microcomputers (16-bit PC) and XE 520 shared-resource processor (the XE 520 acts as a disk, tape and print server for connected B25 micros). Users of Burroughs B25 workstations and XE 520 shared-resource processor will be able to utilize IBM's LU 6.2 and PU 2.0 to exchange files and electronic mail with IBM computers running DISOSS under SNA. Burroughs positions the B25s with an XE 520 shared-resource processor as an entry-level departmental processor. Both systems are repackaged Convergent Technologies computers.

John McCarthy, analyst at Forrester Research, Cambridge, MA, called the Burroughs communications links less than spectacular. "A customer who has Burroughs equipment isn't probably a sophisticated IBM user. Burroughs just wants to make sure they have it in order to get new accounts. They are trying to play catch up to Digital, Data General and Wang."

While Burroughs has never been a plug-compatible manufacturer, they are now working on developing additional gateways and including de facto industry standard gateways in their product lines. This new coexistence policy may not generate many new mainframe accounts, but may play a key part in helping Burroughs retain their existing customer base.

For now, Burroughs' problem lies less with product development than it does with product/market penetration. The main question about Burroughs future centers on whether it will be able to make inroads into new accounts, as well as maintain growth within their existing accounts.

Industry observers doubt that successful inroads can be made into IBM accounts through offering just the B25 microcomputer in combination with the XE 520 shared processor. Burroughs is hoping it can, and that their entry-level departmental processor will eventually translate into new Burroughs mainframe accounts.

WHAT GOES INTO SPERROUGHS

	Sperry	Burroughs
Revenues	$5.7 billion	$5 billion
Pretax earnings	$398 million	$360 million
Employees	77,700	60,500

Revenues by category	Sperry	Burroughs
Computers and Information Sytems	46%	56%*
Defense	41%	9%
Equipment Service	13%	23%
Computer Tapes, Business Forms and Supplies		12%

*Business Week estimate
Sperry figures are for year ended March 31, 1986.
Burroughs figures are for calendar year 1985.

PRODUCT LINE: BURROUGHS

(Burroughs systems include CPU and memory only)

Model	Performance	Price
A15 Model F	17.1 MIPS	$2,920,000 24MB Memory
A15 Model I Dual Processor	32.4 MIPS	$4,530,000 24MB Memory
A15 Model L Dual Processor and Single Processor	46.2 MIPS	$6,790,000 36MB Memory
A15 Model N Two Dual Processors	59.5 MIPS	$8,435,000 36MB Memory
A12	8 MIPS	$1,400,000 24MB Memory

Model	Performance	Price
A10 Model H Dual Processor	4.5 MIPS	$962,000 24MB Memory
A10 Model F	2.5 MIPS	$580,000 12MB Memory
A10 Model D	1.7 MIPS	$410,000 12MB Memory
A9 Model F	1.8 MIPS	$491,120 6MB Memory
A9 Model D	1.5 MIPS	$368,815 6MB Memory
A5	1.6 MIPS	$224,000 6MB Memory
A3 Model K Dual Processor	.93 MIPS	$200,000 6MB Memory
A3 Model F	.65 MIPS	$120,500 3MB Memory
A3 Model E	.65 MIPS	$120,500 3MB Memory
A3 Model D	.65 MIPS	$95,500 3MB Memory
V380	1.6 MIPS	$702,600 10MB Memory
V340	1 MIPS	$390,400 10MB Memory
B25 microcomputer with 256KB		$1,995
XE 520 Shared Resource Processor 512KB memory, 5 meg removable disk drive		$40,100
XE 550 one-half MB memory, 5MB cartridge disk, 37.5 fixed disk		$43,300

PRODUCT LINE: SPERRY

(Sperry systems include CPU and memory only)

Model	Performance	Price
1100/94	25 MIPS	$6,447,041 32MB Memory
1100/93	20 MIPS	$4,818,631 16MB Memory
1100/92	13.3 MIPS	$3,620,221 16MB Memory
1100/92SV	10.2 MIPS	$2,896,972 8MB Memory
1100/91	7.5 MIPS	$2,435,811 8MB Memory
1100/91SV	5.5 MIPS	$2,005,962 8MB Memory

1100/70
Nineteen packaged versions ranging from .4 to 2.9 MIPS
Prices range from $188,000 to $840,040 for CPU

Sperry UNIX-based Processors

Model	Performance	Price
Series 7000/40	7.7 MIPS	$180,000 4MB Memory
Series 5000/90*		$75,575 16MB Memory, 45MB Tape
Series 5000/80*		$76,275 8MB Memory, 45MB Tape
Series 5000/60*		$63,775 4MB Memory, 45MB Tape
Series 5000/50*		$16,830 4MB Memory, 45MB Tape
Series 5000/40*		$17,455 2MB Memory, 45MB Tape

*Please note: Sperry does not make performance ratings available for the 5000 Series. Depending on the type of configuration, the 5000 Series can be compared with the MicroVAX or VAX 8200.

For both Burroughs and Sperry systems, performance is going to depend on the type of system configuration and application software the customer runs. The MIPS number is not constant through every benchmark.

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CONCLUSION: BURROUGHS AND SPERRY SEARCH FOR A FIT

According to Business Week, during lulls in the battle to take over Sperry Corporation, Blumenthal, a biography enthusiast, got solace and mental relaxation from reading the biography of Winston Churchill (whose speeches centered on 'keeping calm in the eye of the storm.') After the takeover, Blumenthal began reading the biography of Joseph Stalin -- but he insists "there is no conclusion to be drawn from that"[1] as he tackles his next challenge of merging Burroughs' corporate culture and products with that of Sperry.

Although many computer industry watchers predict more mergers to follow the Burroughs-Sperry team-up, past trends indicate that big computer company mergers do not work. In the 1970s Sperry bought RCA Corporation's computer business and Honeywell acquired General Electric Company's computer division. The computer lines were incompatible, corporate cultures conflicted and in both cases the mergers failed.

Blumenthal appears to be unconcerned with past history, claiming his merger plan is different. The new unnamed company will support both Burroughs and Sperry product lines, instead of merging them the way the other companies tried to do. Blumenthal also wants to trim research, sales and production costs -- the so-called economy of scale factors.

Outside of Sperry's defense and aerospace electronics business, the two companies offer a range of comparable systems. At the high end, Burroughs' A series is roughly comparable to Sperry's 1100/90 in performance. In the mid-range, Burroughs' V series (architecturally incompatible with their A series) competes against Sperry's Series 5000 and 7000. At the low end, both companies have an IBM-compatible microcomputer.

The main difference between the companies' two product lines are their fundamentally incompatible operating systems in the mid and high-end systems. (Sperry uses OS and Burroughs uses MCP operating systems.)

One unlikely product strategy would be to integrate the Burroughs MCP operating system with the Sperry operating system; the differences in the architectures are too great. Burroughs' A series is based on 48-bit architecture and Sperry's 1100 series is based on 36-bit architecture; MCP is COBOL based, while OS is assembler based.

In the short term, another alternative would be to migrate users to UNIX. This is the only likely point for product convergence, allowing Burroughs users to adapt programs for use on Sperry's UNIX computers or vice versa. The planned addition of Burroughs' Linc product (Linc is a real-time applications generator that maps a Burroughs program, for example, onto a UNIX program structure) to the UNIX-based XE 550 could allow Sperry users to adapt the UNIX system if they want Sperry computers to communicate with Burroughs machines.

Burroughs managers say that the XE 550 (a Convergent Technonolgies system), as well as other (unspecified) products, could be made to support both companies. Another possibility would be to have the high-end A15 support Sperry's UNIX programs. However, this would require Burroughs to begin a new UNIX development effort. But the question remains, how many customers are interested in trying such links?

At a recent Sperry user group meeting, Sperry executives suggested that Sperry's Mapper relational database query system could be ported to Burroughs' mainframe products, but no target date was given. More interesting to Sperry users might be the ability to buy disk products from Memorex Corporation, a wholly owned subsidiary of Burroughs.

A longer-term alternative would be to develop a strategy to migrate Burroughs and Sperry users to a single line of yet to be developed high-end systems. The difficulties of developing a single product line are couched in Burroughs' statements that the two companies' mainframe lines will continue to evolve independently. And the announcement statement by Burroughs was viewed as an attempt to appease Sperry users.

Customer Reaction

The merger of Burroughs and Sperry envisioned by Blumenthal as creating a stronger IBM competitor may leave the new corporation vulnerable to customer defection. The biggest challenge that awaits the merged companies is for them to retain their respective installed bases.

Martin Litzky, president of the largest Sperry users group, called USE, expressed his organization's concern to Blumenthal about the how the merger will help Sperry users. Sperry user groups were not the only ones concerned with the merger.

Jim Bishop, a vice president of administration for Harris Corporation, which uses Sperry mainframes, stated in InformationWeek, "Sperry users have nothing to gain by it. I don't see the acquisition as much of a help at all. I think the merger makes sense for Blumenthal, but not for Sperry users."[2]

Phil Hunter, a manager of systems software at Harris, explains "The merger is like Ford and General Motors getting together and trying to share parts. Probably worse mergers have taken place, but I can't think of any. I question what the new company has to offer. If it doesn't offer something better than IBM, we will go IBM."[3]

Elaine Massa, technical service manager at Connecticut Natural Gas Corporation in Hartford, Connecticut, expressed a similar view in a letter to both Sperry and Burroughs management before the merger agreement was announced. Her letter was written on behalf of 17 New England-based Sperry users, the letter warned that the "potential for erosion of the Sperry user base will increase dramatically."[4]

According to senior analyst John McManus at Thomson McKinnon Securities Inc. of New York, "In effect, IBM could be a big winner if Burroughs does not appease its users."[5]

The merger, in which the two companies expect to set up combined management teams within the next month, was advocated by Burroughs Chairman W. Michael Blumenthal as an opportunity to more effectively challenge IBM. The following represents Burroughs positioning for the largest merger in the computer industry.

"The marketplace for information sytems has been a quasi-monopoly," Burroughs Corporation officials stated in the May 5 merger proposal. "The merger will create a stronger alternative to this dominant vendor (i.e., IBM)....The new company will bring competition, diversity and freedom of choice to the marketplace."

According to John Rutledge, vice president of Dillon, Read Inc., an investment banking and brokerage firm in New York, Blumenthal's view has been, "It's difficult to compete with IBM if you are a $5 billion dollar corporation, and not so difficult if you're a $10 billion corporation. But, we don't buy that view."[6]

Neither does William Easterbrook, a partner with Kidder, Peabody in San Francisco. Easterbrook believes that IBM will not feel much of an impact from the new corporation. "They will compete the same as they did individually,"[7] he said.

John Rutledge goes on to say that most businesses that need computers already have them and have established relationships with manufacturers. "It's unusual for them to change vendors. There is a gradual preference by users for products from the larger computer corporations -- IBM and Digital ....if they do change, they want to go with a winner."[8]

And one of the few things that will motivate a customer to change is the fear factor of survival. It is the uncertainty over whether their current supplier will be around in the future. The result of the merger may very well drive customers to Digital and IBM.

Industry analysts state that IBM's main competitors in the large systems area (Burroughs, Sperry, NCR and Honeywell) have held onto their customers by locking them into incompatible software. According to Rutledge, Burroughs and Sperry could have maintained that formula for profitability for many years.

The main problem for Burroughs is to keep Sperry customers committed, with a steady new product flow and good product support, without adding to the uncertainty among users and employees.

The difficulties that may arise as the two companies try to merge in the wake of a less than friendly takeover are numerous. A lot of confusion, including personality conflicts (among upper management) and department infighting may result due to Burroughs indicating it will selectively divest itself of unspecified "ancillary businesses" -- that will reduce the acquisition debt. Estimates of as much as $1.5 billion are being bandied about by Burroughs top management.[9]

Through much of July, Blumenthal and Probst were touring Sperry facilities and meeting with Sperry users trying to allay fears concerning the merger. And currently, only time will reveal answers to such questions as: What products/departments get consolidated? How much integration will or can occur, as long as Burroughs plans to maintain incompatible architectures? How long will that promise be kept, given the fact that Blumenthal does not speak for his successors? How much money will really be saved without merging the products? And will the merger continue to raise the level of customer concerns or mitigate the new and pending 'economies of scale'?

B I B L I O G R A P H Y

[1]Business Week, June 23, 1986

[2]InformationWeek, June 2, 1986

[3]IBID

[4]IBID

[5]PC Week, June 3, 1986, p. 143

[6]IBID

[7]IBID, p. 147

[8]IBID, p. 147

[9]Electronic News, June 2, 1986, p. 4

Special note of thanks to the staff of the Marlboro Market Research Center, without whose efforts this paper would not have been possible. Thanks to Beth Geer, Rene Davis, Priscilla Duffy and Priscilla Littlefield.

COMPUTER-AIDED SOFTWARE ENGINEERING SOLUTION COMPETITIVE POSITIONING

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MR03-1/Q17

Computer-Aided Software Engineering (CASE) Tools have emerged to support software development projects across the entire software engineering life cycle. CASE tools enable engineers to develop software systems that are more complex and can be produced within more competitive time and cost factors.

Digital's leadership in CASE is built on our ability to provide high-quality software development tools, coupled with our full range of powerful VAX computers. The VAX family supports two of the most popular operating environments for software development -- namely, VMS and ULTRIX. Consequently, VAX currently represents one of the leading systems of choice among software engineers.

With the advent of the low-cost VAXstation II/RC workstation, Digital provides support for front-end, graphical CASE tools in distributed environments comprised of workstations as well as team computing resources.

The activities occurring in each phase of the software engineering life cycle parallel the steps found in most design disciplines: analysis and design, implementation and test, and support.

KEY CUSTOMER MESSAGE

Digital's approach provides support across the entire software engineering life cycle.

DIGITAL'S SOLUTIONS FOR THE ANALYSIS AND DESIGN PHASE

Digital, along with our CMP and other third-party suppliers, provides a variety of graphically oriented tools for requirements analysis, preliminary design and detail design. These front-end tools assist in data flow diagramming for structured analysis, structured design, data modeling and real-time system modeling. One Digital front-end design tool -- the VAX COBOL Generator -- is used to derive correct COBOL code from an interactively created graphical representation.

Digital competes with both Apollo Computer and Sun Microsystems in supplying solutions for the front end of the software engineering life cycle. Both have similar graphical analysis tool offerings. Digital's strategy for competing with these vendors is to offer a super-set of superior tools. The following table outlines these tools.

Table 1 lists the leading graphical CASE tools, along with when and on what Digital, Apollo and Sun platform those packages run. For example, the Design Aid package from Nastec is deliverable for the Digital VAXstation family in October 1986 but not available for either Apollo's or Sun's workstation.

TABLE 1

GRAPHICAL ANALYSIS & DESIGN TOOLS
DIGITAL VS. APOLLO AND SUN

	Digital		Apollo	Sun
Package/Supplier	VMS	ULTRIX		
DESIGN AID/NASTEC CORP. - Structured Analysis - Structured Design - Data Modeling	10/86	1987	NO	NO
SA TOOLS/TEKTRONIX-CASE DIV. - Stuctured Analysis	10/86	10/86	10/86	NO
SD TOOLS/TEKTRONIX-CASE DIV. - Structured Design	10/86	10/86	1/87	NO
SOFTWARE THRU PICTURES/ INTERACTIVE DEVELOPMENT ENVIRONMENTS - Structured Analysis - Structured Design - Real-Time Support - Data Modeling	11/86	NOW	10/86	NOW
TEAMWORK/CADRE TECHNOLOGIES, INC. - Structured Analysis - Structured Design - Real-Time Support	11/86	?	NOW	NOW
EXCELERATOR/INDEX TECHNOLOGY - Structured Analysis - Structured Design - Real-Time Support - Data Modeling	11/86	NO	NO	NO
PROMOD/PROMOD, INC.*	NOW	NO	NO	NO
	7 PKGS	3 PKGS	4 PKGS	2 PKGS

*NOTE: All packages, except Promod, run on VAXstation II/RC, VAXstation II and VAXstation II/GPX, in native graphics mode. Promod runs on VAX computers with either Tektronix or VT24X terminals.

FOR INTERNAL USE ONLY

The chart indicates that by November 1986, Digital will have a super-set of leading graphical CASE tools available for our workstations versus both Apollo and Sun.

The benefits to customers are clear. With Digital's VAXstations, customers have the broadest choice of the leading CASE solutions. This enables them to pick the best solution for their particular requirements. Therefore, with Digital's VAXstation family, they have the safest and most flexible solution.

DIGITAL'S SOLUTIONS FOR IMPLEMENTATION AND TEST PHASES -- The Multi-lingual World of VAX Systems

Digital and our CMP and third-party suppliers also provide tools for the implementation and test phases of the software engineering life cycle. These tools are most commonly associated with programming.

Digital has a broader range of high-level language compilers than any of our competitors. Presently, Digital offers sixteen compilers which we develop, sell and support directly. The majority of these compilers take advantage of Digital's Common Language Environment, in which various program modules can be written in several different languages and then combined into one routine. This results in one set of programming tools which can be used for all supported languages, meaning that once programmers know how to use the Language-Sensitive Editor for one language, such as Pascal, they automatically know how to use it for another language, such as FORTRAN or C. This limits the need to relearn a different tool when a different language is used.

Apollo and Sun do not have as broad a range of high-level language compilers. Apollo currently develops, sells and supports only four compilers. They are FORTRAN, C, LISP and Pascal. The rest of their offerings all come from third parties. Sun also offers only four compilers which they develop, sell and directly support. Any additional language need is met from third-party offerings. In both the case of Apollo and Sun, third-party offerings may not necessarily be consistent with the semantics of their own languages or use the same tools that Apollo and Sun offer.

Table 2 shows this comparison. It lists the entire complement of compilers offered by Digital and then compares that offering to Apollo and Sun.

TABLE 2

HIGH-LEVEL LANGUAGES

Language	Digital	Apollo	Sun
FORTRAN	YES	YES	YES
C	YES	YES	YES
PASCAL	YES	YES	YES
COBOL	YES	NO	NO
ADA	YES	NO	NO
BASIC	YES	NO	NO
PL/I	YES	NO	NO
LISP	YES	YES	YES
RPG	YES	NO	NO
DIBOL	YES	NO	NO
BLISS	YES	NO	NO
OPS5	YES	NO	NO
CORAL 66	YES	NO	NO
APL	YES	NO	NO
VAXELN ADA	YES	NO	NO
SCAN	YES	NO	NO

DIGITAL'S SOLUTION FOR IMPLEMENTATION AND TEST PHASES -- VAXset - An Integrated Programming Environment

In addition to the widely used VAX compilers and VAX debugger, Digital also offers a variety of tools for enhancing programmer productivity. These tools include:

- o VAX Language-Sensitive Editor -- A multi-language, multi-window, screen-oriented editor that provides users with language-specific information and structures.

- VAX Performance and Coverage Analyzer -- A tool to help users analyze and optimize the performance behavior of their programs.

- VAX/DEC Test Manager -- An automated regression testing system that executes user-defined tests on complete software systems.

- VAX DEC/CMS -- A system that manages software files during development by storing the files in a project library, tracking changes and monitoring access to the library.

- VAX DEC/MMS -- A tool that manages system building during day-to-day development, implementation and maintenance of a software system.

These five tools make up an integrated programming environment called VAXset. They lead the industry from both the standpoint of the individual functionality they each provide and work together in an INTEGRATED fashion. For instance, if an error is uncovered in the VAX Debugger, the programmer can directly invoke the Language Sensitive Editor. The Language-Sensitive Editor will then position the cursor at the same point in the source code where the programmer discovered the error, allowing the programmer to make the changes immediately to correct the mistake.

In addition to the five components that make up the VAXset integrated programming environment, there are several other programmer productivity tools available from Digital. They include:

- VAX DEC/Shell -- A package that provides a UNIX command language interface to the VMS operating system and many UNIX utilities.

- VAX Notes -- An electronic conferencing system that provides an environment for improving the team communication process.

Table 3 compares programmer productivity tools from Digital, Apollo and Sun. Digital has an offering in every functional area, whereas Apollo and Sun have several areas in which they currently do not offer similar capabilities. This clearly is a competitive advantage for Digital and also a very strong customer benefit. The wider range of programmer productivity tools can be translated into higher productivity.

TABLE 3

PROGRAMMER PRODUCTIVITY TOOLS

Function	Digital	Apollo	Sun
LANGUAGE-SENSITIVE EDITOR	*LANUGAGE-SENSITIVE EDITOR	NO	NO
PERFORMANCE ANALYZER	*PERFORMANCE & COVERAGE ANALYZER	DOMAIN/PAK	NO
REGRESSION TEST SYSTEM	*DEC/TEST MANAGER	NO	NO
CODE MANAGEMENT SYSTEM	*DEC/CMS	DOMAIN/DSEE	SCCS
SYSTEM BUILDER	*DEC/MMS	DOMAIN/DSEE	MAKE
SYSTEM BROWSER/CODE NAVIGATION TOOL	*SOURCE CODE ANALYZER (Q2)	NO	NO
UNIX SHELL	DEC/SHELL	DOMAIN/IX	NATIVE UNIX
CONFERENCING TOOL	VAX NOTES	NO	NO

*INTEGRATED FUNCTION

DIGITAL'S SOLUTION FOR IMPLEMENTATION TEST PHASES -- Leadership Extended

Digital will be advancing our leadership with the VAXset integrated programming environment by adding capabilities and enhancements.

The new VAX Source Code Analyzer (SCA) allows a programmer to navigate and examine an entire software system at the source-code level, versus just at the source-code FILE level, as with an editor. This navigation action is based on queries by the programmer to "see" various structures.

One major use of SCA is to ensure system-wide consistency when making a programming change, such as when an argument is added to a subroutine. When an argument is added to a subroutine, every call for that routine in the entire software system must be modified with the new argument. To miss even one calling statement creates a "bug."

Using SCA from LSE (easy since SCA is integrated with LSE), the programmer asks SCA to list everywhere the subroutine is referenced. From these, every calling statement can be found, brought up on the screen and modified. This capability is unique!

Another enhancement is the integration of DEC/CMS with LSE. This will allow programmers to work with CMS-managed files directly from the Editor. This also extends Digital's leadership in tool integration.

DIGITAL'S ADA SOLUTION -- Unique

Digital has the most respected ADA offering in the industry. It is respected for its compile speed, efficiency of compiled code and use of/ integration with VAXset.

APOLLO AND SUN DO NOT HAVE THEIR OWN ADA COMPILER. Both rely on third-party products that have different semantics from their own compilers and do not integrate with their respective programmer productivity tools. Apollo and Sun customers have to learn two programming environments. Digital customers can use the same integrated environment.

For ADA code that is targeted to run on 1750A or 68000 microprocessors, Digital has an agreement with System Designers (SD) to cooperatively market SD's ADA cross compilers. Furthermore, Digital and SD are co-developing ADA cross compilers that will be semantically identical to VAX ADA and use Digital's programmer productivity tools.

This will be unique. Only Digital will provide an environment that uses the same ADA and productivity tools, regardless of whether the final code will run on a VAX, VAXELN, or is embedded in a 1750A or 68000-based system. Reference Sales Update Vol. 17 No. 23 dated May 19, 1986.

DIGITAL'S SOLUTIONS FOR IMPLEMENTATION AND TEST -- A Natural for Microprocessor Software Development

Digital, via CMP, SCMP and third-party suppliers, offers the industry's broadest choice of Microprocessor Software Development (MSD) tools. These enable customers to utilize the productivity features of VAX systems and workstations to develop code that will execute on industry-standard microprocessors such as Intel and Motorola products.

The type of tools that CMP, SCMP and third-party suppliers sell include:

- Cross Compilers
- Cross Assemblers
- Cross Debuggers
- Hardware/Software Integration Equipment

Table 4 lists the major suppliers of MSD tools and compares the breadth of solutions for Digital versus Apollo and Sun.

TABLE 4

MICROPROCESSOR SOFTWARE DEVELOPMENT SOLUTIONS

	Digital		Apollo	Sun
Supplier	VMS	ULTRIX		
Boston Systems Office	Yes	Yes	No	No
Tektronix-CASE Div.	Yes	Yes	No	No
Intel	Yes	No	No	No
Intermetrics, Inc.	Yes	Yes	Yes	Yes
Microtec Research	Yes	Yes	Yes	Yes
Oasys, Inc.	Yes	Yes	Yes	Yes
Software Development Systems	No	Yes	Yes	Yes
Systems & Software	Yes	Yes	No	Yes
Unipress Software	No	Yes	Yes	Yes
Enertec	Yes	No	No	No
Virtual Systems	Yes	Yes	No	No
First Systems	Yes	Yes	No	No
Language Resources	Yes	No	No	No
Nuvatec, Inc.	No	Yes	No	No
WINTEK Corp.	No	Yes	No	No
2500AD Software, Inc.	Yes	Yes	No	No
Hunter-Ready	Yes	No	No	No
	13	13	5	6

This table illustrates that, by far, there are more choices of VAX-based MSD solutions than Apollo and Sun combined. This provides customers with the ability to choose the best solution for their needs.

SUPPORT AND MAINTENANCE PHASE

For this phase, Digital offers its WPS-PLUS family of document processing tools which run on the VAX, MicroVAX and VAXstation computers, as well as on Digital's VAXmate Professional 300 series, Rainbow and other industry-standard personal computers. Other Digital products, such as DECpage and our line of laser printers, enable users to create and print compound documents.

The ability to support the same document tool across a broad range of compute styles is unique to Digital. This means your customer can have the right platform on each team member's desk, yet all can use a consistent documentation tool on the same documents.

The integrated nature of Digital's tools play a key role in supporting various maintenance functions. Because the VAXset tools work closely together, they provide an excellent environment in which to correct, change and improve software. NEITHER Apollo nor Sun have this same integrated programming environment.

VAXstation -- The Ideal Environment To Extend And Distribute Software Development Environments

Most of your customers already have substantial investments in VAX-based software development environments. This investment includes tools, programs, data, operational procedures, personnel and programmer knowledge on how to use the system.

Now these customers want to extend and distribute this environment by giving each programmer local compute power and a multi-window environment to run sophisticated CASE tools.

Apollo and Sun can sell workstations that run CASE tools, but they cannot sell your customer workstations that have:

- The Same Operating System
- The Same CASE Tools
- The Same Operating Procedures
- The Same Data

as their present VAX system investment. Remember! An Apollo Domain ring of workstations, running Cadre's Teamwork CASE package, hooked to a VAX system via an Ethernet bridge is NOT an integrated environment! It is a distributed environment to run Cadre's package and a very expensive terminal emulator to the VAX system. It hosts three user interfaces (Cadre's is different from Apollo's), two different operating systems, different development tools (different editors, different compilers, etc.) and different network commands -- not integrated.

MEETING THE CHALLENGE OF ALLIANT

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MR02-4/E33

This is the second in a series of articles that examine the minisupercomputer vendors. This document will address the challenge posed by Alliant and their FX/Series systems.

The first article appeared in Competitive Update Vol. 6 No. 4 dated October 13, 1986, and focused on Convex Computer, Inc. There are major differences between the products offered by these two companies. However, since there are also many similarities between these firms with respect to their size, age, and the market appeal and perceptions of their products, many of the statements made in the previous article on Convex will also be applicable to Alliant. To avoid repetition, you will be referred to the Convex article when appropriate.

ALLIANT COMPUTER SYSTEMS CORPORATION

Company Overview

Alliant Computer Systems Corporation, headquartered in Acton, Massachusetts, was incorporated in 1982 and shipped their first production systems in late 1985. To date they have shipped about 32 systems.

Entry-level, end-user systems start at about $100,000 for the FX/1 (bounded, single compute engine system). They claim to offer OEM discounts as high as 41%. Two-thirds of the systems they have sold, however, are their high-end FX/8 at an average system price of about $750,000. Their primary marketing thrust is to sell to end users; however, they are aggressively pursuing OEM partners (Apollo, for example). To date, their marketing efforts have also been confined, geographically, to North America. As is the case with many of these new "hot-box" vendors, they view Digital as their main competition.

Their stated target market is the general scientific/engineering arena with applications in geophysical processing, signal processing, circuit simulations, academic research, etc.

Product Overview

Alliant offers two system configurations: the low-end FX/1, featuring vector processing (no parallel processing) and the expandable, high-end FX/8 system, featuring integrated vector and parallel processing, with up to 8 Computational Elements.

Both systems consist of identical modules. Their basic difference lies in the manner in which these components are connected and, consequently, how each configuration can be expanded.

Both systems employ a 32-bit architecture featuring integrated scalar and vector processing. Alliant's uniqueness stems mainly from the fact that

their systems offer multiple processors for interactive applications (1-2 for the FX/1, 1-12 for the FX/8) and a separate processor(s) for computationally intensive tasks (1 for the FX/1, 1-8 for the FX/8). Though each task on either an FX/1 or FX/8 employs at most one Interactive Processor, on the FX/8 a single process may employ up to 8 Computational Elements working cooperatively to potentially speed execution. (The potential success of this approach is highly application and workstream dependent.)

The operating system on the Alliant systems is called Concentrix, and is a non-standard variant of Berkeley UNIX 4.2. Their only high-level language that takes full advantage of the system's power is an optimizing, vectorizing, auto-decomposing FORTRAN compiler called FX/FORTRAN. Their FORTRAN is also claimed to be VAX FORTRAN compatible since it supports many of the VAX FORTRAN extensions to FORTRAN-77 that are not dependent on the VAX architecture. In addition, it supports array extensions patterned after the proposed FORTRAN-8x standard. They do offer Pascal and C, but these languages do not produce code which take advantage of the vector or parallel processing features of the FX/Series systems.

For more particulars on their hardware/software, please refer to p. 13 of the Competitive Update Special Issue dated February 18, 1986, or call the Competitive Hotline at DTN 251-1888 or (617) 264-1888.

For communications, they support TCP/IP, UUCP for file transfers and remote execution of UNIX commands, and are working with Sun Microsystems, Inc. to provide support for Sun's Network File System (NFS).

Their advertised performance for the Computational Element (CE) is 4.45 MIPS scalar and 11.8 MFLOPS for pure vector applications. These numbers are for 32-bit operations. For comparison with vendors supporting a 64-bit architecture, such as Convex, these numbers for 64-bit operations on a single Alliant CE are 3.63 MIPS and 5.9 MFLOPS.

Putting these numbers into some perspective, one regularly refers to the LINPACK results, a common scientific benchmark. These results show the FX/1 delivering 1.3 MFLOPS and the FX/8 2.5 MFLOPS (with 8 CEs) at full precision (64 bits) for that application. However, by applying a simple compiler directive to the standard program which allows access to the parallel processing capabilities of the system, the FX/8 with 8 CEs demonstrated 6.2 MFLOPS.

Alliant also has a number of commercial third-party software packages available for special applications. Among these are ANSYS and ABAQUS for Finite Element Analysis, and PowerSPICE and HSPICE for Circuit Simulation.

Alliant Strengths (Compared to Digital)

Alliant's FX/1 will be a very tough competitor when the target customer has a highly vectorizable application and can afford a "dedicated" compute engine. Alliant markets the FX/1 for applications requiring good performance (as measured in MFLOPS), but at a relatively low price (11 MFLOPS at $100,000-$200,000); however, the performance of this system is well bounded.

In addition, Alliant also offers the FX/8, their flagship product, which can also deliver increased speed for individual applications which exhibit parallelisms in their coded logic. By that we mean if a user knows their application contains major "looping structures," such as DO loops in

FORTRAN, which follow certain conventions, then the execution of these loops can be spread over several Computational Elements (CEs) in the FX/8 and executed at the same time (in parallel). The end result is that the actual wall-clock execution time for such a process has the potential to be reduced by an amount related to the percentage of parallelism in the process, on the one hand, and the overhead incurred to distribute the computation, on the other. Note, however, that Alliant's FORTRAN compiler does attempt to do most of the work of identifying the parallelisms in a user's code and their system does all the work in building a process which distributes itself symmetrically over several CEs (if available). However, in most cases a user will have to analyze, and possibly restructure, their code in order to attempt to attain the desired performance from an Alliant system.

The flexibility of the FX/8 also allows a user to potentially increase the performance of their system in the future by expanding the number of Computational Elements and/or Interactive Processors over time. And finally, the FX/8's flexibility also allows the user to obtain reasonable performance when servicing a number of applications/users simultaneously by appropriate decisions made regarding how many CEs will actually work together on a single application and how many will work independently on additional applications. (Optimizing the manner in which the CEs are configured is not a simple process, however. Reference the section on "Successfully Countering Alliant" for more details.)

Customers seem to be satisfied with the service and support that they are getting from Alliant. Their delivery schedules seem to be acceptable and their claim to VAX FORTRAN "compatibility" also seems reasonably accurate.

Alliant's salesforce has the same advantages as Convex's (reference the article on Convex in Competitive Update Vol. 6 No. 4 dated October 13, 1986), due to the company's small size and their small product set.

An Alliant representative recently stated their goal is to provide a machine that "solves one problem very, very fast." For a very limited number of applications and customer situations, they will be hard to beat. In short, if the customer can afford to devote their entire system to a single user and application at any one time, has a vectorizable, FORTRAN application that may also exhibit significant parallelisms, and can afford to take a chance on a new vendor, then they sound like a good Alliant prospect (for that application!).

Alliant Weaknesses (Compared to Digital)

Most customers do not fit the description in the previous section. Most have a mix of applications they will want to run on any system costing in the neighborhood of $750,000. Even at $100,000 for the FX/1, justifying the dedication of a system to a single application is not the norm.

As with Convex, the ONLY item that might be perceived as being in the plus column for Alliant is the perceived performance or price/performance of their products. Thus, in EVERY other category including languages, applications, connectivity, support, product migration and corporate stability, even THEY would not claim superiority with respect to Digital. So, as with Convex, we will take a close look at this performance issue.

The performance of the FX/1 is vulnerable to the same situations as the Convex C-1, though there are differences. Having an integrated vector

processing unit typically has a very negative effect on system performance when context switching. Therefore, when attempting to support multiple tasks or users, the performance of the FX/1 will degrade. Though the FX/1 system may still exhibit some price/performance advantage over many Digital configurations for a "FORTRAN shop," the actual advantage is minimal when observed under normal site operating situations. When considered in the light of the overwhelming advantages offered by Digital in every other area, this small price/performance edge for a point product should not spell "buy" to the average, thinking customer.

The FX/8, though appearing to be the real performance winner for Alliant, is actually a more questionable performer. Its effectiveness in delivering promised power is highly dependent, not only on the application(s) being run and the number of competing tasks, but ALSO on the manner in which the system has been configured to allow for cooperating Computational Elements (CEs). In some standard scalar tests, a VAX 8500 can be shown to clearly outperform a fully configured FX/8. For many different kinds of workloads it has been shown that an 8-CE FX/8 could optimally deliver performance that equaled or exceeded that of a VAX 8800, especially when involving vectorizable applications. However, for the IDENTICAL workloads, one can also almost always find more than one FX/8 configuration scheme (number of cooperating CEs vs. number of independent CEs in a single system) where the performance of the FX/8 did not measure up to that of the VAX 8800.

The bottom line is that the FX/8 will by no means clearly outperform the systems offered by Digital. The customer variables involved with the use of the FX/8 are numerous. One should feel quite confident that on the average, the VAX 8800 will deliver better, and definitely more predictable, performance than any single FX/8 configuration, assuming even a small mix of applications to be run by a user.

Since, as we have observed above, the price/performance offered by FX/Series systems is at best comparable to our systems for a "FORTRAN shop," the combination of other factors involved with a purchasing decision gives Digital an enormous advantage. (One should note, however, that many of these other factors will be of most concern to the management levels of your customers' organization. The "technologists" in a firm may still be more impressed with single-application benchmarks.)

To summarize, Digital can provide a growing range of truly general-purpose systems that can also provide outstanding performance characteristics for a wide variety of applications.

In sharp contrast, Alliant can provide only a minimal product set, providing outstanding performance for a very limited number of applications and then, only in very specialized computing environments.

Our stability and reputation are established and, by most measures, are outstanding. Alliant has yet to be tested.

Sales Situations Favorable To Alliant

Here again, due to the similar size and age of these companies, their impressive published, peak-performance rates and the "state-of-the-art" features of their products, both Alliant and Convex share similar kinds of sales situations favorable to them. (Also putting them into direct competition in many of these infrequent sales situations.)

Please refer to the article on Convex in Competitive Update Vol. 6 No. 4 dated October 13, 1986 for a description of favorable scenarios.

Note, however, that since Alliant's systems feature even more apparent "state-of-the-art" capabilities than the Convex C-1 (the FX/8 offers symmetric parallel processing in addition to vector processing), the attractiveness of this system to the pure technologists will be that much greater.

Successfully Countering Alliant

The same two points apply when competing against Alliant (as with Convex):

- For some customers, an FX/1 or FX/8 may provide a very good solution (at this time). We must recognize those situations and attempt to provide complementary proposals to achieve a "total solution" in those instances.

- For most customers looking for "high-performance computers," neither the FX/1 or FX/8 is the best solution. No matter what the raw performance numbers say, without a careful analysis of their requirements, we should not feel "locked out" of any opportunity.

In many cases, a Digital solution will simply outperform an Alliant system given the normal workload for a site. There is no need to feel apologetic about our performance simply because a LINPACK benchmark for an FX/Series system exceeds that of one of our systems. Even an impressive benchmark on an FX/Series system for one or two of the customer's applications should not be discouraging. The real power of our systems, especially the VAX 8800, comes into play when used "under actual conditions." This would include a mix of scalar/vector applications being run. It includes several to many users accessing the system simultaneously. This is reality, and this is how real system performance, which translates into customer productivity, should be measured. (Reference Competitive Update Vol. 6 No. 2 dated August 18, 1986, for an actual sales situation where a customer, thinking they needed a "hot-box" solution, found that Digital had the performance product they were seeking.)

The FX/8 system also presents some unique advantages for us in a sales situation. Though it sounds simple enough to use (this perception is enhanced via Alliant's strategy to focus attention on their auto-decomposing FORTRAN compiler), attempting to maximize the potential benefit of this system is no simple task (if, indeed, it is even possible!).

For example, multiple Computational Elements (CEs) must be associated at system boot time. So, if you wanted this system because one application could use 4 cooperating CEs but no/few other applications could use 4 cooperating CEs, you would either have to decide to "waste" 3 CEs most of the time or reboot your system, both before and after each run of your 4-CE application.

Also, only one set of multiple CEs can be associated. That is, if your system has 8 CEs, you can have 4 CEs associated to work on a single task and the other 4 each working independently, or 6 working together and 2 independently, but you could not have two groups of 4 working together. So, if you wanted to buy the system because you wanted to run applications which would benefit most from some different combinations of multiple CEs, you

would also be disappointed to find that the FX/8 could not address the needs of your several tasks concurrently or efficiently.

To complicate predictable performance on the FX/8 further, it has been shown that the effect of cache hits and vector sizes have an inordinate affect on actual performance. This means a user might experience wide swings in delivered performance from time to time for no obvious reason. They would have to become extremely intimate with both the new system and application in order to optimize for predictability and performance enhancement.

None of the preceding discussion addresses the changes one might have to make to their existing FORTRAN in order to optimize for improved execution times. Obviously work will be required for this purpose also.

As can be easily seen from the preceding discussion, realizing the potential power of an FX/8 is not a passive or one-time undertaking for a potential user or site. Productivity will surely be negatively affected by attempts to adjust a site's workload to the idiosyncrasies of such a system.

Even in cases where the customer's workload and applications would allow an FX/Series system to realize its promised performance, a customer may still be better able to "afford" to purchase one of our systems instead. Please reference the Convex article in Competitive Update Vol. 6 No. 4 dated October 13, 1986, for a discussion of this factor.

Need More Information?

For more information on Alliant or any other of the "hot-box" competitors, contact the Competitive Hotline at DTN 251-1888 or (617) 264-1888. They will either have the information you need or direct you to the right source.

Additionally, via the engineering network, you may want to visit the High-Performance Scientific Computing NOTES file (CURIUM::HPSC) for a continuing discussion of these vendors, as well as other related high-end scientific computing topics.

TAKING ON ALLIANT, CONVEX AND SEQUENT

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We should not be bashful selling against new startup vendors in traditional VAX markets. These vendors, like Alliant, Convex and Sequent, are making claims that raise some serious issues in real application environments. We should raise reasonable doubt about these issues, challenge the opposition's claims and make some of our own claims. We should be in a win-win situation against these vendors most of the time. Since the article on new competitors (Alliant, Convex and Sequent) appeared in the Competitive Update Special Issue dated February 17, 1986, there have been some new items of interest. We have heard from the field and some industry watchers some things that lead us to the following conclusions about:

Alliant

- Performance degrades in various multi-processing configurations (discussed below in more detail).
- The FX/8 cannot be expanded dynamically; each time a Computational Element (CE) is added, the System must be brought "down" and reconfigured manually.
- The Alliant operating system is a non-standard version of UNIX. Alliant uses an implementation of the Berkeley 4.2 version of UNIX called Concentrix. This raises two issues: Can Berkeley 4.2-based applications be ported to Concentrix without any modifications? How efficient are these applications?
- The number of cooperating CEs in an FX/8 configuration is established at boot time. To change the number of cooperating CEs, the system must be re-booted.

Convex

- The performance of the Convex C-1 is extremely dependent on the degree to which the application is vectorized, and the degree to which scalar and vector applications are mixed. C-1's application performance is often limited by weak scalar performance. C-1's elapsed time is typically dominated by scalar performance. For a detailed analysis of Convex, reference the cover story in Competitive Update Vol. 6 No. 4 dated October 13, 1986.
- When Convex runs a benchmark, they will typically select a single application that runs well, claiming superior performance. This will not provide a viable solution in most cases which involve multiple-application environments.
- The Convex FORTRAN compiler is the only vectorizable compiler offered by Convex.

Sequent

- Sequent's disappointing results in the technical market have led them to refocus their marketing strategy in the highly competitive office market.
- Sequent's UNIX, like that of Alliant's, is also a proprietary implementation of Berkeley 4.2 UNIX. Some customers have reported difficulty porting some applications to Sequent's Systems.
- The performance of each individual processor in a Balance 21000 is the equivalent of a VAX-11/730-VAX-11/750 (the 21000 utilizes National Semiconductor's 32016 microprocessors).
- The Sequent compiler is very incompatible with VAX systems.
- Sequent recently lost a bid to a South Korean company which signed a joint marketing agreement with Encore. After some serious testing, this company found that Sequent's I/O capability was very poor.

OPPORTUNITY FOR THE VAX 8550 AGAINST THE FX/8

For many applications, the VAX 8550 should outperform an Alliant FX/8 complex. For applications with real expansion needs, the VAX 8700 or VAX 8800 might be more appropriate. The VAX 8800 should outperform the "flattening" performance of a comparable FX/8 complex with eight CEs (reference the Competitive Update article in Vol. 6 No. 2 dated August 18, 1986, p. 49, on the University of Texas data).

The VAX 8550 -- a real good price/performer -- could be "the sleeper" of the 8000 product line.

ARE THESE VENDORS FOR REAL?

These vendors' systems are still very new and unfamiliar. This point should be stressed over and over -- given Digital's undeniable viability as a long-term leader as a major systems integrator. Nonetheless, these vendors are shipping systems -- a feat which some experts doubted a year ago. Alliant has installed about 32 FX systems, Convex has 52 C-1 systems installed and Sequent has 82 systems installed (these figures are as of July 1986). Unlike the fault-tolerant startups (Auragen, Sequoia, Synapse and Tolerant Systems), which have failed to produce despite over $150 million in venture capital funding, these startups have successfully delivered products to the market and appear to be on an aggressive growth curve.

MARKET POSITIONING: ALLIANT AND DIGITAL

Alliant is clearly going after the high end of the traditional Digital market for scientific compute-intensive applications. Alliant is positioned aggressively to undercut Digital at the mid-Midrange. The entry-level FX/1 lists for $132,000 (consists of one Computational Element, 8MB of main memory, 67MB disk drive, FX/FORTRAN compiler and six-slot Multibus chassis) and offers 4.45 MIPS, as opposed to the VAX 8500 offering 3 MIPS at approximately $300,000 (includes 20MB of memory, 450MB of disk and 1/2" streamer tape).

In an attempt to attract the low end of the market, Alliant recently introduced packaged FX/1 systems (an 8-user configuration for $99,500) to entice scientific users with budgets around $100,000. However, the FX/1 is NOT upgradeable to the FX/8 -- leaving FX/1 users with no easy migration path. Therefore, a more meaningful comparison for users with expansion requirements is the FX/8 entry-level system with one CE at 4.45 MIPS costing $270,000, as opposed to the VAX 8500.

PERFORMANCE CLAIMS VERSUS REALITY

There are several ways to configure Alliant's FX/8 multiple processor (e.g., multiple Computational Elements) systems. Each FX/8 system can support up to eight CEs, and the CEs can either be added in cooperating or non-cooperating configurations. Examples of possible FX/8 configurations are:

- For CEs cooperating to perform a single job, with the other four as autonomous CEs each performing a single job (for a total of up to five jobs being performed).
- None of the eight CEs are cooperating, but are performing up to eight different jobs.
- All eight CEs are cooperating, performing a single job.

To appreciate Alliant's claims versus their capabilities in competitive situations, it is important to understand how the FX/8s are configured and anticipate how potential users might need to configure them as their needs grow. Alliant claims to offer linear performance throughput as additional cooperating processors are added to the FX/8. A maximum of eight processors can be added to an FX/8 system. Thus, Alliant claims a maximum capability of 35 MIPS with the FX/8 at a base cost of $750,000 (or around $21,000 per MIPS).

We have some feedback and results from users and industry conferences that seriously challenge Alliant's claims for many applications. A paper published by the IEEE in August 1986 (from the University of Illinois, entitled "Vector Processing On the Alliant FX/8 Multiprocessor") concludes that:

- There is no appreciable increase in performance when the number of cooperating CEs is increased beyond four.

More specifically, there is good reason to believe that:

- Alliant is not competitive for single-stream scalar codes whether the FX/8's CEs are cooperating or not.
- Alliant is competitive for multiple-stream vectorizable codes when the FX/8's CEs are NOT cooperating, but not when at least half of the FX/8's CEs are cooperating.
- Alliant is barely competitive for multiple-stream scalar codes with no CEs cooperating, and less so as the number of cooperating CEs increases.
- Alliant is not competitive for single-stream large codes.

- Alliant is competitive for multiple-stream large codes with no CEs cooperating, but not when four or more CEs are cooperating.

The performance of Alliant's FX/8 is extremely APPLICATION DEPENDENT and any given application might run better on a VAX system. Alliant typically shows a LINPACK benchmark to a potential customer -- a highly vectorizable, single-job application. This is not the typical real application environment -- which is multiple applications running multiple jobs! Alliant's benchmarks are typically designed to take advantage of the FX/8 architecture. Other benchmarks in customer situations -- like the University of Texas resevoir simulation benchmark -- cast doubt on the FX/8's capability in other application environments. Customers have reported no appreciable increase in performance beyond four cooperating CEs.

Salespersons should tell customers in competitive situations to ask Alliant for at least three customer reference sites. If it comes to a benchmark, the salesperson should structure the benchmark to run a mix of jobs, with multiple languages. Any language other than FORTRAN (the only vectorizing decompiler that Alliant offers) will severely handicap Alliant (languages like ADA, C and PASCAL). Salespersons can also win by running large codes single stream.

OTHER ISSUES: SYSTEM INTEGRATION AND SUPPORT

Three other key issues are networking, support and applications availability. Digital has obvious superiority in all three areas. Alliant's immediate priority is to perfect their hardware systems architecture and offer more applications software. Digital's superior advantage in networking is likely to remain indefinitely. However, Alliant currently supports Ethernet and will offer improved networking capabilities soon. Alliant will likely leverage their joint agreements with both Sun Microsystems and Apollo (see below) to offer more functionality in areas where it is weak.

While Alliant is trying to build a third-party software library, this will also take considerable time. The fact that Alliant's operating system is based on UNIX Berkeley 4.2 does not mean that UNIX Berkeley 4.2 applications will run efficiently on the FX/8.

Finally, as a new company, Alliant can in no way offer the same level of support and service that Digital can. Digital's service capabilities are international, whereas Alliant must operate with a small organization until their installed base ramps up.

ALLIANT'S DEALS WITH SUN MICROSYSTEMS AND APOLLO

More important in the long run is the joint marketing and development agreement with Alliant and Sun Microsystems, signed last January, and the agreement with Apollo that enables Apollo to offer Alliant's systems. Both these deals give Alliant leverage and credibility, and they both enable Apollo and Sun (currently competing against each other in the technical workstation market) to broaden significantly their market opportunities. Look for future products integrating the Sun Network File System (NFS) and the Apollo DOMAIN System with the Alliant FX/8.

In fact, Apollo is already marketing the Alliant System under their private label. Apollo markets the Alliant System for compute-intensive applications within the Apollo environment. For example, Apollo workstations are used to design circuits. Now the design will be sent to the Alliant "server," where the design will be simulated. (This is not Apollo's only strategy, however. Apollo, which probably makes only minimal margins on the Alliant System, has also introduced an "open architecture" to embrace VAX "servers," as well as other networked systems.)

SEQUENT: POSITIONED AGAINST THE VAX 8300 AND VAX 8500

Despite Sequent's claims of providing 21 MIPS with the Balance 21000 (an upgrade of the Balance 8000; the Balance 21000 began shipments in July 1986), we believe that Sequent -- which offers basic systems ranging in price from $50,000 to $500,000 -- is positioned to compete against the VAX 8200, 8300, 8500 and 8550, and possibly even the MicroVAX at the low end.

As mentioned previously, Sequent's raw performance for each processor is weak. On a single-user raw performance basis Sequent compares very poorly. Sequent's strategy, therefore, is to compete more aggressively on price.

OEM DEALS: SEQUENT AND TERADYNE, SEQUENT AND SIEMENS

Sequent is pursuing an aggressive OEM strategy and to date has completed two major deals, including:

1. A $50 million deal with Siemens AG announced in March 1986 -- Siemens will incorporate the Sequent Balance 21000 within its current systems. The deal also gives Siemens manufacturing rights of the Sequent system. Siemens is a $20+ billion international electronics and electrical company involved in application areas like power systems, industrial equipment, factory automation, telecommunications test equipment, connectors and tools for design verification.

2. A three-year $10 million OEM contract with Teradyne, announced in July 1985 -- the deal also involves a joint-development arrangement for future Teradyne products. Teradyne, a large user of VAX systems and Digital OEM, is a leading supplier of automatic test equipment for semiconductors and electronic subassemblies, telecommunications test equipment, connectors and tools for design verification. Teradyne made specific reference to their interest in Sequent's parallel architecture.

Ironically, Sequent's initial bid for technical markets has stalled and Sequent is now going after commercial office market opportunities. The Teradyne and Siemens deals are the only major OEM bids Sequent has won. Sequent recently added some office automation experts to their staff and Siemens will apparently try to utilize the Balance 21000 for new office systems products. The Balance Systems support Unify's database management systems and utilities, but Sequent's sudden turn towards the office is an admission of unfulfilled expectations in the technical market. The office and departmental market requires support for networking standards and applications interfaces -- even for a vendor with an OEM strategy. Sequent will have a tough time competing here. The reported difficulties in the I/O area in the Korean bid discussed previously will not help either.

SUMMARY

Of the three startups discussed, Alliant and Convex are best positioned to compete against VAX systems in the traditional Digital scientific market. Sequent's strategy appears to be confused. Alliant and Convex, however, are poised to take us on in price/performance for compute-intensive applications.

Our strategy should be to instill doubt about these machines' performance capabilities in real application environments, as well as market our strengths as a systems vendor -- including networking, support and service, and applications availability. VAX systems offer predictable performance over a wide range of applications and environments, as well as a range of compatible VAXcluster systems.

Need More Information?

For more information on any of the "hot-box" competitors, contact the Competitive Hotline at DTN 251-1888 or (617) 264-1888. They will either have the information you need or direct you to the right source. Or you can call the LDP Hotline at DTN 297-5869.

DATA GENERAL'S MV/7800 AND DG'S WEAKENING MARKET POSITION

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Data General is desperately looking for new marketing opportunities. Slow growth in their office markets, the failure of the DG portable, and a general loss of confidence by large corporate users of DG's long-term viability as a major system integrator has pushed DG to retreat from its aggressively focused office/departmental strategy of the early 1980s.

A clear sign of DG's wavering surfaced when the new MV/7800 was announced in late July. While the MV/7800 is very aggressively priced -- 60% below the entry pricing of the VAX 8200 -- a closer look at DG's strategy reveals their weak competitive positioning against Digital. Consider the following points about Data General:

Market Strategy

DG is trying to get back into the technical market. DG has just consolidated their technical division with their Information Systems Division (ISD), and Bob Miller, Senior VP of ISD, said that the MV/7800 is aimed at the technical OEMs, including petroleum, chemical and utility vertical markets (Electronic News, August 4, 1986). Ed deCastro emphasized DG's turn back to the technical market with the MV/7800 introduction, admitting that DG made a mistake by putting their eggs in one basket (focusing almost exclusively on the office market). A recent First Boston Corp report shows DG FY85 revenues breakdown with $325 million or 26.2% industrial/technical, $490 million or 39.5% commercial, and the remainder service/maintenance. FY86 projections are 20.2% or $260 million technical/industrial, or a decline of 6%. DG hopes to reverse the trend in FY87, with $400 million, or 23.6% for technical/industrial. For DG to achieve this goal they must aggressively underprice the MV/7800 at the low end to get back technical users and OEMs they have lost.

Pricing Strategy

DG has priced the MV/7800 60% under the VAX 8200. However, in order to compensate somewhat, DG also raised MV/8000 and MV/10000 prices by 6% and increased CEO packaged software prices by 10% across the board.

Software Strategy

DG has some new CAD/CAM packaged software included with TEO (Technical Electronic Office, which is CEO integrated with high-resolution graphics software). There are two offerings -- TEO/Electronics, acquired from Cericor in Salt Lake City, and TEO/3D, through an acquisition from Easinet Holdings in Australia.

Workstation Strategy

Two new workstations for the technical market were introduced last November -- the DS/7700 and DS/7500. The DS/7700 was due for delivery in March, but

DG just cancelled the product because the high-speed multiprocessor bus (44 Mbits/sec.) would not work. DG has finally begun to ship the low-end DS/7500 -- a high-resolution workstation for CAD.

Product Positioning

DG is very poorly positioned here. There is no upgrade path for the MV/7800, which obsoletes the MV/4000 and essentially obsoletes the MV/8000 (which is a fraction more powerful, but is six years old). There is a huge gap between the MV/7800 and the MV/10000, a 4+ MIPS machine based on old TTL technology. The MV/20000, which is based on new ECL technology, is the high end of the line (10 MIPS). DG must rebuild the middle of the MV line, but it is unlikely they will introduce any clustering capability soon (two years ago DG had no cluster project under development).

DG Installed Base

With the introduction of the MV line six years ago, DG has ignored the Nova/Eclipse installed base. For the first time, DG is offering a 32-bit board upgrade (the 7800 board) for $10,000. This board-level offering will also help attract back some technical OEMs.

In summary, DG is encountering a severe crunch. DG lacks a strong MV installed base, their office market (which was strong two years ago) has stalled, their product line is not well positioned to offer modular growth, their communications are relatively weak (strong in SNA support, but weak in Local Area Nets and network management/diagnostics), and they are unlikely to regain much in the technical market (reference the chart below).

One last point: the MV/7800 does not currently support AOS/DVS (DG's distributed systems software), nor does it support DG/UX (DG's UNIX).

In competitive situations against the MV/7800, we should raise questions about DG's capability to deliver on future technologies and their weak positioning against Digital in general, especially with regard to departmental processing situations.

DIGITAL VERSUS DG

	Digital (VAX 8200) VS.	DG (MV/7800)
Price		Superior Advantage
Performance		Same for both
Migration Path	Good	Poor
Applications Software	Excellent	Lacking
Technical Workstations	Proven products	Delayed; Cut prices
Installed Base	Strong	Very weak
Data Communications	Excellent	Fair-Good
Office Market	Good growth	Slowed growth

Need More Information?

For more information on any of the "hot-box" competitors, contact the Competitive Hotline at DTN 251-1888 or (617) 264-1888. They will either have the information you need or direct you to the right source. Or you can call the LDP Hotline at DTN 297-5869.

DIGITAL'S APPLICATION CENTER FOR TECHNOLOGY (ACT) PROGRAM

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PK03-2/5E

In recent months Digital has been developing and implementing a program to sharpen our competitive edge against the competition. This new sales support tool is called APPLICATION CENTER FOR TECHNOLOGY (ACT).

The ACT Program is a centrally directed corporate program. Each ACT is an integration of the functions formerly performed in Digital's CAD/CAM centers, Office Solution Centers and Field Application Centers. The consolidation and integration of these functions allow Marketing, Sales Support and Delivery activities to be contained under one roof and displayed there to our customers.

The stated goal of the ACTs is to leverage the sale of Digital's solutions by concentrating our industry and implementation experts in the most significant stages of the customer's problem-solving process. The ACT industry experts define and analyze the customer's computing needs, then demonstrate the latest technologies, tools and processes applicable to their solution. The ACTs will be strategically located at seventeen different geographical locations throughout the U.S. during FY87. In the future, ACT facilities will be located in Europe and GIA. The locations and dates that each ACT is planned to open are contained in Appendix 1 on p. 44.

The physical design and staffing of an ACT are intended to exhibit Digital's professional attitude and image. Each ACT will have an industry focus based on its geographical location. Examples of this: Detroit will focus on transportation, New York will focus on financial services, Washington, D.C. will focus on government, etc.

ACT COMPONENTS

There are four major components to each ACT: equipment demonstration area (a mini DECWORLD), customer conference areas, Industry Experts and Project Consultants staff area.

The purpose of the mini DECWORLD is to demonstrate Digital's state-of-the-art equipment running on applications pertinent to each particular customer, whether it is solutions that we custom designed or other applications including third-party systems from our corporate marketing partners. The equipment in the mini DECWORLD will be based on the ACT equipment model and the industry focus of the geographical area. Some equipment in certain ACTs may include various types of our competitors' equipment for the sake of comparison. In this mini-DECWORLD setting, which replicates elements of the business environment (executive offices, shop floor, telecommunications center, etc.), customers can make informed decisions that meet their specific requirements.

The conference rooms (two small rooms, plus a large conference room that can be divided in half) are for the purpose of communicating directly with the customers, either with media presentations or on a one-on-one basis. This is where an important function of the ACT will take place -- the analyzing and solving of the customer's business problems by Digital's industry experts. This key function makes the ACTs different from a demo center.

The industry expert will have all the necessary technical and industry knowledge to relate to the customer more as a colleague than as a demonstrator. They can communicate to the customer on their own level because of actual experience in the field. The industry expert understands their problems and needs. A process has also been developed to facilitate the sharing of industry experts between ACTs, if deemed necessary to enhance a sales opportunity. Industry expert sharing is an integral part of corporate strategy: to use all of Digital's available resources, and to increase the probability of booking sales and increasing market share with either new or add-on business.

The FAC (Field Application Center) area of the ACT will be staffed by our PSS project consultants. By having them located in the ACT we can demonstrate to customers our ability to custom design and implement computing solutions for their specific needs. The industry experts will work very closely with these integrators, to express the needs and desires of each individual customer. The customer will be able to witness firsthand the integration of Digital's product offerings and services, all being developed on time and within budget.

ACT UTILIZATION

Although there will be no salespeople located in the ACTs, they are intended for use by the salesforce as early in the sales cycle as possible. The ACT Manager is the focal point of the ACT's activities; they receive direction from the area sales management.

Following is a typical scenario. A customer is invited to come to the ACT at a prearranged time by an appropriate sales representative. The ACT Manager coordinates all the necessary ACT components so the customer's time will be fully utilized. During the first visit, the customer's situation is discussed and analyzed by the appropriate ACT staff members. The customer then returns at a later date, when they can witness the solution to their problem being created, all in an environment that simulates their own. Because the ACT is a permanent facility, a customer can send different employees at different times, if necessary, to see the solutions that are pertinent to their area of concern.

The benefits to the customer are clear. The ACT is a single source for the best answers to their needs. Our solutions can help them to increase productivity, decrease production costs and strengthen their competitive positions. Digital's investment in the ACT program is material proof of our commitment to our customers.

ACT STRATEGY

Marketing sells to sales, sales sells to the ACT; this is the process for determining the activities of each ACT. Marketing continually communicates to the salesforce the latest information concerning their respective focus areas. This allows the various sales organizations to plan their present and future sales strategy. The ACTs are the best way Product and Industry Marketing, along with the CMPs and SCMPs, can exhibit their offerings. The ACTs will also be a critical part of Digital's Product Announcements strategy.

The strategy of the ACTs is to convey to our customers that due to our most recent new product announcements and enhancements to our existing products, Digital is a technology leader. Presently, one of Digital's strongest areas is our networking capability. We must convey to the customer our image as the computer company that has the ability to have our products communicate with each other and communicate with other vendors' products. The ACTs are an integral part of Digital's short and long-range strategy.

ACT -- TOTAL SOLUTION SUPPLIER

Digital is no longer a computer company supplying solutions in certain niches. We now have the capability of supplying many business solutions in the computer industry -- from the office, the factory, departments, small businesses and more. What better way to convey our message than to allow our customers hands-on viewing of their own customized solutions resulting from the highest-level consulting available. The emphasis on customer satisfaction cannot be more pronounced than it is at the ACT, with the highest-quality equipment and people at your disposal. The bringing together of technology and people in the ACT is the best way to harvest a true business relationship. The building of this long-term relationship will foster a team feeling which must precede the ordering of products and services. The impact of being part of a customer's business should leverage significant future sales opportunities.

The ACT's role in fostering this relationship will be its influence in the sales cycle and the most important part of this evolution is the concept of the Industry Expert. The Industry Expert is the key element in the ACT. This is Digital's most significant commitment to the customer. The Expert will be the most instrumental ingredient in gaining the customer's confidence and allowing us to become the customer's predominant computer vendor. What the Experts will create in the minds of the customers is that Digital really does understand their computing problems and has the resources to solve them. The customer will realize that Digital is no longer a company selling products and services, but rather a company selling solutions. The ACT Program is where Digital's marketing strategy meets the customer, reinforcing our growing reputation as a supplier of total solutions.

A P P E N D I X 1

ACT OPENING DATES

	Sites	Planned Openings	ACT Manager
1.	IRVINE	RUNNING	SKIP MAUSER
2.	ATLANTA	RUNNING	JOHN CARROLL
3.	DETROIT	RUNNING	STAN GARFIELD
4.	CHICAGO	RUNNING	DEAN ZWIKEL
5.	DENVER	NOVEMBER 13	JIM HERTZEL
6.	SEATTLE	OCTOBER 24	WARREN SCHUBERT
7.	WASHINGTON	NOVEMBER 3	STAN MOSCHELLA
8.	PHILADELPHIA	DECEMBER 15	LARRY SALTZMAN
9.	HOUSTON	DECEMBER 22	BRUCE TAYLOR
10.	DALLAS	JANUARY 30	DON JONES
11.	HARTFORD	DECEMBER 30	TBA
12.	SANTA CLARA	MARCH 16	TBA
13.	ST. LOUIS	MAY 29	TBA
14.	NEW YORK	MARCH 30	MANNY BARRETO
15.	ROCHESTER	MAY 29	TBA
16.	CINCINNATI	MAY 29	TBA
17.	BOSTON	TBA	TBA

TBA -- TO BE ANNOUNCED

AT&T...IN THE WAKE OF ISDN

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AT&T, in an attempt to penetrate the computer industry, will often do so by way of telecommunications...as a product and as a service. This strategy is one we must begin to understand.

From the point of preliminary PBX discussions (either a new system or an analog-to-digital upgrade), AT&T has the attention of the executive. This gives AT&T a distinct advantage, particularly since a PBX system is usually the first system to be evaluated. If we are not alert, a PBX system can also preempt an office automation system, as we define OA in our ALL-IN-1 solution. It is during the PBX sales cycle that AT&T will "assist" the executive in defining a network, as well as OA, in their own terms of course. They will reference ISA (Information Systems Architecture) and its compatibility with the new, emerging ISDN (Integrated Services Digital Network) standard (to be discussed shortly), thereby impressing the novice buyer with the AT&T solution to "tomorrow's" communication system.

Your best tool against AT&T is knowing how they think. Since this is the case, we will attempt to put you in the AT&T mindset. We will consider WHERE AT&T is going, as well as WHY. We will answer these questions by defining ISDN and addressing the market opportunities ISDN presents.

We will then review AT&T's CURRENT solution to ISDN. The overview will consist of AT&T's networking and OA product lines. Knowing the product lines' limitations is your advantage, for you will find they lack congruity, integration and purpose. AND you will find they lack strategic direction and a commitment to distributed processing (in the true sense of the word). This review should assist you in developing an overall strategy for your account or prospect base.

ISDN OVERVIEW

ISDN (Integrated Services Digital Network) is a theory proposing the merging of major network services (i.e., telephone, data and possibly broadcasting). If implemented, we will have access to a multiple array of services via a single plug in the wall.

ISDN is also the FOUNDATION for the universal goal of world communications. It is both an architectural concept (or vision) and a technical reality.

At this time NO standard for a FULLY FUNCTIONAL ISDN has been defined, although efforts to do so have been made by the CCITT (Consultative Committee for International Telegraphy and Telephony) and ISO (International Standards Association).

However, some facets of ISDN HAVE been defined. The actual connection, to some degree, has been defined, but the IMPLEMENTATION standards, with respect to switching technologies, have not been defined; nor have the services. This should become clearer when we review AT&T's network product lines.

However, despite the fact that implementation standards have not been defined and functional standards (connectivity) have just begun to be defined, most telecommunications firms and some chip manufacturers have moved ahead with their own "proprietary" solutions.

These vendors anticipated the outcome and, in fact, have attempted to drive the outcome. These vendors may or may not be compliant with the functional CONNECTIVITY standards that have been defined. But perhaps what is even more important is the fact that no vendor can be compliant with IMPLEMENTATION standards, for THEY have not been defined.

While efforts HAVE been made to define the ISDN implementation standards, debate over wiring schemes, interfacing, speeds, security, tariffs, anti-trust and actual market demand have complicated matters considerably. It may be years before a fully functional ISDN is defined as a standard. In fact, most industry experts agree that it will be an ever changing and evolving standard for the next decade.

Despite the fact that no standard exists for ISDN, most major telecommunications and data processing firms ARE moving toward the goal of a worldwide ISDN network. This is the reason for many of the new voice-messaging, videotex and interactive video products that have been introduced over the last few years.

Since the theory proposes the merging of major network services (telephone, data and possibly broadcasting), there is tremendous opportunity for "database" and "application" services. It is envisioned that via a single plug in the wall, travel agency information, educational courses, shopping catalogs and newspapers might be delivered to your business or home, either in data, voice or IVIS-like form.

Like other vendors positioning themselves for the "database" and "applications" market of ISDN, AT&T's target market includes those businesses which could provide a "SUITABLE" ISDN service. For example:

- Banks
- Publishing houses
- Broadcasting stations
- Retail/grocery store chains
- Building and construction firms (and associated realtors)
- Airlines and affiliated travel agencies
- Municipalities
- Educational institutions
- Government agencies

Although it is clear the service firms referenced above, as well as the data processing and telecommunication industries, ARE moving in this direction, it is still unclear "how" the information will be delivered. The shopping catalog, for example, may reside somewhere on the global network or, perhaps

contrary to AT&T's strategy, it might be delivered to you via CD or optical disk ROMS should a sophisticated (and inexpensive) voice, data and video unit become available.

Since delivery is still unknown, AT&T takes a dual approach when selling to the service businesses. To these end-user, OEM and/or joint venture business partners, AT&T will promote "system" solutions and/or "long-distance" value-added services. Both the system and service strategies should be of interest to you, for they offer customers an alternative to a Digital solution.

Although this article will primarily focus on AT&T's "system" solutions, a brief discussion of "long-distance" value-added services is appropriate as we wrap up the ISDN overview.

LONG-DISTANCE VALUE-ADDED SERVICES

AT&T will promote "long-distance" value-added services as a means to protect and differentiate their long-distance business. Because telecommunications is a commodities business, carriers are losing both profit and market share. By offering services such as credit card verification, electronic mail and teleconferencing, AT&T differentiates their long-distance business, while at the same time increasing revenue for the use of these "value-added" services.

These "value-added" services COULD compete directly with Digital's end-user and OEM OA solutions, particularly as more services are added to the portfolio (recall our reference to joint venture business partners). If and when you encounter this situation, counter the tactic with a needs assessment and cost analysis. Your analysis should prove the economic value of an in-house system.

One CURRENT service which deserves highlighting is AT&T Mail. Similar to MCI Mail, AT&T Mail offers users a way to send subscribers and non-subscribers electronic mail. It can be used internal to an organization as well as external...it is the internal that we contest. By offering a COMMUNICATIONS LINK for their different mail systems, AT&T appears to round out an otherwise incompatible OA product line. This product line will be discussed in detail throughout the following pages.

In summation, AT&T intends to pursue the service industry; the goal being to gain substantial market share in the up-and-coming ISDN market and insure their position in the long-distance services business.

AT&T'S SYSTEMS SOLUTIONS

This next section will review AT&T's current "systems" solutions, their solution to "tomorrow's" ISDN. Both their NETWORKING AND OA PRODUCT LINES WILL BE DISCUSSED, AS IT RELATES TO AT&T'S INFORMATION SYSTEMS ARCHITECTURE. As indicated earlier, you will find their product lines lacking in congruity and integration -- major flaws considering their long-term goal.

A graphical summation of AT&T's MAJOR products is presented below, with detail to follow:

FIGURE 1

OA Packages		System		Network	
Unified Messaging Service		PBX		Premises Distribution System	INFORMATION
	NOT		NOT		SYSTEMS
Q-Office		3B Series		3BNet or PDS/ISN	
	INTEGRATED		COMPATIBLE		ARCHITECTURE
PC OA		AT&T PC		Starlan or PDS/ISN	

INFORMATION SYSTEMS ARCHITECTURE

NETWORKING PRODUCT LINE

Tactic #1

AT&T markets the Information Systems Architecture (ISA) as an umbrella architecture that ties together PBX NETWORKED systems and computer NETWORKED systems. It is NOT an architecture. It is, however, a marketing concept. It is a concept that is being presented as an architecture, one that AT&T will continue to revise in order to be consistent with the evolving ISDN implementation standards.

Counter #1

ISA is a marketing concept. It is NOT an architecture. It is NOT ISDN. It could, however, evolve into a PROPRIETARY implementation of ISDN.

ISA is NOT ISDN for two reasons:

- ISDN has not been fully defined. Although some functions have been defined, the implementation standards have not been defined.

- In the WAKE of ISDN standards (Integrated Services Digital Network), TRUE voice and data communications integration (and possibly broadcast video) would be managed and controlled by a single node. By single node we mean that it is capable of performing both circuit switching and packet switching (circuit switching used for voice communications and packet switching used for high-speed data communications). Although AT&T's PBX switch is capable of managing both voice and data communications, its primary strength lies in voice communications (circuit switching). When clients require a considerable amount of data communications capabilities (typically more than 10% of the PBX capacity), a central packet controller is used. This is a second, differently designed node. Until the actual IMPLEMENTATION standards have been defined, AT&T will not be compliant with ISDN. This is understandable, under the circumstances.

Until, and unless, AT&T markets a PBX that includes both circuit-switching AND packet-switching capabilities, and/or until ISDN implementation standards HAVE been defined, AT&T will not be ISDN compliant. Their offering will be a proprietary implementation of ISDN, which is contradictory to the universal, open systems intent of ISDN.

In summary, although ISA supports both voice and data communications, a SWITCHING mechanism is used rather than an integrated circuit and packet switching system topology.

To further understand this point we will draw upon three ISA scenarios. The three scenarios "build" upon each other, the result being the ISA AT&T views as "tomorrow's" ISDN. We will then follow-up the point by reviewing a typical sales approach to selling a fully configured AT&T ISA network.

Scenarios:

You will find scenarios #1 and #2 primarily voice networks and data networks, respectively. Although networks of primarily voice communications and networks of only data communications are supported under the ISA marketing umbrella, the third network scenario is the ISA AT&T envisions as their architectural solution to ISDN. TO FURTHER UNDERSTAND ISA, THERE IS A DIAGRAM WHICH WILL FOLLOW (REFERENCE FIGURE 2, P. 47).

Scenario #1

In an environment where voice communications is predominant and minimal data communications takes place, a PBX system (stand alone) is utilized. Operations for company voice AND data communications are "managed by" and "integrated into" the PBX switch.

Yet although the PBX system is capable of managing both voice and data communications, its data communications are limited from a volume standpoint. When greater than 10% data communications is required in a network, AT&T must sell a second node -- the central packet controller. In the wake of FULL ISDN standardization, AT&T's PBX/ISA is non-compliant.

Scenario #2

In a data communications environment consisting of multiple computer system networks (requiring network-to-network data communications) or in an environment where terminal clusters are granted multiple host access, a central packet controller might be used. The packet controller is the heart of AT&T's ISN (Information Systems Network) and is used to network host computer systems or to network "networks" of host or personal computer systems. Today, ISN is only a local area data communications network.

With terminals connected to a packet controller and/or data concentrator, along with host systems or network bridges, users can have access to any number of computers on the ISN network. Although the approach resembles a terminal server on Ethernet, ISN users are more vulnerable. ISN RELIES ON THE CENTRAL PACKET CONTROLLER AS ITS NETWORK HUB. If the central controller were to fail, network performance, customer communications and business operations overall would be affected.

No matter how you look at this scenario, it is NOT ISDN. Voice communications are NOT "integrated" into the network.

Scenario #3

In an environment where voice and data communications ARE managed by one networking scheme, and data communication requirements exceed 10% of the PBX capacity, the network will include a PBX, central packet controller and associated concentrators. The packet controller is designed to handle the majority of data communications between individual or networked computer systems and the PBX is primarily designed to manage the voice communications. Again, in the WAKE of full ISDN implementation standards, this two-node management scheme is NOT ISDN compliant.

From a wiring standpoint, this network scenario includes both twisted pair cabling and fiber optics. Premises Distribution System (PDS) is the two-cable, twisted pair wiring scheme utilized for voice and data communications. The first cable in this ISN scenario is used to connect the individual telephone unit to the PBX. The second cable is used to connect data terminals to data processing systems.

The Premises Distribution System is considered ISN's physical medium. PDS is also used in a stand-alone PBX installation. In essence, PDS is the physical layer used for both PBX and ISN installations. PDS is then the ISA PHYSICAL medium.

ISN also utilizes fiber optics, although the backbone of an ISN/ISA network is still PDS. Fiber optic cables are housed in the packet controllers. The fiber optic buses transmit data at 8.64 MB/S. These fiber optic links are then extended to the data concentrators. Terminals then connect to the data concentrators via the twisted pair Premises Distribution System, transferring data at 19.2 KB/S.

A diagram describing ISA is as follows (3BNet and Starlan will be discussed in Counter #2):

FIGURE 2

```
                Outside world        19.2 KB/S
                              \| PBX |------BCT voice & data terminal
                               -----
                                  |
          Modem pool              | 19.2 KB/S
                         \-------------------- 8.64 MB/S ------------
   ----      ----- / | Packet controller |---------|Concentrator|
   | PC |----| PC  |  |     8.64 MB/S     |          ------------
   ----      -----    --------------------            |         |
    \ Starlan |                | 8.64 MB/S       ------     ------
     \   -----         ----------------------    | Host |---| Host |
1 MB/S | PC  |       |   Data concentrator  |    ------     ------
        -----          ----------------------      \   3BNet /
           19.2 KB/S   /  / / / / \ \ \ \ \        ------  /
                      VT VT VT VT VT VT VT        | Host |/10 MB/S
                                                   ------
                                                     |    |19.2 KB/S
                                                    VT   VT
```

Note the BCT (Business Communications Terminal) voice and data terminal in the above display. Even though the terminal is a voice AND data terminal, which can impress a novice buyer, voice and data messages are not necessarily integrated. Your customer needs to understand the difference between physical integration and functional integration. Your customer also needs to understand that this is not what is meant by ISDN (integrated voice and data) today.

"Physical" integration, as displayed in the first graph, does not necessarily improve communications or reduce costs, although the novice buyer may believe this to be true. "System" integration, as displayed in the second graph, SHOULD improve the integration of OA communications.

1)

```
Physical                                   Functional
-------                                    --------
| CPU |                                    | CPU |
\     /  (2) separate wires                --------
 \ /          \   /                                  /  \  (2) wires
 * *   (2) separate ports                 /    \
| V |                                    | * | | * |  (2) ports
| O |                                    | T | | T |
| I |                                    | E | | E |
| C |                                    | L | | R |
| E |                                    | E | | M |
|   |                                    | P | | I |
| & |                                    | H | | N |
|   |                                    | O | | A |
| D |                                    | N | | L |
| A |                                    | E |
| T |                                    ---   ---
| A |
|   |
| T |
| E |
| R |
| M |
| I |
| N |
| A |
| L |
---
```

2)

```
     AT&T                                  Digital
--------------                         -------------
| PBX System  |                        | VAX System  |
|   Voice     |-----| 3B |             |   Data &    |
| Limited Data |     ----              |   Voice     |
--------------                         -------------
      |                                    |     |
      |                                 -----  ---------
    -----                              | VT |  | DECtalk |
    |BCT|                              -----  ---------
    -----
```

Digital offers "system" or "functional" integration of voice and data. We can provide this level of integration because we have an integrated OA solution. With ALL-IN-1 we are able to "functionally" integrate voice and data communications at the "system" level. Although we utilize separate terminals for voice and data, the results are virtually the same. Functions such as speech recognition, directory access and phone ringing are performed. The telephony features are integrated INTO ALL-IN-1. Users will

have access to telephone AND data messages from EITHER a standard data terminal or the telephone, both on a local AND remote basis. Reference our DECtalk and voice mail products.

Furthermore, should it be a requirement to CONNECT to a PBX system, Digital can accommodate, thereby growing the information network to include high-volume voice communications.

AT&T, on the other hand, offers "terminal" or "physical" integration, as well as a low level of "system" integration, in their PBX systems. At this time AT&T cannot offer fully functional "system" integration on their computer systems, due to their use of third-party OA solutions. AT&T has no internal product such as ALL-IN-1, which can integrate "new" telephony products such as DECtalk and other voice mail products. To compensate for this lack of "system" integration, AT&T must sell their PBX system.

In summary, when the BCT user is physically attached to a PBX system, messages are sent to, and consolidated within, the PBX system. If a "data" message, it will either be SWITCHED to the appropriate data processing system or stay within the PBX (if the data communications load is light).

Sales Approach to Installing a Fully Configured AT&T Network

Generally speaking, the FIRST STEP in installing all components under the Information Systems Architecture (ISA) is the PBX. The SECOND STEP is installing PDS (Premises Distribution System). When selling a PBX system, AT&T will promote their PDS as ISN's PHYSICAL medium. Although PDS is not required in a PBX installation, AT&T anticipates future communication needs and sells the client on additional "up-front" wiring.

The FINAL STEP in installing a fully configured voice and data network is the data processing system(s). As indicated in the introduction, AT&T has a distinct advantage. For months AT&T has had the attention of the executive.

Counter #2

AT&T's networking product line includes two other networking schemes -- 3BNet and Starlan. Starlan ties together AT&T PCs, IBM-compatible PCs and 3B2 systems, while 3BNet ties 3B systems together.

Although neither of these two networks is required in an ISN installation, they are sold when network speed is an issue and/or when an ISN network will not support peer-to-peer communications. 3BNet transfers data at a speed of 10 MB/S. Starlan allows PCs to communicate peer-to-peer, whereas ISN does not allow PCs to communicate peer-to-peer.

Today, from a network interface standpoint, 3BNet cannot communicate with ISN. Only Starlan can communicate with ISN. This is a real problem for AT&T. Until an interface is developed, each 3B system (other than those on Starlan) must directly connect either to the PBX or the packet controller. Since this is the case, ISA (the marketing concept sold as an architecture tying PBX networks and computer networks together) is not as functional as one might think. So much for AT&T's architecture!

For more detail on AT&T's networking strategy, please reference Competitive Update Vol. 5 No. 7 dated February 17, 1986, article on p. 27.

AT&T'S OFFICE AUTOMATION PRODUCT LINE

Tactic #1

With the voice and data capabilities of AT&T's PBX systems, AT&T claims they have ISDN-like solutions. Specifically, in the area of office automation AT&T promotes a service (product) known as Unified Messaging Service -- an integrated voice and data OA product. UMS resides on the PBX S/75 and S/85 and consists of a voice store/forward in-box, a message router and electronic mail for brief messages.

In addition, with AT&T's BCT 510 personal terminal (a voice and data terminal) physically attached to the PBX systems, basic telephone functions such as directory dialing, conference calling, automatic callback, last extension dialed, etc., are performed.

Counter #1

The claim of ISDN solutions appeals to the novice OA buyer. Although integration appears to be true on the surface, considering the one terminal for data AND voice, IT IS NOT INTEGRATED. Reference the discussion of physical integration versus functional integration.

Counter #2

The fact that the UMS DOES reside on AT&T's PBX S/75 and S/85 is the KEY to your counter strategy. The PBX system is primarily a switching device. Granted it is sophisticated, but it is still a switch...not a true data processor.

Although the S/75 and S/85 can handle both voice and data communications, its strength lies in voice communications, WHICH TODAY IS NOT SUFFICIENT TO MEET MOST COMPANY COMMUNICATION NEEDS.

Even AT&T realizes that their PBX system(s) support only 10% data transmission, at a rate of only 19.2 KB/S. For those firms whose daily operations DEPEND on data communications, which are the majority of them, a 3B computer system and/or PC(s) are recommended which, of course, means another architecture, another user interface, another communication concern. Reference the interconnect problem of AT&T's ISN.

Tactic #2

AT&T will be promoting UNIX to keep their sales pitch on the offensive. They promote UNIX as the common denominator between systems/architectures. This argument is easily combatted.

Counter #1

First and foremost is the fact that UNIX is NOT a user interface. UNIX is simply the system's intelligence and not a very friendly one at that. The actual user interface, as defined by OA standards, comes in the form of menus. The menu for UMS on the PBX systems differs from the menu on the 3B which, in turn, differs from that on the AT&T PCs. Each system uses a different OA solution, resulting in separate command languages and user interfaces. The 3B uses Q-Office from Quadratron, a third-party supplier

AND servicer. The PCs use PC electronic mail and word processing, as well as a number of other third-party solutions.

This, of course, means additional training and an overall increased servicing cost. But perhaps what is even more obvious is the lack of integration.

Tactic #3

AT&T will also promote UNIX as a universal operating system, one that adheres to the open systems standards because of its portability.

Counter #1

AT&T will always be faced with the dilemma of portability versus integration. Their marketing strategy revolves around the portability of UNIX and its adherence to open systems, yet customers still want congruity and integration.

UNIX is actually a LEAST common denominator from an integration standpoint. To claim portability among different hardware systems, UNIX cannot take advantage of a vendor's state-of-the-art application or hardware. And if it were tailored or optimized to take advantage of state-of-the-art functions, portability is compromised. This is certainly not integration.

INFORMATION SYSTEMS ARCHITECTURE -- SUMMARY

Considering AT&T's inconsistent software solutions and multiple systems/ networks of varied functionality and architecture, AT&T does not have an integrated approach to solving every-day business problems.

A truly functional networking and OA solution would provide full integration at both the hardware and software level; it would provide independence, control and access at a local level; and it would personify company commitment in its implementation. AT&T's commitment to one OA solution is non-existent and their network product solutions are vunerable to single points of failure, making independence at a local level virtually impossible.

Network Highlights

- ISA is NOT ISDN.
- ISA is not an architecture. It does not provide integration, therefore is not as functional as one might think.
- ISN is vulnerable to a single point of failure.
- Alternative forms of cabling are prohibited and/or non-promoted by AT&T.

Office Automation Highlights

- OA solutions available through third party; issue of service, commitment and integration.
- OA solutions vary by system type.
- OA solutions not "system" integrated.
- No OA products such as Videotex, IVIS, DECtalk.

SUMMARY

We believe the most important ingredients in the future of ISDN are the application-specific programs, for they are what the end user will be working with...not the actual communication vehicle, medium or switch.

Since application-specific expertise is MOST key to the reality of ISDN (as conceived), the most PROTECTED investment would be a Digital solution. Digital has the applications expertise. Reference our overall OA strategy which includes ALL-IN-1, voice messaging, voice mail, DECtalk, IVIS, videotex, MCI mailgate, telephone management system, third-party database access and networking.

Furthermore, Digital's COMMITMENT TO COMPLY WITH STANDARDS adds credence to our story. Even though the actual ISDN implementation is not known at this time, our strategy for cabling, transmission and connectivity is equally as strong as our applications strategy. We offer our client base the CHOICE of transmission and/or cabling technology. We recognize the value in each technology and have positioned our support accordingly.

We offer a sophisticated wiring scheme (which can employ baseband, twisted pair, fiber optics, broadband, satellite, etc.) via our DECconnect product/service. Do not let vendors such as AT&T diminish the importance of this program and commitment.

You have a real competitive advantage against AT&T. LACK of product line integration is an Achilles' heel to them. Although AT&T intends to pursue the long-term ISDN market, Digital is FAR better prepared. By having captured a majority share of TODAY'S OA market, we are well positioned for TOMORROW'S ISDN market.

And even though customers ARE concerned about the future, it is the solution to TODAY'S business problem, NOT the technology, that is of real interest to your clients. Your clients want to do business with a vendor committed to TODAY'S solutions, NOT tomorrow's dreams. And Digital is that vendor...NOT AT&T.