

88-2

16 February 1988

FORUM DOCUMENTATION

This special issue of <u>Release 1.0</u> is designed to put the Personal Computing Forum into perspective for those who attend, and to share some of what we hope to achieve there for those who do not. Specifically, we will attempt to outline (but not resolve) the issues to be addressed there, and to explain how and why we chose the people who will address them. Bill Gates and Bill Lowe need no introduction, but who is Bob Epstein (that's been clear since last month), or Mark Teflian (that should become clear in the future)? This year we have sought less well-known companies for concurrent presentations in the afternoon, in part to illustrate some of the concepts we have covered over the past year. Mitch Kapor has contributed an insightful perspective on the platforms of the future. Our goal here is not to explain everything, but to stimulate your curiosity and provoke discussion.

Companies, people and products present at the Forum are highlighted in boldface, courtesy of our HP LaserJet Plus. Speakers, panelists and companies making presentations are listed on page 26, followed by an index.

We have loosely structured this guide around five topics: Hardware platforms, or the jockeying among pcs and workstations and whatever the PS/2 is; software platforms, or operating systems, communications and interfaces; databases, the next layer above the platforms; the next generation of applications; and how all these things will be distributed and supported. In

this year of the customer, we no longer consider "the importance of the customer" to be an issue: We have recognized it instead with Mark Teflian's speech and by including customers on almost every panel.

HARDWARE PLATFORMS

Long ago managers did their work through people. People did their work through machines such as tractors, telephones and typewriters, machines that amplified their physical capabilities. Then engineers got workstations, analysts got 1-2-3 machines, and secretaries got word-processors to amplify their mental capabilities. But managers still do their work mostly through people. WELCOME TO THE FORUM!

INSIDE		
ISSUES		
Pcs and workstations.	1	
Platforms.	6	
Databases.		
New applications.		
Distribution.		
PROFILES		
Bob Flast, AmEx.	19	
Peter Coffee, Aerospace.	20	
Joyce Wrenn, American.		
Mark Teflian, Covia.	20	
Eric Drexler, Stanford.	21	
Edward Tufte, Yale.	22	
SHAPE OF PLATFORMS TO COME		
By Mitch Kapor.	23	
SPEAKER/COMPANY LISTINGS	26	
CALENDAR	29	

EDventure Holdings Inc., 375 Park Avenue, New York, NY 10152, (212) 758-3434

That's changing now, as workstations and pcs become cheaper and powerful enough to handle applications oriented to softer tasks than numbers and word-processing, as a new generation of managers who can type shows up, and as communication among these machines supports group efforts as well as individual tasks. Pcs are now a tool for management as well as for production and analysis.

Can the industry support a new platform? IBM and Microsoft are trying to ease people up onto the PS/2 and OS/2, while Apple is trying to benefit from the raising of the platform question to shift users more abruptly onto the Macintosh. However, the Macintosh will undergo its own traumas shortly as Apple builds a true multi-tasking operating system for it (and simultaneously invades the UNIX community with A/UX). Meanwhile, Sun, AT&T and their partners are trying to persuade us that the engineers were right all along, and that UNIX, now enriched with a standard implementation and a graphical front-end (and powerful, scalable hardware underneath) is the only way to grow up. All UNIX now lacks, they argue, is a specific look and feel.

PS/2

IBM's PS/2 is the machine only IBM could hope to pull off -- different enough to be an inconvenience, better enough to be worth it, with greater reliability, flexibility and extensibility. On the other hand, we suspect IBM may be pulling its punches to protect the S/3X line, selling the PS/2-OS/2 combination initially as a single-user workstation rather than as the server it's fully capable of being. The full utility of the Micro Channel can be well exploited on a server, which could profitably support several different peripherals for, say, mainframe access, remote communications, printing, local storage, and perhaps some hardware-assisted special-purpose data processing (an inference engine, say, or scientific calculations).

It is true, however, that OS/2-based applications will run as well on most clones as on the PS/2 line (although that may change), and that legal PS/2 clones will be available, one way or another. OS/2 is well on its way to becoming a standard in part because it is generally available. The same will happen to the PS/2, already supported by hundreds of card vendors, as soon as various people within IBM can figure out and agree on how to price and license the technology gracefully. Then we will see clones from the likes of Compaq and Dell Computer and clone kits from Chips & Technologies, Western Digital, and Intel (and possibly systems as well). Although resellers such as Businessland still express reluctance to carry PS/2 clones without some signal of legal acquiescence by IBM, there will be ample second sources for the PS/2, and people can go ahead and support it. (Computer-Land's Ken Waters says it's a business decision: Why sell a clone when you've got the real thing?)

Among the PS/2 supporters are Cumulus, the new PS/2 peripherals company founded by Tecmar founder Marty Alpert, and Altera, a supplier of programmable chips for PS/2 cards. Altera sells erasable, programmable logic devices (the British call them "uncommitted" logic arrays) that can be configured cost-effectively into chip sets customized for low-volume or prototype systems, as well as for fast development for higher-volume uses. Altera's strength is not so much the chips themselves, but its supporting software for logic development, which enables users to customize those chips quickly and efficiently. In the current environment, time-to-market is a signi-

Release 1.0

ficant factor for success, yet it carries a cost for the necessary use of inefficient standard parts and less integration than, say, C&T can get with its high-volume chipsets or Altera can achieve with its instant parts.

At IBM itself, the focus will shift some this year. IBM will become increasingly aggressive in its sales efforts and its support of dealers, whom it is spurring with increased quotas and wooing with a host of new programs including advertising support and a ukase against competition from IBM's own salespeople. IBM is maintaining its freeze on new medallions, to the dismay of players such as 47th Street Computer, and to the delight of existing members of the club such as Businessland and ComputerLand, who won't face new competition and will get more support from IBM's branch offices as management's policies favoring third-party sales filter down through the ranks.

IBM's advertising/marketing approach will also shift from selling solutions, which IBM traditionally offers at the high end, to stressing the sheer quality of its boxes. Most customers know by now that most software (i.e., solutions) runs on clones as well as on PS/2s. But they are still concerned, rightly, with reliability, power, display quality and other areas to which IBM has devoted much attention. Moreover, the company has put the industry on notice that it will be bringing out new products (but not a new generation) on a six-month basis, providing a far faster-moving target than the PC. By 1989, all new IBM PS/2 models, from entry-level systems up, will be 386- or 486-based.

Recently, companies such as **Compaq** have flourished in the wake of IBM's departure from the AT market -- but the margins in that market are minimal. Like IBM itself, they will have to search for higher margins elsewhere. Compaq's 386 superclones, especially its portables, are a good start.

Macintosh

The rise of Apple's Macintosh over the past few years has extended its benefits far beyond Apple and the 10 percent or so of the installed base it comprises.¹ Many customers know full well that OS/2 with Presentation Manager will offer much of the richness of the Mac, but they want it now (perhaps influenced by DEC's ads). One thing the past ten years of change has taught us all is that no solution is forever. Thus customers are willing to buy Macs even if they're not ready to abandon IBM forever, and suppliers are showing greater sensitivity to the problems of retrofitting existing solutions. DEC and Apple, in their recent co-development agreement, are merely helping along a set of connectivity products already available from third parties such as AST Research, Centram/Sun, DCA, Network Innovations, Odesta, Orion Network Systems, 3Com, Novell, and Virtual Microsystems.

The Macintosh has been the foundation for much of the innovative software released over the past couple of years. However, that is about to change as the focus shifts from graphically rich *personal* tools to the next generation of groupware and database-based applications. Most of the next generation

¹The percentage of Macs is 11 percent and growing at VAX sites, according to Computer Intelligence; this number is lower than the frequently quoted one-third figure because it is half a year old and measures the percentage of the total installed base rather than the percentage of sites that have at least one.

Release 1.0

of software will use OS/2 or even UNIX, and talk to an SQL database. Macintosh, while very rich on the front-end, has a limited notion of back-end functionality. In addressing the next-generation software market, the Mac has suffered not just from the lack of a multi-tasking OS, but also from the absence of a substantial, SQL-based database management system, a situation about to be ameliorated by **Sybase** and perhaps others, including **Blyth**. (Odesta's Helix already offers a powerful database that runs transparently across the Mac and the VAX, but it has not captured a wide market.)

Workstations on the way

Long ago, Sun Microsystems was considered an upstart, taking on Apollo and Symbolics. That battle behind it, Sun is now attacking DEC at the high end and IBM and Apple at the low end. With AT&T's money and clout, Sun is attempting to establish its system and the open UNIX ABI (Application Binary Interface) standard as yet another platform. Sun is making a downmarket incursion into VAD and VAR distribution channels -- a move spearheaded by Sun director and Kleiner Perkins partner John Doerr. The success of these efforts will depend not only on the quality of Sun's products but on their perceived and anticipated success, which will help them garner third-party support. In other words, it's a game of bluff until (or unless) Sun can assemble the right cards to win a round and stay in the game. This is a game in which no one wins for good, although many along the way have lost. (For what it's worth, Sun's rumored 386 machine is not yet another pc, but a way to let engineers run Intel-architecture software. Sun's attack on the pc market will be with a cheaper, UNIX-only system, using the success of TOPS as a wedge. "We don't want the connections between PCs and Macs to grow into full-scale networks without Sun being there," says Doerr.)

"This will not be 'yet another platform'," asserts **AT&T's Vittorio Cassoni**, "but *the* platform. Our major problem until now was lack of consistency, but now it is *one* platform. This was the overwhelming objective of our agreements with Microsoft and Sun. Now we have the only operating system that can ride the RISC curve [using the SPARC RISC chip]."

Sun and AT&T will be working closely together (as are Microsoft and IBM). Vendors who considered AT&T a software vendor with an inept hardware effort are seeing it turn into a genuine competitor with an alliance with another genuine competitor. The UNIX market has changed dramatically, and the teamup of Sun and AT&T has spawned a counteroffensive by a collection of other UNIX resellers called the Hamilton group.² They are upset that (1) AT&T and Sun will "control" the standard, whatever that means, and (2) they will optimize it to run on Sun's SPARC chip.

Our fix on all this is that it's good someone is finally turning UNIX into a single thing rather than a loose description of a number of things, and no one is forcing these people to use it. Sun's and AT&T's proclamation of a standard doesn't make it one; the market still has to buy it. If customers prefer what AT&T and Sun cook up (and promote, to be sure), that's what business is all about. Given that AT&T and Sun will license the system freely, what's to object to? If they kept people from using it (cf. Ashton-Tate and

²There's an interesting counterpoint here to the Ashton-Tate/dBASE language situation. A-T wants to keep dBASE proprietary, and is objecting to a group that wants to make it into a standard.

Release 1.0

16 February 1988

4

the dBASE language), that might be another matter. In fact, the other vendors should be glad that Sun and AT&T are developing a standard for them to rally around; without it, UNIX would surely lose to OS/2, VM, or DEC's VMS.

What will happen long term, of course, is an interesting question. If AT&T should attempt to assert proprietary rights, the Hamilton Group will then be able to charge unfair trade practices. But if AT&T simply tries to change UNIX unilaterally, the customers will be the first to complain.

The second objection -- on SPARC, Sun's RISC chip -- is equally dubious. However, SPARC is as freely available as UNIX (at prices set by vigorous competition among vendors such as Cypress and Fujitsu). Making this point eloquently, Sun's Scott McNealy notes, "We don't know how many SPARC licensees there are. We don't own the design wins."

Sidestepping the point, Apollo's chief technical officer Dave Nelson promises that Apollo, a Hamilton group member, will soon "make SPARC look technically inadequate" with its own RISC chip. Cassoni's response: "We chose SPARC for its openness, not for 10 percent performance here or there. The Hamilton group, I met with them and addressed their concerns. Our intention is to keep UNIX open. If that is their concern, then we are addressing it."

The major technical question remaining is the completion of the UNIX standard with a tight definition of the standard user interface. X-Window, NeWS and the others are all *facilities* that can be used to create a multiplicity of possible look-and-feels. Compare, for example, Presentation Manager, which is not just some software but a set of specs (part of IBM's Systems Application Architecture) specifying what look should be built with those facilities. In the future, IBM and Microsoft (as well as third parties such as **Micrografx** and The Whitewater Group) will offer templates and graphical objects that will save builder/users the trouble of creating their own from scratch. Microsoft for one would dearly love to see a Presentation Manager look-alike on top of UNIX, and is lobbying AT&T for it. "We are working on it," says Cassoni vaguely. "We are working on deciding to put PM on top of UNIX" -- probably in addition to something else.

The major market question is the prospects of this venture. In the end, a standard that no one owns is a standard no one invests in. On the other hand, investments may extend a standard into something else, with a greater, and ultimately proprietary, value...

Apollo

Despite its revenues of \$553 million in 1987, Apollo has lost ground relative to Sun, even though Apollo's original architecture offered a superior networking environment, Network Computing System. Unfortunately, NCS, with superb networking and file management, languished in mostly proprietary form until early in 1987, whereas Sun has always been eager to spread around its solutions -- NFS, for Network File System, and PC-NFS; Centram's TOPS Mac-PC links; NeWS, for Network-Extensible Window System; NSE, for Network Software Environment. "We didn't want to lower ourselves to the least common denominator," explains Apollo's Nelson. But with Sun's example before it, the company has figured out how to do so with a minimum of compromise, and has announced a tight integration of its NCS with "standard" UNIX, Domain/OS.

Release 1.0

In essence, the Apollo environment manages transparent multi-user access to data and computing resources, multiple versions, conflict resolution and other issues that arise when data and processing power are distributed among multiple sites. Long before the word (or the concept) groupware became popular, vendors of applications such as CAD, CASE (computer-aided software engineering), editing tools and engineering functions were using Apollo systems because of their ability to manage the efforts of multiple users.

Even today, says Nelson, Apollo still wins in large multi-user sites where hundreds of people must coordinate on giant projects such as at Siemens, Boeing, CalTran, and the Software Productivity Consortium (which has got to be one of the world's best reference accounts for someone selling a CASE platform), while Sun wins where people need to assemble an environment of heterogeneous systems. Apollo also has long offered DSEE (Domain Software Engineering Environment, pronounced dizzy), against which Sun is pitting NSE. Both offer different approaches to group development of software; DSEE is better on dealing with version management, while NSE, not yet shipping, promises to provide file merge (reconciling different users' changes) and links between objects, such as source code and its documentation.

PLATFORMS

How long will it take DOS to disappear? A long time; DOS 3.4 is scheduled for 1989. Like CP/M, DOS will remain alive years after people stop talking about it.³ It will persist on user workstations -- in many cases, as the front-end to interesting server applications. For example, Network Technologies' DocuForum consists of a UNIX server back-end and DOS-based frontends. The DOS version of Ashton-Tate's dBASE IV 1.X (the release that will support SQL Server) will give users access to many OS/2 applications built around SQL Server. Other OS/2 applications will offer similar support for DOS workstations, with facilities within OS/2 that support DOS front-ends.

To be sure, OS/2 is not just for servers. Rich and power-hungry users will want OS/2 on their individual workstations so that they can benefit from a host of multi-tasking, multi-threaded applications, efficiently sharing common libraries of standard functions. In the long run -- as OS/2 becomes more and more prevalent -- the notion of an "application" will seem strange: Rather than applications, users will call on the services of a variety of program modules to perform specific tasks. Current applications are collections of such program modules tightly lashed together, because there's no other way to ensure that they can work with each other. Lotus's LEAF is an attempt to provide support for such modules around 1-2-3 and Symphony; the combination of OS/2 and extended BASIC from Microsoft or REXX from IBM will provide the same function more generally. The notion of "tasks" as a multi-user effort will also gain currency, supported by networks and peer-to-peer communications and groupware tools such as FCMC's Staffware and Workhorse, which now work on UNIX, and Hewlett-Packard's NewWave.

³Although CP/M is not on a retail price list, DRI is still selling it to OEMs, and customers are still using it and the newer Concurrent DOS to run their CP/M applications. MicroPro has recently shipped almost 30,000 copies of its upgraded CP/M version of WordStar in the U.S. alone.

Atop the operating system we will see not just databases and applications, but tools and environments that will serve to integrate them (above) and present them to users (Windows, Presentation Manager, the Mac interface, NeXT, and Tandy's DeskMate, an interface that other vendors are eyeing with interest). Sun's NeWS and X-Window are both environments that support windows but don't have much to say about what you put into them, so that there is no distinct look and feel such as with the Macintosh -- or 1-2-3. The spread of Adobe's PostScript and Display PostScript will help software writers by increasing device independence for some printers and displays.

These systems are only beginning to address the fundamental issue: accessibility. If users could only get at what functionality any system offers, that would be a stunning victory. Macs may provide 20 percent of the functionality, of which users can use 80 percent; Suns provide 80 percent, of which people can use 20 percent. Pcs with OS/2 and groupware and better interfaces, we hope, will provide 80 percent functionality with 80 percent usable. That amounts to 64 percent of potential, or four times the 16 percent most systems manage now. (These numbers are vaporous, of course.)

IBM's Extended Edition

IBM's Extended Edition is IBM's vision of the compleat platform for application development, with communications and database built in. In its first release later this year, it will go only part of the way, because it will provide all these facilities *per workstation*, in a heavy burden on system resources. Later on, these facilities will be available in remote mode, offering multi-user access to data and a multi-user gateway to remote systems. IBM will also separately sell its LAN Server software for \$995, which will add support for common server functions such as print spooling, multi-user file access and security. The network support within OS/2 EE simply enables an OS/2 workstation to hook into the network, but not to "serve" it.

Other vendors are lining up to offer alternatives to Extended Edition. With 3Com and Sybase, Microsoft offers a partial solution, including UNIXstyle communications from 3Com's Bridge unit, but still lacking full IBM SNA support. Everyone has more or less agreed that whatever your hardware and operating system, SQL is the proper way to trade data. By contrast, there is little agreement about communications media and protocols; all users can ask for now is that everything they buy should have sufficient drivers and interfaces to talk across the most common links. This is wasting a lot of vendors' time as they struggle to provide support for a multitude of communications environments. Vendors such as DEC or the UNIX crowd may boast of homogeneity, but connecting to the IBM world is *their* problem so long as it is their customers' problem.

Among the vendors ready to jump into the breach with add-in SNA support is Orion Network Systems. Mostly a supplier of technology to OEMs, Orion has provided OEM connectivity products to non-IBM hardware vendors such as AT&T, Philips, Prime, Honeywell, Olivetti, and Apollo. Orion also provided the foundation of Apple's and Banyan's recent announcements of APPC/LU 6.2 support. Long run, says president Paul Rampel, he wants to move the company beyond its OEM orientation and provide end-users an alternative to OS/2 Extended Edition's communications facilities -- perhaps in conjunction with some other vendor's network or database. Overall, the communications world suffers from a proliferation of "standards" that require too much investment for any single vendor to support en masse.

Release 1.0

16 February 1988

7

DATABASES

We've all heard it: Database management systems are commodities, SQL rules the world, and so forth and so on. In fact, there's a big difference between standards, which are necessities and commodities, and what you can do with them to extend the least common denominator. In the database world, for example, SQL is necessary but not sufficient. Providing SQL is only the first cut.

SQL allows any SQL-using front-end to retrieve data from an SQL-using backend, but it does not allow either end to make full use of any additional capabilities the other end may offer. That is, any SQL-using front-end will be able to use data (for which it has authority) stored on a vanilla SQL server, but it won't necessarily be able to create or call the stored procedures, triggers, or integrity-enforcing schemes of the Ashton-Tate/Sybase/ Microsoft SQL Server, which are stored with the data, not with the applications at the user's workstations.⁴ In the same way, Lotus's back-end from Gupta Technologies is likely to offer spreadsheet-oriented facilities (such as cross-system consolidations and consistent access during updates) that won't be available to SQL Server-specific front-ends. All this is inconvenient but not devastating. You lose something but you still get access.

Distributed databases

Things get more interesting when you deal with distributed databases, where not only the users but the data are all over the place. Distributed database is not a typical problem in the pc world, where even distributed access with record-locking is considered an unusual if desirable feature. But it will become a real issue as people get serious about sharing data: We can't all run off the same server. This is where the back-ends have to work with each other to coordinate "commits," the signal that a transaction has been successfully completed. (The holy grail of incomplete transactions is one that allows you to withdraw money from the bank without debiting your account.) That's difficult enough for a single vendor's systems to do --Tandem and Sybase have this capability; IBM, Oracle, and Cullinet are all promising it -- and even tougher in a heterogeneous environment.

Complaints about ownership of standards in database will get really fierce, because you need deep knowledge of another system's workings in order to coordinate commits. Sybase promises to be the Sun Microsystems of the database world, offering its protocols to all comers and competing on the sheer firepower of its own implementation. IBM, for its part, warns against putting integrity controls into the database or expressing them in anything other than pure SQL, since that limits portability, and the ability to use optimized SQL systems such as Nucleus'. Of course, locking customers in is precisely what some vendors have in mind.

The diagram across (numbers approxi-		<u>Data</u>	<u>MIPS</u>
mate) shows how important it is to be	Mainframes	80	20
able to get to foreign databases. Al-	PCs	20	80
though the workstation end of the mar-			

⁴Triggers, of course, work automatically, so any front-end will automatically "use" a trigger when it does a triggering action on the relevant data.

Release 1.0

ket is growing much faster than the mainframe business, most of the data is still sitting in mainframe disk farms, not in DB2 but in IMS or IDMS or even flat VSAM and ISAM files. We may not ever be able to bring these wholesale into the distributed database world, but access facilities such as those from DB/Access and Information Builders (Focus) help. Other similar tools such as Network Innovations' Multiplex or IntelliCorp's KEEconnection handle the simpler job of generating SQL queries for access to most relational databases. Network Innovations' new Connectivity Language enables users to do cooperative processing, as well as just data query, across systems. And Odesta's Helix runs on both Macs and VAXes.

Object-oriented databases

Object-oriented database management systems are just starting to show up commercially from vendors such as Servio Logic and Ontologic, but they are starting to show up in droves in business plans, says Vern Raburn, a key figure in the histories of Microsoft, Lotus and Symantec and now a venture capitalist with partners Phil Cooper and Rick Karash at Cooper & Raburn. Object-oriented databases right now are where relational databases were a decade ago -- mostly academic exercises, but just about ready to meet a new set of needs. In the case of relational databases, the needs were end-user access and ease of development; in the case of object-oriented databases, the needs are storage of graphical and textual information, richer models of the world, and better management of program elements themselves. Future end-user and programmer environments will depend on object-oriented structures to present data in a way users can grasp intuitively, and to provide easy access to a variety of information management tools. (See also Mitch Kapor's essay, page 23.)

ON BEYOND NUMBERS: NEW APPLICATIONS

Business schools and business people are paying increasing attention to managing not just production and sales, measured in numbers, but to quality, positioning, marketing, all expressed in text (and poorly measured). So, although we're interested in the battle over the spreadsheet marketplace, we're more interested in defining *new* markets for applications that will help us deal with the more complex world ahead.

There are two divergent paths -- visible display and invisible data manipulation. One is computer-aided content presentation; the other is computeraided content analysis. What do these horrible terms mean? (We use them only to clarify the juxtaposition.) Computer-aided content presentation is about letting users add content or impute significance to information with visual cues. Graphing is probably the most familiar: it doesn't analyze the information except in a rudimentary way, but presents it so that it is more meaningful to a person. The user can further improve the presentation with appropriate scaling and the right amount of the right information, as Edward Tufte amply illustrates in his classic The Visual Display of Quantitative Information (and as he will discuss over lunch on Monday).

Until such time as we all communicate via terminals (a long way off), the end result is likely to be slides, a fact well heeded by **Presentation Tech**-

Release 1.0

16 February 1988

9

nologies, which was early enough into an increasingly crowded field to get the name of choice. PT sells ImageMaker, a slidemaker that works with Macintoshes and PCs. The company's vector-based software produces extraordinarily clear slides and fonts, but it needs to develop a raster (bitmap) capability as well. Long-run, the company says, it wants to provide a back-end graphics engine for presentations in any medium -- paper, slides, skywriting (computer-controlled airplanes?).

The provider of one significant standard, PostScript, Adobe has expanded from an OEM supplier of its graphics language to enter the retail market with Illustrator, a superb drawing packages. (Micrografx offers Designer, a competing package for Windows and soon Presentation Manager.) Adobe also makes Display PostScript, which offers device-independence for displays as well as for PostScript printers. And then there's Datacopy, which helps to get the bit-map images in there. We had thought scanners were boring, in fact, until we visited Datacopy and discovered all the neat software you can apply to enhance bit-map images. Datacopy also uses character recognition software, and text-object recognition software from Avalanche Development, which can determine from bit-maps or from the placement of ASCII text whether something's a headline, or a footnote (but that's content analysis...)

Text

The other half of the presentation equation (for now) is text (treated as objects, not information), and all the wonderful things you can do to it with fonts, halftones, layout, etc. (Like all power, these capabilities can be misused with disastrous results.) Aldus's PageMaker was one of the first such tools and helped to create the market for (and the word) desktop publishing. With a little push from Ventura Publisher, PageMaker now includes a more powerful array of features. Meanwhile, the company has broadened its scope to compete with Adobe with Freehand, a drawing package.

Interleaf preceded even Aldus into WYSIWYG editing, and is the true forebear of much of the current proliferation of desktop publishing. Interleaf, one of the first mass-market applications to run on a Sun, is now available on a pc -- the Macintosh II to be specific. But the company wisely understands that being on a Mac doesn't necessarily turn a product into a retail item. Instead, Interleaf is keeping the price relatively high (\$2500) and selling to those of its customers that want the product on a Mac, rather than trying to take on PageMaker and its ilk directly. It is also selling companion word-processors for use on the Mac and the PC.

Competing in this high-end market with a cheaper product (until Interleaf restructured its product into modules) is Frame Technology of San Jose, CA, with its Sun- and Sony-based Frame Writer and Frame Maker, soon to be ported to the Mac and other systems. Frame puts more focus on text and content than Interleaf, which wins on the basis of its graphics capabilities and a fuller function set.

You can also represent and add meaning to data by organization, not just display. Hypertext, a much-buzzed term that basically refers to anything that includes links from one piece of data to another, is also a use of computers to *represent* meaning, not to create (or derive) it. Aggressive marketing people could call Dan Bricklin's Demo Program hypertext, since it lets you create links from screen to screen. ("And it lets you fantasize!"

Release 1.0

crows FCMC's Tony Kobine.) Knowledge Systems' Knowledge Management System is closer to what the market considers hypertext, but with extensions that make it a hypertext-based tool rather than "pure" hypertext. KMS, the outgrowth of an academic project at Carnegie-Mellon called Zog, is a nifty hybrid of hypertext, outlining and desktop publishing that exploits Sun and Apollo workstations to their fullest.

Computer-aided content analysis

Word-processing treats text as inert data; "desktop publishing" allows a user to pretty it up and invest it with meaning through graphical cues such as layout and fonts. *Computer-aided content analysis*, by contrast, is the use of computers to derive meaning from text or numbers; in addition to numerical calculations, it's natural-language processing, object recognition, text classification (see Release 1.0, 31 January), and other means of abstracting inexplicit content from data or text. Such pattern-recognition and pattern-matching techniques can be used to analyze a spreadsheet and detect the underlying formulas, or to parse a sentence and derive the underlying word structure so as to check its grammar (as in Houghton Mifflin's CorrecText). Another example is MIT's Information Lens, which can inspect a message to determine its meaning and then provide an appropriate response according to rules set by its user; it can inform the user of a new appointment and update his calendar, or notify him that his budget request was approved and generate a purchase order.

Even as desktop publishing and graphics tools vendors are giving people the tools to add content to words by presenting them more richly, tools such as those from **Avalanche Development** and **Third Eye** offer ways for computers to discern that content, by recognizing text objects such as captions, head-lines and titles, and by classifying their topics.

Thus when Apple's Larry Tesler complained about sitting on a word-processing panel, we hastened to explain that that wasn't what we meant at all. To us, text is the wave of the future, the foundation of a richer way of looking at the world than mere numbers. Tesler was relieved to hear that: "Looking at text left to right and down the page is where I have trouble. Screens used to have text that rolled by and scrolled off, but we're getting away from that model. Now we can access things relationally, graphically and inferentially as opposed to linearly. Sure, I can talk about that."

Some examples

Third Eye Software sells Elexir, a text-search software package/technology, on an OEM basis to vendors who use it as the basis of their applications. With clever algorithms the company is able to achieve impressive speed in similarity searching -- a sort of query-by-example for text where you show the system a paragraph or other model of the kind of article you want, and it searches for anything similar, producing a ranked list of matches. Third Eye president Peter Rowell waxes eloquent about the wide range of human peculiarities of thought and diction, and their statistical predictability.

Natural Language Incorporated is the company that persuaded Microsoft to invest \$1 million last year. We're still waiting to see the fruits of that effort, but in the meantime the company has been chugging along winning customers such as Ortho Pharmaceutical, NASA, Boeing and Teledyne, and ex-

Release 1.0

tending the power of its natural-language system. Unlike most NL systems, which are essentially query tools, NLI's DataTalker has some notion of rich relationships and actions as taught to it by users through the system's Connector, a tool for teaching it verbs, relationships, and other abstract notions. (For example: If a company bought a VAX on June 23, then the company owns the VAX. How long has the company owned the VAX? Since June 23, or 8 months.)

This spring will also see the release of a trio of text structuring tools (a.k.a. personal information managers⁵): IZE from Persoft (developed by Paul Kleinberger), Agenda from Lotus (developed by Ed Belove, Jerry Kaplan and Mitch Kapor, and GrandView from Symantec/Living Videotext (developed by John Friend). Each builds hierarchical structures from chunks of text, but each has its own personality and features. Each lets users organize and reorganize the structure and sequence of a base of text items, and easily rearrange them according to specified criteria. This is much like a "view" in a relational database, where a user can specify criteria and then view a selected portion of a database that corresponds to his interests.

IZE is the most automatic of the three: It creates outlines or tables of contents that organize text items according to the key words they contain. Aside from optionally specifying keywords, the user does little work. If IZE has a forebear, it is the standard text-search package, which creates an index of all the words in a text base. A text-search package uses this index to find particular items the user specifies by selecting certain words. IZE uses the entire index to arrange a list of the text items according to word frequency: All items are segregated by whether they contain the most frequent keyword; those two lists are divided by whether they contain the next most frequent keyword, and so forth. By omitting a word from the list of keywords (or adding one) the user can dramatically alter the structure of the resulting item list, or outline. If the user doesn't specify keywords, the system uses everything except stop words such as "and," "the," and "of." The effect is to create a hierarchical "map" or table of contents showing the contents of your text base, collapsible or expandable on demand.

GrandView, as you might expect from the makers of ThinkTank, the grand-daddy outlining program, takes much of its character from the outlining metaphor. The idea is extended by letting the user assign text items to categories; then he can ask the program to show him all items relating to a certain category. Thus the user gets both the hierarchical structure of the outline he created by hand, plus selection capabilities according to criteria he specifies: Rather than manipulate an outline just by hierarchical levels, he can also select from it according to content. Each selection comes along with the text beneath it in the hierarchy. Overall, GrandView gives the user a substantial amount of power as an extension of a familiar metaphor.

Agenda has no single, clear antecedent: It's a cross between a database and an outline, with a rule-oriented programming language thrown in for good measure. Unlike IZE, which categorizes each item by the words it contains, or GrandView, which lets items remain uncategorized unless the user takes

⁵The term "personal information managers" also refers to a variety of file and database managers, sometimes preconfigured for personal contact maintenance (Chang Labs' C.A.T and Conductor Software's ACT!), and a variety of free-form "text bases" (Ask Sam and DayFlo).

Release 1.0

specific action or assigns keywords, Agenda can derive categories from the location of items both within a hierarchy and within columns on a screen, or by keywords, or by more complex criteria expressed in the product's Conditions & Actions language. Agenda requires more mental effort on the user's part than IZE or GrandView, but it gives greater power in return. If IZE is the intellectual equivalent of a surveying tool and GrandView is the intellectual equivalent of a lever, then Agenda is the equivalent of a robot -- with all the power and strangeness that that implies. Panelist Bob Flast is one of the product's most enthusiastic beta users (a fact we didn't know when we invited him).

13

GROUPWARE

Workgroup computing is the hot new word in software. But what's the difference between old-fashioned multi-user applications running on a mini or mainframe, and groupware? After all, those traditional applications coordinate several people working together, assign and monitor the completion of tasks, and so forth. The distinction between that and workgroup computing is fine, but it's the difference between workers on an assembly line, and artisans cooperating in a workshop. Or it's the difference between a mass transit system, and a traffic system that allows individuals to travel freely but efficiently in their own cars.

Just as most pc applications are in fact tools, so will most groupware systems be tools that enable people to set up and carry out the processes that run their businesses. Some groupware relies on its users to route and assign tasks (whether dynamically or by pre-assignment); these systems tend to be extensions of E-mail or editing systems. Others, typically forms-based, are built around a database that both holds the office's data, and routes tasks according to rules and values entered or stored in the database. So far, we've automated individuals' tasks, loosely described as paper-generation, and eliminated a lot of drudgery. Now we're about to automate the paper-shuffling...

Groupware tools

Aside from its role in text-centered applications such as those above, text is also a foundation of much groupware -- not surprisingly, since people communicate in large part with words. During his speech Wednesday morning, Lotus's Jim Manzi will cite several examples of beta-customer experiences using a new text-based product designed to support group-oriented work. No, this is not Agenda, but something else still unannounced. It was developed in a joint workgroup drawn from Lotus and Iris Associates, a start-up founded by key Symphony developer Ray Ozzie.

While the Lotus product uses text as a fundamental medium, Workhorse, from Workhorse of Dublin, Ireland, treats text as an object to be manipulated by users rather than by the system. This groupware tool retains a fairly strong text bias because it is oriented towards decision-making and papershuffling rather than heavy-duty transaction-processing or numerical analysis. This UNIX-based system is a combination of E-mail and routing facilities, along with a forms-based interface and integrated tools such as wordprocessing and file management.

Release 1.0

A user-builder can set up a sequence of steps and yes-no branches to be followed by members of a workgroup, and assign the tools (contact files, word-processor, etc.) the user is likely to need at each step. Typical tasks include looking at or entering information, composing letters, and recording decisions. Typical uses might include subscription fulfillment, sales support and follow-up, and other paper-intensive work. Workhorse was founded in 1985 as an extension of a VAR business by managing director Frank Devin and two partners, including Devin's wife Nicky. The company has just hired Lanier co-founder Charlie Hall, who now lives in Europe, to put together a set of documentation, marketing materials and the like to take its show on the road -- to be specific, to UniForum last week.

By contrast, FCMC's Staffware is built around a powerful database, with rules and data underlying decisions and controlling the routing of information and tasks from person to person. The system holds rules determining who does what tasks under what conditions, most of them derived from data in or entered into the database. For example, the system could compare order amounts and credit limits, and route an order accordingly. As the order is filled, picklists may be constructed and assigned according to stock levels and warehouse locations. Staffware developer Tony Kobine will make a presentation about Calypso, the follow-on to Staffware, and show a prototype built with Dan Bricklin's Demo Program.

Staffware lacks the variety of tools Workhorse offers, but it automates more of the decision-making as well as the routine paper-shuffling that goes into group work. Staffware follows rules set up by the builder-user and examines data entered by the user or within the database to determine routing and manage the flow of work, while Workhorse either follows explicit directions or asks the user to determine the routing of its tasks. Of course, some users prefer the extra work; they like to feel in control, at least until they trust the system.

POSTMA^{chi}N^e: Intelligent mail

Although we are listing groupware here as a separate section, "groupware" will eventually be seen properly as a characteristic of an application rather than as a definition of an application. One counterargument is E-mail, which can't exist in other than multi-user form. Yet the groupware version of E-mail tends to be more "intelligent" than traditional E-mail: It does not just deliver messages, but routes and handles them. A case in point is Action Technologies' The Coordinator, a controversial tool that makes the "actions" of communication explicit: Either you ask for something or you don't; there's no such thing as a hint.⁶ In offices muddled by confusion and lack of coordination such a tool can be either a godsend...or a disruptive intrusion that upsets routines and unmasks fuzzy commitments from people who make vague promises to stave off deadlines. By creating specific types of messages, you can use The Coordinator to build specific applications. Action Technologies also OEMs a would-be standard, MHS (for Message-Handling Service), used by Novell and other companies. Lifetree, the vendor of Volkswriter, has broadened its line to include Team/Net Results, a sort of "VolksMail" with E-mail and multi-user calendar management for pcs.

⁶We thought you'd like to know: We love it when people write to us or comment on what we write.

14

Groupware applications

In contrast to The Coordinator, DocuForum from Network Technologies manages a specific group application -- document commenting and editing. To many users, it is *just* an editing system, although users are de facto communicating through it as they comment on and suggest modifications to one another's work. Currently UNIX-based with a DOS front-end (soon to be ported and improved with better access to "foreign" word-processors), DocuForum does in real-time what Broderbund's ForComment does mostly in a sequential manner. Users can see each other's comments as soon as they are made, and respond. The ultimate result can be printed, with modifications as selected by author or editor, or it can remain on-line as a "living" document that spells out maintenance procedures, corporate policy, or any other text material people refer to and update constantly.

Context Corp's Documentation Management Environment is a powerful cross between DocuForum, with its groupware orientation, and Interleaf, with its graphics and layout capabilities (with pricing to match -- roughly \$20,000 per seat including hardware). DME's edge lies in its ability to manage multiple versions of documents composed of multiple objects -- a facility that relies in part on the capabilities of the Apollo workstations it uses. The system can link objects dynamically, so that, for example, a single bit-map image need not be copied and stored many times, but can be retrieved by all users as needed. Moreover, one user can overlay the image with French and another with German text; those pieces too can be assembled as necessary. Context's DME could some day become the "document server" (cf. SQL Server) of publishing systems as client/server architecture spreads to this market too. (Text objects, as opposed to data tables, are a little harder to store and manage, a task that will eventually lead to the proliferation of objectoriented databases; see page 9.) For now, Context offers a complete system with both its rich data-management back-end and a powerful front-end.

Finally there's **Claris**, which is just beginning to establish an independent identity apart from its parent Apple. Claris is a likely candidate to offer groupware for the Macintosh environment. It needs to do something significant to maintain the momentum it has inherited with a set of old (if recently enhanced) software from Apple. The company has just purchased SmartForm Designer and SmartForm Manager from Clearview of Providence, RI. If it can successfully marry these to a back-end database (SQL Server, say), it could end up with a rich tool for managing the flow of work -- with each user seeing the appropriate data through a set of appropriate forms.

Lending plausibility to this goal is Claris's recent coup in hiring Yogen Dalal as its chief technical officer. Marketing vp John Zeisler calls him a giraffe: His feet are on the ground, but he can see over the trees -- as long as he's willing to stick his neck out. Dalal formerly worked at Metaphor, where he helped select Sybase's DataServer (then in prototype), and is a proponent of networking and other multi-user notions at Claris, sticking his neck out. The difference from Metaphor is that the Metaphor system involves analysis of data, whereas forms are more transaction-oriented, says Dalal. If desktop publishing followed and fostered the proliferation of cheap printers and graphics, form-based applications with data-based task routing will do the same for cheap, powerful databases and networks.

Release 1.0

Artificial intelligence

Artificial intelligence, like groupware, is more a technology/approach/ concept that can enhance applications than a kind of application in itself. Companies that are selling "pure AI" tools tend to be going through tough times right now. In fact, AI companies are seeing their techniques taken over by regular applications developers: there are if-then rules and other AI techniques in such programs as Ansa/Borland's Paradox, many tax programs, VM Software's VMCenter tools for VM data center managers, Cullinet's IDMS Architect and Knowledge Build CASE tools, Lotus Agenda, MSA's accounting packages, IDE's Software Through Pictures, spreadsheet analyzers, and the like. Aion's Application Development System, formerly positioned as an AI tool, has now been extended to be a full-scale CASE tool. None of these is sold as an expert system; all are enriched by some embedded ES functions.

To help people build such embedded expert systems, Neuron Data sells one of the industry's most elegant expert system development environments, Nexpert Object. It sells for \$5000 on a pc (Mac II, PS/2, etc., with runtimes for less), and for \$8000 on workstations such as Sun, HP and Apollo, and on the VAX. The system offers a tremendously rich development environment, giving the user colorful, graphically rich tools to visualize the structure of his data and the sequences and relationships of rules. It also includes good facilities for integration with "regular" databases and programming languages. The company is now working to remedy Nexpert's one major flaw by working with third parties to develop rich interfaces for the delivery of standalone expert systems.

Coming from the opposite direction, IntelliCorp's KEE offers perhaps the industry's richest user interface. KEE's edge is in the presentation of rich models, not in the conclusions it can draw from them, and so the company has shifted its focus from expert system tools to database access and IntelliCorp will now try to leverage its spectacular user intermodeling. face where it makes most sense -- aiding an intelligent human in thinking about his data. IntelliScope, a data analysis tool, and KEEConnection, a link that lets it load and analyze data from standard SQL databases, allow a user to build a rich model of relationships and structures using data drawn from a standard SQL database. In conjunction with the shift in direction and following a tough year, the company has made some management changes: Former chairman Tom Kehler remains as ceo and has taken over as president from Gene Kromer (an excellent manager who ended up in the wrong place at the wrong time), while co-founder Ed Feigenbaum, the well-known AI guru, has become chairman. The company is looking for a chief operating officer.

Nestor is one of the few companies using neural nets for (semi-) commercial applications. Some claims for neural nets are fantastic and off-putting; however, it's clear that they can do a good job of pattern-recognition for tasks such as reading handwriting or classifying parts. Also exciting but not proven would be their ability to detect good credit risks, favorable trading patterns, and the like. Our vision of the world is that a neural net has the ability to detect a pattern -- A or B, say; an expert system knows what to do in each case of A or B; and an application does it. Nestor, founded 12 years ago, is one of the few companies selling neural net technology commercially. The company recently announced its Nestor Development System, which has been sold to companies such as BancTec, Ford, and General Electric.

Release 1.0

Computer-aided software engineering

Computer-aided software engineering is one of those misleading -- and leading -- applications that tells a lot about the coming interaction between pcs and workstations. Although people are increasingly selling and using CASE on pcs (Index Technology's Excelerator is a case in point), it is not a traditional pc application and is not sold through the usual pc channels. "CASE" still has a COBOL flavor to it, and the pc world thinks in C. Pc software designers tend not to use CASE -- at least not knowingly. But Dan Bricklin's Demo Program (now in its enhanced second version) is one of the most widely used CASE tools around, with about 17,000 copies in use.

There is also a new generation of pc CASE tools that masquerade as database add-ons, sold to work primarily with dBASE (such as Clear, from Clear Software). In the mainframe world, CASE vendors are likely to encounter fierce competition from database vendors such as Cullinet, Applied Data Research and Cincom who are now selling CASE tools as line extensions. As databases become harder to sell in a world dominated by IBM's DB2, these tools become differentiators.

Interactive Development Environments is our token CASE company this year. IDE's Software through Pictures, which runs on Apollos, Suns, HP 9000s, VAXstations and Sonys, is a front-end CASE tool that enables analysts to design systems interactively and jointly. Aside from its rich interface and support of group work, IDE holds completeness and consistency rules that ensure that the system the analysts design will function -- although what it will accomplish is still dependent on the designers' skill. IDE's Tony Wasserman admits some interest in exploring OS/2, but it won't mean much to him until it has Presentation Manager and networking. "We can't go out there with a standalone system," he says. "Index would eat me alive for breakfast."

DISTRIBUTION CHANNELS

As noted above, the main question about Sun's entry into dealer channels, and Sony's launch of its Sun-clone workstation, is not the quality or priceperformance of the machines themselves, but the vendors' ability to get them into the right distribution channels. The market's overall structure isn't changing as much as it appears, but the traditional measures -- price points -- and the roles of particular players and products are changing. In many companies, internal people such as American Airlines' Joyce Wrenn (who calls her users "customers") are taking on the role of a reseller, buying direct where possible and distributing the goods to users. Internal systems integrators such as Covia's Mark Teflian are using PS/2s where they might formerly have used minis or terminals.

ComputerLand, the largest pc retailer, with \$1.8 billion (through franchisees) in sales last year, is still facing internal as well as external changes. ComputerLand's Ken Waters' goal is to form strategic alliances with a few key vendors, and to gain back 10 points of market share to about 30 percent (still below the 40 percent the company enjoyed in its heyday).

Release 1.0

Waters sees the market's changes clearly: Retailers will reduce the number of lines they support, as vendors demand greater commitment in return. As the products get more complex, Businessland's Enzo Torresi, Corporate Software's Mort Rosenthal and Waters agree, each single vendor needs to expand its shelfspace of the mind to win adequate support from third parties.

Torresi wants to keep a general salesforce (now 700 strong) and back it up with an increased number of support specialists doing phone duty, installation, and other support tasks. Says Torresi (using the corporate "I" common in this industry): "I can only do four or five things well. I can't cram more knowledge into my 80 specialists or my 700 salespeople. The vendors don't realize how much higher the barriers have gotten."

OS/2 in particular will require much higher levels of support. "It's a good thing for our business," says Rosenthal. "Customers need more help. But the challenge is still marketing. The danger is that technology leaders are force-feeding the customers. We spoon-feed them."

The refrain is familiar among distributors too. Softsel is also moving towards support-intensive lines, concentrating on connectivity, as in recent deals with 3Com and DCA. Softsel also carries the AT&T low-end lines of 6300s and 286es and 386es. However, chairman Dave Wagman notes, "AT&T has given us no indication of our role vis-a-vis Sun or SPARC or whatever they might be doing there." A former mainframe programmer, Wagman is taking a personal interest in the connectivity line; the company's new Mac division is under co-chairman Bob Leff's direction.

Dave Blumstein, who has just joined Ingram Software after a brief stint as a consultant, will now be competing with his old employer, Softsel. Blumstein's goal at Ingram is to change the company's image from games to serious business, and to raise margins. "We need to give Ingram credibility in the computer world. We're losing money selling products *above* cost, and our competitors are killing each other selling them *below* cost. We can't afford to do that. We'd rather have an exclusive on something that makes money" -for example, his recent exclusive with Surpass Software for its high-end spreadsheet.

Even Egghead, known for breadth of seleggtion rather than seleggtivity, is making eggressive moves in providing support. With its 110th store opening this month, the chain is about to launch Eggs on Legs (spelled with a single "g" to avoid upsetting the hosiery people), a corps of outbound support people "that will go home with you after you've bought the product," says Egghead's Victor Alhadeff. As for selection, says Alhadeff, "If everyone else is narrowing, I'm thrilled." The company is about to double its range of titles, and is working on an computer system that will provide finer tuning of inventory on a store-by-store basis. So, Victor, when are you going to invade New York City?

While the role of resellers will change as a result of increased support requirements for OS/2 and connectivity, IBM will also drive change in the market with its new aggressiveness in selling through dealers. "Lowe and Lautenbach are sincere about wanting to do 100 percent of their PS/2 business through the channel," says Waters. "We'd like to be their delivery vehicle. If they deliver direct, we'll provide the support. Already, many of our dealers are becoming service arms: We're just starting a new program

Release 1.0

to carry their accounts receivable and inventory costs and give them a fee for supporting the customers. They won't pay us royalties; we'll pay them fees out of what we collect from the customers" (whether or not ComputerLand collects it).

Closer alignment between services provided and revenues generated will be key as different players take on different functions in the distribution channel -- and it may be difficult to make money on products. Torresi agrees: "We've got to get better at unbundling support." Great Plains, for one, is doing nicely with a three-tier support system for its accounting packages, with higher rates for service within one hour (\$750 per year) or within three hours (\$250). The standard version (\$50 plus \$25 per call) promises a one-day turnaround. The support system itself is an excellent example of groupware, with software system that distributes calls by priority to the appropriate specialist among Great Plains' 50 support people, and that notices when a customer's wait is almost up. Customer histories are kept on-line in a database built on SoftCraft's B-trieve.

The <u>real</u> support issue

In general, as people switch from *personal* computers to mostly connected workstations, the sheer complexity of setting up networks, multi-user applications, and distributed databases will force them to seek more help from outside even as they increase the sophistication of their internal personnel. We still believe (hope) that equipment and software itself can ease some of the problem: Consider self-installing software, the Micro Channel's self-configuring cards, and almost everything in the Macintosh environment. If a system is sophisticated enough to know something doesn't work, it should be sophisticated enough to figure out how to *make* it work. We consider systems management to be one of the highest-leverage potential uses of natural language: It's a problem shared by everyone, yet (rightly) no one regards systems management as an end in itself.

PROFILES

This year there are more customers than ever attending the Forum, as user companies take a more intense interest in the industry (and as our marketing improves!). On the panels, users include Bob Flast, Peter Coffee and Joyce Wrenn.

Bob Flast spearheaded the Authorizer's Assistant project at American Express Travel-Related Services. For his pains has been promoted to a position at headquarters where he oversees the entire company's⁷ adoption and use of new technologies. Authorizer's Assistant is an expert-system-based workstation that collects data from a variety of AmEx databases and massages them appropriately to help authorizers determine whether to grant credit for a particular transaction. Try to charge too much in Naples and you may be

⁷Travel-Related Services (including cards and traveler's checks), IDS, Shearson Lehman, and the bank.

Release 1.0

called to the phone by an authorizer trying to determine whether you'll be good for the money! Flast is now involved in technologies such as image management and voice recognition, but his first love is still expert systems. Most applications, asserts Flast, are "human-aided applications," where the data is assembled by the computer, which then calls on the human to make the decision. Artificial intelligence promises the "computer-aided application," where the computer truly does most of the work.

Peter Coffee, engineering specialist in information technology research at Aerospace Corporation, has moved from day-to-day responsibility for pc user support into a technology-planning role at Aerospace Corporation. Aerospace operates as a supplier to the Department of Defense and works on military and space projects. As you might imagine, Coffee gets to see a lot of interesting new software, and works with systems ranging from PCs and Macs to Symbolics workstations and VAXes. Somewhat hyperactive, he also runs a consulting business on the side and teaches information systems management at Pepperdine.

Joyce Wrenn, now with American Airlines, spoke at the PC Forum in 1984 in her role as director of software publishing for IBM's Entry Systems division in Boca Raton. Early in 1985 she left IBM to work for Max Hopper at Bank-America; he left late in 1985 and she followed him a year later to American Airlines, where she now works as vice president of data and applications services for Sabre Computer Services. In that role she manages all end-user computing and data management for American, and software applications development within Sabre. She and her team buy or build most of what American's internal people use -- and she's building much more than she would like. For example, she says, there is no general business-information directory she'd care to use, and no suitable generic office environment.

Wrenn is also facing the decision of when, how, and with what to replace American's current "hodge-podge" of thousands of workstations and dumb terminals -- a decision that should be of intense interest to every hardware vendor at the Forum. Of course, not everyone will use the same system, and Wrenn has already selected one vendor for the company's internal datamanagement staff. As she said at the 1984 PC Forum, speaking for IBM, "As technology continues along the price curve...software developers will be better able to produce competitive application products using standards. However, we should always give developers the ability to make a trade-off -to discard the standards when they are too restrictive."

The day we went to visit Wrenn, by the way, American cancelled our flight and we had to fly Delta. On the other hand, when we went to visit Teflian at United, United cancelled our flight and we had to fly American!

Mark Teflian, formerly responsible for the development of the Apollo travel agency reservations network at United Airlines, is vice president of technical planning and systems engineering at Covia, the Claris of United Airlines. That is, Covia is now a separate company (looking for partial outside ownership) comprising most of United's data-processing and communications operations, selling its services to United and others. Covia is undergoing an sea change right now, as the company attempts to decentralize its operations and do the same with the supporting computer systems. However, notes Teflian, "the more you distribute your operations the more you have to centralize your development, so that it all works together."

Release 1.0

Covia has an unusual implementation of the airline-industry-standard reservation system (IBM's TPF) with data distributed across multiple logical systems in Denver. Teflian is also moving more functions and adding new functions onto minis and micros, using UNIX, DOS and Windows, and building what he calls "the world's largest transaction network running mission-critical applications on pcs. Isn't it refreshing to see that instead of all those spreadsheets sitting on pcs?" Gluing all this together is Covia's OSM (for Open Systems Manager), a set of protocols, application services and interfaces that performs the same functions across multiple hardware and software systems that Systems Application Architecture will ultimately perform across the IBM line.

We recently took a tour through United's new terminal at O'Hare, a model for its other facilities in the future, and saw our first TI Explorer AI workstations in commercial use. They are being used to manage gate assignments; one of these days, they will be extended to reduce the likelihood that connecting flights will be parked at opposite ends of the terminal, or at different terminals. (And you thought that all the airlines already had systems to ensure that that does happen!)

Eric Drexler

Eric Drexler is a visiting scholar at Stanford. As he explains it, he rarely teaches and they don't pay him, but both sides benefit from the association. Drexler, 32, has an extraordinarily fertile mind that is beginning to gain attention because of his book *Engines of Creation*. *Engines* outlines his theory of nanotechnology, or the ultimate in miniaturization. As a student at MIT, he started wondering about "what we could build with tools we don't have yet." Now, we build big things one by one and small things in batches; with techniques such as protein engineering and molecular machines, we will ultimately be able to build minutely small, complex structures atom by atom. Whether or not this happens, argues Drexler, it is likely enough that we should start thinking about the implications now.

That leads to the notion of hypertext publishing, as a way to foster thinking about the implications of nanotechnology. Traditional thinking about hypertext views it as a medium for presentation and distribution of information. But a greater value is using it for the evolution of new knowledge, through a sort of open information market, or hypertext publishing. Conventional thinking about hypertext publishing also "immediately hits pitfalls," says Drexler. "People think that there will be too much garbage; everyone will post his stuff and it will be a mess. The opposite view assumes some sort of editorial board. But who are they? Who chooses them?" In fact, he argues, there's an intermediate path: "Right now, there's a tremendous waste of intellectual effort. Readers' judgements and reactions as they read things are poured right down the drain. At a minimum, we could have three kinds of 'go-way' buttons for them to push when they're done: good, neutral, or don't bother. That alone would provide a huge amount of information, especially if you said who was doing the voting. And some people of course would comment...and other people would vote on the comments. Welldesigned, such a system could contain 99 percent garbage and still look like 99 percent gold to a reader."

21

The subtext of Drexler's vision of hypertext publishing is evolution through an open market, a notion crystallized in a collaboration with Mark Miller, who earlier worked on Ted Nelson's Xanadu project. Consider a market as applied to software execution and system resource allocation. Conventional thinking about money looks at it as a motivator: Juan pays Alice so that Alice will work hard. But money is also an information medium⁸: the paycheck indicates to Alice what is worth doing, and the way she spends it shows the market what she considers worth having. In the same way, software tasks could be assigned values, so that in distributed systems with no central control, priorities could still be determined on a local basis. All this is contrary to traditional deterministic notions of software architecture, but fits quite nicely with notions of object-oriented programming. The goal is to take all these independent, self-directing little bits of software and get them to work together in the systems equivalent of Adam Smith's mythical invisible hand.

Edward Tufte

Ed Tufte teaches at Yale, where he is Professor of Political Science and Statistics, Senior Critic in Graphic Design, and Lecturer in Law. Despite all that, he is best known as the creator of *The Visual Display of Quantitative Information*, a stunning book that explains with illustrations how graphics can be used to elucidate rather than merely decorate or, at worst, obfuscate, quantitative data. Tufte is an ardent foe of "chart junk, simple data tricked up with three dimensions and six colors." Asked to comment on *USA Today*, he says politely that the weather map's not bad and then points out, "People think it's so successful, but what's the best-selling paper in the country? The Wall Street Journal. It's absolutely full of information, and no chart junk."

Trained as a statistician and political scientist, Tufte discovered graphics while teaching a course on statistical graphics at Princeton with John Tukey (inventor of the fast Fourier transform): "I discovered that I could see, and I could count. Most people can do only one or the other. We had five graphics designers and five statisticians in the class, and I made them do their homework in pairs." In 1980 and 1984, Tufte worked for The New York Times as a consultant, helping with the interpretation and presentation of election and poll results. He is currently working for IBM as the corporate consultant on information design and, yes, on Presentation Manager. He maintains a proper silence on the specifics of his work for IBM, but offers this general advice: "If you want the right skills to design a computer interface, don't go to a programmer, or a psychologist, or a graphic designer. Go to a mapmaker! Mapmakers are a magnificent combination of engineer and designer. They have a 5000-year history of visual craft. The map is an ideal model for interface design."

Tufte is also president of Graphics Press in Cheshire, CT, the company he founded in order to get his book printed and published right. Since 1983 it has sold 73,000 copies in eight printings -- plus another 470 distributed at the Forum.

⁸This is not a new idea, of course. Economists have been thinking along these lines for centuries; Tom Malone of MIT has discussed similar ideas in relationship to information publishing in several papers. However, it is not generally discussed (or applied) in the context discussed here.

Release 1.0

THE SHAPE OF PLATFORMS TO COME

By Mitch Kapor, ON Technology

Mitch asked us to let him write his own introduction. Our pleasure!

Let me present the industry's conventional wisdom along with my impressionistic comments and questions regarding the state of personal computing platforms. The only players of significance today who have the ability to lead in the definition of computing platforms are Apple and Microsoft/IBM.

Both Sun and NeXT will throw their hats into the ring in the attempt to establish new platforms. Currently Apple's position is that of being more progressive than IBM. Sun and NeXT will try to position themselves as the new leaders in personal computing technology, i.e., they will try to out-Apple Apple. To employ a political metaphor, if IBM is the conservative Republican force and Apple the liberal Democratic one, NeXT and Sun will be the new splinter parties to the left of the liberals. But until they formally declare themselves as candidates, details are speculative.

Curiously, there are some similarities between what NeXT will do and what Sun might do. Both companies have adopted UNIX, a mature multi-tasking operating system, as their standard. And both have higher-level imaging models (Display PostScript for NeXT, NeWS for Sun) as integral parts of their platform. I suspect their respective offerings will have other similarities, at least in the general performance range of hardware.

The functionality that is now typical in today's workstation market (e.g. the Sun 3), is becoming the power user's personal computer (Mac II or 386-based machine) and will become the standard PC of the early 1990's. This class of machines is built around a 32-bit microprocessor like the Motorola 68020/030 or Intel 80386/486?, four to eight megabytes of RAM, an 80-megabyte or larger hard disk, a built-in high-speed network, and a multi-tasking operating system with a graphical user interface.

Real differentiation among the competitive platforms will be based on more than hardware horsepower, but promises of more MIPS and megabytes must be kept to stay in the game at all.

The inescapable fact is that the available computing power per dollar continues to increase at an exponential rate, creating opportunities for new platforms to arise alongside old ones. A hardware company with a new platform is well-advised not to take on a leader head-on, but to find a niche which is vulnerable and seize it, and then build a base of power from that beachhead. IBM and Microsoft control the corporate market, but the college and post-graduate education market is no one's central constituency today.

Do not be fooled into thinking that the next wave of system software offerings is anything more than a temporary consolidation. Clearly the combination of OS/2, Presentation Manager, LAN Manager, and SQL Server from Microsoft/IBM will finally allow software developers to break the shackles of application development under the relatively impoverished circumstances of

Release 1.0

DOS, a character-based interface, and inadequate connectivity support. Just as clearly, vendors like to hail their next major release of system software as the definitive platform of the future. But while relational databases have proven value for various transaction-oriented applications, they are known to be deficient as storage and structuring mechanisms for rich textbased applications. There is another generation of object-oriented technology whose time is rapidly approaching. These object-oriented systems are much better suited to applications which want to model, contain, and act upon real-world information. Today's system software is nowhere close to this promised land.

While OS/2 and a future version of MultiFinder support real multi-tasking for personal computers at last, they also retain the same type of ugly hierarchical file system as DOS, UNIX and any other operating systems you'd care to mention with the possible exception of Smalltalk-based systems. If we're going to make operating systems which are more compatible with the ways in which people actually work and think, we're going to have to break the link that binds a file, referring to some physical area on some storage medium, to a document (or stack, or item) whose coherence ultimately is more in the user's mind than on a hard disk.

Our ideas about what a document is are still closely tied to the paper-based origins of documents. Paper, as an information-bearing medium, is both linear and rigid. Paper documents have a necessary order (a page at a time from front to back) and are bounded in space. Each item of information on a paper document is located in exactly one place. These limitations have been unconsciously and unnecessarily carried over into computer-based documentprocessing systems. Movies were originally conceived of as filmed records of stage plays, but later developed their own unique vocabulary (the jump cut, the dissolve), each term of which embodies a unique style and meaning. So too can we free ourselves of the limitations of paper-based documents by inventing the appropriate representations and interactions.

Documents will become "soft" and "virtual," made up of many little pieces, each with its own separate identity. The document you see on the screen will really be a kind of view into a large new-wave database of text, graphics and other data types like audio and video. This database (perhaps we will call it an infobase) will not necessarily be completely local. It may be distributed over a LAN or even updated periodically (and transparently) and automatically over a wide-area network. Just as information may "arrive" from many different places, it may also put in multiple appearances in a variety of contexts defined by and in accordance with the user's wishes. Making a change to the item in any of its guises will automatically cause it to change everywhere else.

If we really want to empower users, we must provide more support for poweruser programming and customization as well. In their time 1-2-3 macros were a significant breakthrough, and today we have HyperTalk as the latest example of a powerful new way for nonprogrammers to express themselves and build useful, interactive products. But HyperTalk is at best a stepping stone from the old world to the new in programming languages. What lies on the far shore?

The support for this vision of computing must be created, if these dreams are to be realized, and they can't be created out of what we have today, nor

Release 1.0

even out of extensions to not-fully-released new systems. New metaphors, new platforms and continuing innovation is the battle cry of this viewpoint.

The fundamental innovations on the sofware side which so far have fueled the enormous growth of personal computers are reaching maturity. Both spreadsheets and graphical user interfaces, to name two, are going to continue to evolve, but not by leaps and bounds. This obviously favors existing market leaders.

The real wild card in software platforms is what role new software metaphors and virtualities ("artifical realities") will play. For instance, how big an opportunity are hypertext and hypermedia? Is it possible to create a standard platform for developing hyper-anything applications? If so, its supplier will be in a position to dominate a whole new market segment.

What about groupware? Is there a platform for local and wide-area communication and information services which is something other than an extrapolation of Microsoft's LAN Manager? We hear a lot about connectivity and strategic alliances in that area, but it seems to me that all of them are at too low a level to spark a new wave of application breakthroughs.

What are the key research areas, like object-oriented systems, which are ripe for commercialization? If Xerox PARC was the intellectual godparent of the personal computers today, where is the Xerox PARC of the 1990s? Now that events have shown us there is no AI industry unto itself, the time is ripe for the integration of AI technology which will be genuinely useful. Which software companies are doing this?

The shape of the entire industry in the next decade depends as much on the answers to these and similar questions as it does on the working out of details of existing computing paradigms.

Release 1.0

Release 1.0 is published 12 times a year by EDventure Holdings, 375 Park Ave., New York, NY 10152; (212) 758-3434. It covers the pc, software, CASE, groupware, text management and connectivity markets, and artificial intelligence. Editor & publisher: Esther Dyson; Forum director & associate publisher: Sylvia Franklin; circulation manager: Hyacinth Frederick; secretary: Anita Fowler; copy chief & consulting editor: William M. Kutik. Copyright 1988, EDventure Holdings Inc. All rights reserved. No material in this publication may be reproduced without written permission; however, we will gladly arrange for reprints or bulk purchases. Subscriptions cost \$395 per year, \$475 overseas.

FORUM DETAILS

Confirmed speakers include (additions and changes in italics):

Victor Alhadeff Bob Berland Dave Blumstein Gordon A. Campbell Vittorio Cassoni David Chapman Peter Coffee Michael Dell John Doerr Eric Drexler Bob Epstein Edward M. Esber Gordon Eubanks Robert Flast Robert Frankenberg Jean-Louis Gassee William Gates Jerry Kaplan Mitch Kapor Bill Krause Bill Lowe Jim Manzi Mike Maples Scott McNealy Peter Miller Dave Nelson Bob Orbach Safi Qureshey Vern Raburn Paul Rampel John Roach Ben Rosen Mort Rosenthal Mark Teflian Larry Tesler Enzo Torresi Edward Tufte David S. Wagman Kenneth R. Waters Joyce Wrenn Haviland Wright

Egghead Discount Software IBM Application Systems Igram Software Chips & Technologies AT&T Cullinet Aerospace Corporation Dell Computer Kleiner Perkins Stanford ("Nanotechnology") Sybase Ashton-Tate Symantec American Express Hewlett-Packard Apple Computer Microsoft Corporation GO Corporation ON Technology Inc. 3Com Corporation IBM Entry Systems Lotus Development Corp. IBM Entry Systems Sun Microsystems ON Technology Inc. Apollo Computer 47th Street Computer **AST Research** Cooper & Raburn Orion Network Systems Tandy Corporation Compaq Computer Corporate Software Covia (United Airlines) Apple Computer Businessland Yale University Softsel Computer Products ComputerLand American Airlines Avalanche Development

The following companies will make individual presentations on Monday and Tuesday afternoons: Action Technologies, Adobe, Aldus, Avalanche (with Datacopy), Blyth Software, Claris, Context Corporation, DB/Access, FCMC, Great Plains, Houghton Mifflin, IntelliCorp, Interactive Development Environments, Interleaf, Knowledge Systems, Lifetree, Natural Language Incorporated, Nestor, Network Innovations, Network Technologies, Neuron Data, Nucleus International, Odesta, Orion Network Systems, Persoft, Presentation Technologies, Symantec/ Living Videotext, Sybase (including Ashton-Tate's Ed Esber for Q&A), Third Eye Software, Traveling Software and Workhorse.

Release 1.0

RESOURCES, PHONE NUMBERS & PAGE NUMBERS

Forum, plus selected others. References after company names are to issues of <u>Release 1.0</u> where the company was discussed. References in italics after phone numbers indicate page numbers in this issue. Mark Miller, (415) 949-4871, 21-22 Rick Mellinger, Fernando Flores, Action Technologies (86-10, 87-12), (415) 654-4444, 14 John Warnock, Adobe (84-12), (415) 961-4400, 7, 10 Peter Coffee, Aerospace Corporation, (213) 336-5187, 19-20 Paul Brainerd, Aldus (85-1), (206) 622-5500, 10 Rodney Smith, Altera, (408) 984-2800, 2 Joyce Wrenn, American Airlines (87-2), (817) 540-5500, 17, 20 Bob Flast, American Express (86-10, 87-9), (212) 640-4718, 19 Jean-Louis Gassée, Larry Tesler, Apple Computer (passim), (408) 973-2590, 2, 3.11 Dave Nelson, Apollo, (617) 256-6600, 5-6, 15 Ed Esber, Ashton-Tate (87-1, 88-1), (213) 538-7354, 8 Safi Qureshey, AST Research, (714) 756-4802, 3 Vittorio Cassoni, AT&T (87-2, 87-10), (201) 898-6680, 4-6, 18 Haviland Wright, Avalanche Development (87-10), (303) 449-5032, 10 Michael Kenny, Blyth Software, (415) 571-0222, 4 Enzo Torresi, Businessland (86-2), (408) 437-4204, 2, 17-18 Gordon Campbell, Chips & Technologies (87-5), (408) 434-0600, 2 Bill Campbell, John Zeisler, Claris (87-9), (415) 960-1500, 15 Vadim Yasinovsky, Clear Software, (87-10), (617) 232-9788, 17 Ben Rosen, Compaq (passim), (212) 687-5115, 2, 3 Mike Hagan, Computer Intelligence, (619) 450-1667, 3 Ken Waters, ComputerLand, (415) 475-3310, 2, 3, 17-18 Mike Bosworth, Context Corp., (503) 646-2600, 15 Vern Raburn, Cooper & Raburn, (617) 494-1617, (415) 366-5760, 9 Mort Rosenthal, Corporate Software, (617) 329-1450, 17-18 Mark Teflian, Covia, (312) 952-7145, 17, 20-21 Dave Chapman, Cullinet (87-7), (617) 329-7700, 8, 17 Marty Alpert, Cumulus, (216) 247-2236, 2 Rolando Esteverena, Datacopy (87-10), (415) 965-7900. 10 Ed Adams, DB/Access, (408) 255-2920, 9 Michael Dell, Dell Computer, (512) 338-8400, 2 Victor Alhadeff, Egghead Discount Software (87-2), (206) 486-7337, 18 Tony Kobine, FCMC (86-2, 87-12), (415) 549-7100, 14 Bobby Orbach, 47th Street Photo, (212) 260-4417, 3 Steve Kirsch, Frame Technology, (408) 433-3311, 10 Jerry Kaplan, GO Corporation (87-11), (415) 543-3200, 12 Doug Burgum, Great Plains Software, (701) 281-0550, 19 Bob Frankenberg, Hewlett-Packard (87-12), (408) 973-1632, 6 Terry Kwan, Houghton Mifflin (87-10), (617) 725-5205, 11 Bill Lowe, Mike Maples, Bob Berland, Sam Albert, IBM (passim), (914) 749-3054,

2-4, 7, 8 Rich Carpenter, Index Technology (86-5, 87-2), (617) 494-8200, 17 Dave Blumstein, Ingram Software, (716) 874-1874, 18 Tom Kehler, IntelliCorp (86-4, 87-1), (415) 965-5713, 9, 16 Tony Wasserman, Interactive Development Environments, (415) 543-0900, 16, 17 David Boucher, Interleaf (84-6, 87-8), (617) 577-9800, 10

Release 1.0

16 February 1988

The following listing shows all the companies making presentations at the

Ray Ozzie, Iris Associates, (617) 692-2800, 13 John Doerr, Kleiner Perkins, (415) 421-3110, 4 Rob Akscyn, Knowledge Systems (87-9), (412) 733-8333, 10 Camilo Wilson, Lifetree, (408) 373-4718, 14 Jim Manzi, Mike Kolowich, Ed Belove, Lotus Development (86-7, 86-11, 87-5, 87-10, passim), (617) 577-8500, 6, 8, 12, 13, 16 Paul Grayson, Micrografx, (214) 234-1769, 4, 10 Rob Glaser, Bill Gates, Microsoft (passim), (206) 882-8080, 2-7, 8 Bob Bozeman, Ron Conway, Natural Language Incorporated (87-6), (415) 841-3500, 11 Mike Buffa, Nestor (87-7), (401) 331-9640, 16 Jim Groff, Paul Weinberg, Network Innovations (86-5), (408) 257-6800, 3, 9 Larry Brilliant, Network Technologies (87-6), (313) 994-4030, 15 Patrick Perez, Neuron Data (85-6), (415) 321-4488, 16 Ray Sanders, Derek McLeish, Nucleus International (88-1), (213) 450-1166, 8 Dan Cheifetz, Odesta (84-8), (312) 498-5615, 3, 4 Mitch Kapor, Peter Miller, ON Technology (87-11, 87-12), (617) 225-2545, 23-25 Paul Rampel, Orion Network Systems, (415) 649-4000, 3, 7 Ed Harris, Persoft (87-5), (608) 273-6000, 12 Bob Wall, Presentation Technologies, (418) 749-1959, 9-10 Sam Darsie, Servio Logic (87-8), (503) 644-4242, 9 Dave Wagman, Softsel (86-7), (213) 412-8200, 18 Dan Bricklin, Software Garden, (617) 332-2240, 14, 17 Eric Drexler, Stanford University, (415) 364-8609, 21-22 Scott McNealy, Sun Microsystems (86-11, 87-10), (415) 960-1300, 3, 4-6, 7 Bob Epstein, Sybase (86-6, 88-1), (415) 548-4500, 4, 7, 8 Gordon Eubanks, Symantec (85-6, 87-1), (408) 253-9600, 12 Spencer Leyton, John Friend, Symantec/Living Videotext (84-16, 86-6), (415) 964-6300, 12 John Roach, Scott Cutler, Howard Elias, Tandy (86-8, 87-8), (817) 390-3700, 7 Peter Rowell, Third Eye Software (88-1), (415) 321-0967, 11 Bill Krause, 3Com (87-4), (408) 562-6460, 3, 7, 18 Mark Eppley, Traveling Software, (206) 483-8088 Gianluca Rattazi, Dave Saxby, Virtual Microsystems, (415) 573-9596 Frank Devin, Charlie Hall, Workhorse, (353 1) 608721, 13-14 Ed Tufte, Yale University, (203) 272-9769, 9, 22

COMING SOON...

• Connectivity: Promises, promises.

- Parallel processing.
- Nitty-gritty experts.
- Airline experts.
- And much more...

- March 1-3 Third international CD ROM conference Seattle. Sponsored by Microsoft. With Bill Gates, Jim Manzi, Bill Atkinson, Jerry Kaplan, Norm Meyrowitz, Ted Nelson, John Sculley, Marvin Minsky, Esther Dyson, Joe Dionne (president and ceo of McGraw-Hill). Why be anywhere else? Contact: Sherrie Eastman, (206) 867-3305.
- March 3-5 ABCD visions '88 Newport Beach, CA. Keynote by John Sculley. Sponsored by abcd, the microcomputer industry association. Contact: Bernie Whalen, (312) 240-1818.
- March 7-10 IEEE conference on computer workstations Santa Clara. Sponsored by IEEE. With sessions on distributed systems, computer-supported cooperative work, and OS/2. Call Pat Mantey (408) 429-2158 or Robin Williams, (408) 927-1842.
- March 7-11 Seybold Seminars '88 Santa Clara. With Jonathan Seybold. Seminar of record in the electronic publishing business. Call Kevin Howard at (213) 457-5850.
- March 8-10 Connect '88 - New York City. Sponsored by Cahners, with Datamation and the Gartner Group. A trade show on connectivity and integration directed at corporate end-users. Contact: Richard Molden, (203) 964-0000.
- March 14-16 CASE Benchmarks Dallas. Rather than just present companies and tools, moderator Vaughan Merlyn controls the proceedings and *compares* the various tools on a common scale. "Benchmarks" here doesn't mean raw numbers, but such measures as comprehensiveness, documentation support, and other practical metrics of effectiveness. Sponsored by Digital Consulting. Call Scott Dorman, (617) 470-3870.
- March 14-18 Artificial intelligence applications San Diego. Sponsored by IEEE. With Charles Bachman, Eric Bush, John Landry, Jan Aikins (Aion), Walt Scacchi (USC), among others. Call Richard Greene, (301) 468-3210 (exhibits) or IEEE, 371-0101 (program) or Paul Harmon (415) 861-1660.
- March 16-18 Desktop presentations San Jose. "Computers reach for new media." Sponsored by CAP Interantional. Contact: Jean O'Toole, (617) 837-1341.
- March 16-23 Hannover Fair CeBIT Hanover, West Germany. Contact: Donna Peterson Hyland, Hannover Fairs USA, (609) 987-1202.
- March 20-23 ADAPSO SPRING CONFERENCE Palm Desert, CA. Software and services vendors at the oasis. Contact: Sheila Wakefield, (703) 522-5055.
- March 22-24 AAAI spring symposium Palo Alto. Explanation-based learning, parallel architectures, and other topics. Contact: Claudia Mazzetti at AAAI, (415) 328-3123.

March 23-25	CONFERENCE ON OFFICE INFORMATION SYSTEMS - Palo Alto, CA. Sponsored by IEEE and ACM groups. With Terry Winograd and others. Contact: Robert Allen, (201) 829-5315.
March 27-30	Software Publishers Association spring conference - Berkeley, CA. Contact: Jackie McDonald, (202) 452-1600.
March 28-31	World Congress on Computing - Chicago. Interface Group's response to NCC. Contact: Jane Wemyss, (617) 449-0600.
April 7-10	13th West Coast Computer Faire - San Francisco. Contact: Jason Chudnofsky at Interface Group, (617) 449-6600.
April 10-13	AEA Conference - Washington, DC. Companies under \$75m in annual revenues. Call John Baumeister, (408) 987-4200.
April 11-14	AIIM show - Chicago. Information and image management. Sponsored by Association for Information and Image Manage- ment. Contact: Sue Wolk or Betty Garrett, (301) 587-8202.
April 11-15	IEEE Tenth international conference on software engineering - Singapore. From an international perspective. Sponsored by IEEE and NCB Singapore. Contact: Tan Chin Nam or Lim Swee Say, (65) 772-0200.
April 19-21	CEPS/Spring '88 - Chicago. Corporate electronic publishing systems. Sponsored by Cahners and InterConsult. Call Mike Driscoll, (203) 964-0000, or Paula Wertman, (617) 547-0332.
April 27-29	Seybold Technology Forum - Cambridge, MA. "Distributed network computing: A journey into the future." Sponsored by Patricia Seybold's Office Computing Group. Discussions ranging from communications protocols to computer-supported cooperative work. Call Catherine Cooper, (617) 742-5200.
Мау 3-6	CASExpo - Dallas. Managed by Arthur Young & Co. Contact: Ken Burroughs, (703) 845-1657.
May 9-12	Comdex Spring - Atlanta. Peaches and PCs. Contact: Jane Wemyss at the Interface Group, (617) 449-6600.
May 15-19	Human factors in computing systems - Washington, DC. Spon- sored by ACM groups and the Human Factors Society. Con- tact: Sylvia Sheppard, (301) 369-2422, Scott Robertson, (201) 932-2911, or ACM (212) 869-7440.
May 31-June 3	National Computer/Conference Exposition - cancelled.
June 1-3	CASE Benchmarks - Dallas. An incisive look at a variety of CASE tools. See March 14. Sponsored by Digital Consult- ing, Inc. Contact: Scott Dorman, (617) 470-3870.
June 6-8	Artificial intelligence in electronic publishing - San Jose. Sponsored by the Graphic Communications Association.
Release 1.0	16 February 1988

 \rangle

Applying AI to design, content, process, etc. Contact: Marion Elledge, (703) 841-8160.

- June 19-22 Congress VI Paris. The world computing services industry gets together. Sponsored by national trade organizations, including our own Adapso. Contact: Phyllis Cockerham, (703) 522-5055, or Diana Kirby, London, (441) 405-2171.
- June 21-23 PC Expo New York City. End-users en masse. Contact Steve Gross, (201) 569-8542 or (800) 922-0324.
- July 12-14 CASE '88 - Cambridge, MA. Second international workshop on computer-aided software engineering. More academics and less hype than most CASE conferences, for better or worse. Sponsored by several academic institutions. Call Pamela Meyer, Index Technology (organizers), (617) 494-8200, x454.
- July 24-27 IEEE conference on neural nets San Diego. The second, because the first was so successful. Contact: Richard Rea (exhibits), (619) 222-7477, Sue Varga, (619) 281-8991, or Nomi Feldman (papers), (619) 453-6222.
- August 1-5SIGGRAPH Stanford, CA.Sponsored by IEEE, ACM and
SIGGRAPH.SIGGRAPH.Contact:Adele Newton, (519) 888-4534.
- August 8-12 IEEE conference on applications of artificial intelligence in engineering - Stanford, CA. With Raj Reddy and Rick Hayes-Roth, among others. Sponsored by IEEE. Contact: R. Adey, (617) 667-7582.
- August 22-26 AAAI-88 St. Paul, MN. The seventh annual. Sponsored by the American Association for Artificial Intelligence. Contact: Claudia Mazzetti, (415) 328-3123.
- September 14-17 Seybold desktop publishing conference Santa Clara. The industry standard, moderated by Jonathan Seybold. Contact: Kevin Howard, (213) 457-5850.
- September 25-27 Agenda '88 Southwest US. Second annual. Run by Stewart Alsop, managed by Marketing Partners, sponsored by PCW Communications. Call Elizabeth Readerman, (415) 363-8080.
- September 25-30 OOPSLA San Diego. Object-oriented Programming: systems, languages and applications. Sponsored by ACM. Contact: Allen Otis, Servio Logic, (503) 644-4242 or Barbara Noparstak, Digitalk, (213) 645-1082. (The conference section of OOPSLA is Wednesday through Friday (28-30), so you can catch most of CSCW first if you miss the OOPSLA tutorials.)
- September 26-28 Second conference on computer-supported cooperative work -Portland, OR. Sponsored by ACM. Contact: Suzanne Sylvia, (617) 225-1860.

Please let us know of any other events we should include. -- Anita Fowler

16 February 1988

Release 1.0

31

SUBSCRIPTION FORM

Please enter my subscription to Release 1.0 at the rate of \$395 per year in the U.S. and Canada. Overseas subscriptions are \$475, airmail postage included. Payment must be enclosed. Multiple-copy rates on request. Satisfaction guaranteed or your money back.				
Name				
Title				
Company				
Address				
City	State	Zip		
Telephone				
How did you hear about Release 1.0?			·	
PCF8	22 9565 6525 62342 6255 6555 6555 8555	-	88-2	

Please fill in the information above and send with your check payable to:

EDventure Holdings Inc. 375 Park Avenue, Suite 2503 New York, NY 10152

If you have any questions, please call us at (212) 758-3434.

Sylvia Franklin Associate Publisher