OPEN? CLOSED? OR EMPTY?

Once a week, it seems, some computer vendor comes to our office and announces, full of excitement, "We're going to sell open systems!" "What's an open system?" we ask. "You know -- UNIX, Motif, the works! Everything open!"

The unspoken assumption is that this will solve all the vendor's problems, give it an unassailable competitive advantage, and launch it to leadership. But there's a middle ground between open and closed, as noted below.

How all these companies -- including Wang, Motorola, Hewlett-Packard, Data General, Unisys and of course Sun -- can assume leadership by doing the same thing is beyond us. Yes, customers want open systems. But they also want something to give them a competitive advantage over their competition. They want full support, multi-vendor systems, instant productivity improvement, and free products. You could go broke giving customers all they want.

Most visible in this openness trend is IBM. Its new RS/6000 system is a price-performance winner, capable of competing respectfully against the likes of Sun, DEC and H-P/Apollo. But although IBM can build a fast box and benefit from manufacturing economies of scale, its overall cost structure and culture make this a risky move. Like the Japanese, IBM can compete effectively at the box level, but how is it going to support its huge, $50-billion-in-expenses-a-year infrastructure? There's an interesting parallel here: In Japan, costs of a cumbersome distribution system and other inefficiencies are absorbed by a lower standard of living among the people at large. At IBM, the costs of corporate overhead will be borne by shareholders if they are not offset by higher gross margins than are available in a commodity business.

We're not suggesting that IBM revert to selling weird, incompatible systems, but rather that it consider what made it successful in the past -- setting new standards, not adopting other people's. Its response to the openness threat should be to license its own technology, not to follow other people's lead. This doesn't mean it should try to launch another new operating system (OS/2 is...

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enough of a challenge right now), but that it should look at where the next set of standards will emerge, and move there preemptively. So, since it's too late to force a new operating system on the public (in a zero-sum game of one system against an equivalent other), how about selling something valuable on top of the OS? Along with Microsoft, Intel and a few other companies, IBM still has the marketplace clout that may enable it to set new standards -- which is how you make real money in this business.

The trick is to be both proprietary and open -- to own something and to sell rights to others to copy it. That enables a vendor to benefit from the growth of the whole market, and yet encourage others to help it grow.

Take the case of NeXT, which licensed NextStep to IBM in hopes that IBM would help to promote it. (IBM, however, has failed to respond to the challenge. Rather than simply make NextStep available "if customers want it," IBM should go out and push it.) Of course, IBM doesn't own NextStep; but it could earn a return on its market power simply by being first to establish a new technology. (And it could try for relicensing rights from NeXT.)

But IBM could do even better promoting and licensing something it owns itself. A couple of items IBM could profitably share are OS/2 Extended Edition and specific protocols for maintaining distributed-database integrity within it and DB2 -- stuff well beyond standard SQL. This is hot stuff, and spreading it around would make life a lot easier for customers fielding the multi-vendor systems of which IBM has now acknowledged the existence.

There are lots of other treasures within IBM -- maybe its RISC technology -- that it could profitably license to others as well as sell itself. Other people would make money too, but isn't that the point? The purpose is to make the world more productive, and if it works, this is a positive-sum game: More productive customers will be happy to share a bit of their surplus with IBM and others. IBM's great hope of success lies in pioneering new technologies and markets, rather than simply sharing in the price-competitive market for open systems. Everything will run on UNIX or will be able to talk to UNIX, but things still won't fit together easily. Customers want something extra to make up for the inevitable pain.

Counterpoint: Apple

Going totally proprietary -- eschewing licenses to third parties -- is a risky strategy. It's easy never to get started if you're selling something totally new; with a me-too product, at least you can lower the price until somebody buys (whether or not you make a profit, sales growth can keep investors happy for a while).

Apple has been an excellent counterexample; it took a proprietary system and made it successful. What of its current malaise? Part of it is due simply to management turmoil, independent of strategy. But the company's problems in the marketplace are due to its unwillingness to respond to the market at all. Now that it's persuaded them to buy Macintoshes, it should listen to customers when they say they want them cheaper, in more different varieties and configurations. If Apple won't allow third parties to extend its line in computer-industry tradition, it should take on that burden itself, supplying not just high-margin, high-end products, but low-end, low-margin ones that will enhance the attractiveness of its entire line both to customers and to the third-party software developers on whose favor it depends.

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ARTIFICIAL LIFE: THE BEST THINGS IN LIFE ARE GROWN

The great thing about artificial life is where it is beginning -- not in a primordial soup somewhere, but in Santa Fe. Researchers at the Santa Fe Institute and the nearby Center for Non-Linear Studies at Los Alamos National Labs are leading the search. We recently attended the Second Conference on Artificial Life there, along with about 300 people who had the highest IQs and the lowest number of affiliations of any group we've run into lately. Many people were listed simply by their names and addresses, which tended towards Berkeley, Palo Alto and Cambridge, MA.

Artificial life is of interest to computer folk for two reasons: Most artificial life "grows" in computers... Is it just simulations? Or is it real artificial life? No matter. They do everything life does, although they consume pure energy rather than turn matter into energy. Whether or not it's "real," the study of artificial life can provide useful techniques for programming, much as artificial intelligence has.

The first tenet of ALife is that life is a property of organization, not of matter. Systems that grow, reproduce, consume resources and reverse entropy (locally) are alive, whether or not they are wet and squishy and carbon-based. Those seemingly cute names have more foundation to them than we imagined. The same materials can be dead or alive; just look at any corpse -- or the transformation of a living carrot into a frozen piece of food and subsequently into the body of a dutiful vegetable-eater. (Or consider many of the new foods we have; they are "food material," but they are manufactured, not grown.) In computers, it is not the silicon but the software -- the "ghost in the machine" -- that is alive. The best-known examples of artificial life are viruses, worms, bugs and other computer wildlife.

The second fundamental tenet is that things grow bottom-up. Artificial life is another name for self-organizing systems; evolving societies, free markets, swarms of bees, all have some characteristics of life. (See Release 1.0, 89-6, for a full discussion of self-organizing systems and some examples of how they can be used. Control is dispersed, and life takes on form and structure from the interactions of multitudes of independent parts.

You cannot design a living thing; you can only design (program) its parts. Those parts then interact to form the living, perpetually changing being. There is no equilibrium other than death (or non-aliveness), either in an organism or an ecosystem. Any living thing keeps on changing until it dies, and the scientifically interesting moments are those of transition and transformation; achievement of equilibrium is an illusion, because there are internal and external irregularities that render a steady state impossible.

Not a lotta meta

There was not a lotta meta at the conference; most of the talks were about building ants that could follow paths; the possibilities, planet by planet, of extraterrestrial life; and techniques, experiments and studies. Theory talks were tantalizing but unsatisfying.

But one fundamental question was clear if not formally stated (and an example of that AI stalwart of reasoning-by-analogy): Why is or is not artificial life like artificial intelligence? AI is many things, but most people
consider it a disappointment. In fact, it has led to a lot of fruitful developments in computer applications -- diagnostic systems, expert systems for product support, voice recognition for order-entry systems, handwriting recognition (stay tuned), machine vision for factory applications, knowledge bases for product support, natural language interfaces to databases, more flexibility in traditional data-driven applications.

Yet AI has failed to live up to its early promise. It's not the reality that's disappointing, but the difference between the reality and the promise. In the Fifties, Allen Newell and Herb Simon, in particular, promised great things for AI; within ten years, a computer would be the world's chess champion, compose music and so forth (as described in "Machines Who Think.")

The broken promise of ALife?

Artificial life may suffer the same backlash as AI (the "AI winter") if its practitioners aren't careful. The proponents of artificial life aren't quite so rash; they don't give dates. But there was enough press at ALife II that promises will still be inferred even if they are not made. (Whereas the first ALife conference was covered by Jim Gleick, a science writer for The New York Times, the second was covered by John Markoff, its computer writer, not given to hype, but an applied technologist nonetheless. Markoff also attended the first ALife conference as a reporter for the San Francisco Examiner, but that's another story.)

The leaders in the field (including Doyne Farmer and Chris Langton of Los Alamos, Norm Packard of the Santa Fe Institute, Jim Crutchfield of Berkeley and John Holland of the University of Michigan) are looking for the theoretical foundations of life -- not quite a Grand Unified Theory, but something more solid than "50 pieces of hackery," says Farmer, the earnest but intensely personable man credited for a fair amount of modern chaos theory, puts it. "Are there a few basic principles underlying it all? If we didn't think so, half of us, the scientists, would have gone home."

Likewise, the early AI pioneers hoped to find some general principles of AI. But it turns out that intelligence, natural or artificial, is best understood as a collection of ad-hoc capabilities rather than a couple of principles. They include pattern recognition (vision and speech recognition), reasoning (expert systems and other inference-based systems), natural language understanding (a collection of skills including parsing, pattern recognition, reasoning by analogy and knowledge representation), learning (neural nets), and even plain old data management.

Two out of five?

All these constitute part of human intelligence, in varying degrees. Many of them are susceptible to implementation on a computer. Is a computer with only one of them "intelligent"? Or do you need three out of five? Is that question relevant? A more relevant question is, Is that computer useful? Unless you really care about the computer, its behavior, not its intelligence, is your concern.

In a similar vein, a computer system need not be alive (or follow a unifying theory) to exhibit useful, commercially interesting, lifelike behavior: iterative optimization, learning (as in a neural net), growth, adaptability,
self-organization, reproduction, self-identification and immune responses, evolution or coevolution. All these are based on the interactions of individual objects that end up creating complex, self-organizing systems which keep changing in ways that are unpredictable except by simulation.

The value of artificial life is creating and handling complexity beyond what we can do ourselves. It requires giving up some direct control -- just as the farmer growing carrots could not "build" the carrots himself, he can foster their growth with proper inputs -- and he can definitely predict that he will produce carrots, not rutabagas, from a given handful of seeds. The difference between traditional AI and ALife is that AI is programmed to do what it does, whereas ALife is "programmed" to develop itself. The AI system will be the same after its experiences, whereas the ALife system will be irrevocably changed -- just as a person is by the vicissitudes of life.

Safe computing and immune systems

In terms of computers, there are potential applications of ALife theory/techniques in graphics, programming (genetic algorithms), optimization, learning, simulation and modeling, among others. Perhaps the first big benefit (aside from simulation games such as the wonderful SimCity, computer art and other unproductive if enriching uses) will be countering some of the artificial life already out there -- computer viruses, worms and bugs.

The notion of an ALife immune system, which can recognize itself and destroy foreign bodies, makes a lot of sense. What worries people about viruses is that systems are so complex that integrity cannot be guaranteed. What we have now -- vaccines -- is akin to antibiotics, or human-built specific substances that can fight specific strains of viruses. This of course is a losing battle. An immune system, by contrast, is an indigenous living ecosystem that recognizes and grows antibodies to specific new viruses as they appear; the feedback loop is much faster and target-specific because humans don't get in the middle. Also, somehow, we could add in the notion of inoculation, to raise sensitivity to broad strains of viruses.

A second notion is a repudiation of excessive standardization. There is strength in diversity, because chances are that somewhere there will be a system resistant to any particular danger. Of course, that doesn't help the systems that are directly vulnerable, but it limits the danger to society at large. Also, diversity fosters adaptability, because it's more likely that a range of existing systems will contain one suited to a new environment; too much specialization renders a thing unfit for any situation other than the one it is so well-suited to.

Will we then, in the future, grow rather than copy our operating systems, so that each is unique? Suppose we just grew them to meet, say, the POSIX

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1 The same applies to the reliability of large systems such as SDI. There is no foolproof way to keep an attack system from pushing the button; you have to keep it physically unplugged -- in which case, why bother? This is why brilliant pebbles or smart bullets, which can be statistically if not absolutely reliable, make more sense than just a few large, offensive boulders. Whether any of it makes sense is another issue....

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specs? (We could devise some scoring system to favor fast performance.)
This may sound a little far-fetched, but in fact it's already happening, on a slower scale, in the marketplace -- that same marketplace that the standards organizations are attempting to subvert. (Or are they themselves part of a larger self-organizing system that includes both profit-making units and bodies at least ostensibly motivated by other goals?) The difference is that these systems are made (programmed) rather than grown, and so the number of varieties is smaller, and there are many exact copies of each.

The implications

For the moment, the major implications of artificial life for computing seem to be in an approach to programming and system design rather than wholesale efforts to create complete instances of artificial life -- whatever it is. Just as AI capabilities or techniques enrich traditional applications, so could ALife features. Most of these are things we already know how to do -- optimization techniques, for example. We have to learn to let them take over, rather than try to control everything centrally. For example, you could use ALife in allocating resources, in designing communications networks, in building adaptive user interfaces. Object-oriented programming -- the real kind, where the objects interact with each other, rather than respond to calls from a central program that's in control -- is another case. The individual objects need to be programmed, yes, but the system as a whole organizes itself. (This is not magic: You want to run the system to make sure it organizes itself properly. The value of object-oriented programming is not that you can avoid programming, but that you can reuse the objects in original or modified form once they have been programmed.)

Of course, there are cases where the AI is most of the system, as in stand-alone expert systems, and there are parallels in ALife as well -- notably in genetic algorithms, where you use evolution as a programming technique. While most MIS managers will tell you there's no way they'd use software that was grown, attitudes may ultimately change -- when people stop thinking of software as digital. After all, they use people -- however unwillingly.

Local optima and the value of diversity

Evolution and diversity in the end may be our only defense against computer viruses, and a major source of incremental performance improvements. On the other hand, the mind of a brilliant programmer/designer, rather than the subtle incremental improvements of evolution and genetic algorithms, may be the only hope for the kind of fundamental progress represented by, say, the NeXT machine (regardless of whether NeXT itself is commercially successful). If there's one thing that ALife teaches us, it's that coevolution -- where both an organism and the problems it is solving are changing -- leads to real progress. Human minds are part of the scheme of things; it may be our ability to think of new problems, as well as answers, that is our real edge.

But perhaps the most important by-product of ALife is better understanding of the market and other forces that guide our industry. The concepts of local optima, the value of diversity and coevolution in fostering progress, the necessity for error as well as trial, and the fundamental assumption that progress cannot be planned or controlled are tremendously important. We can rail at all the waste -- but consider the alternatives.
NEWSPAPERS OF THE FUTURE: INTERSECTING WITH DIRECT MAIL

We recently attended a conference on "inventing the future" in the newspaper business. We would argue (see above) that you can't "invent" the future but can only grow it through individual actions in response to a changing environment. The basic feature of that environment is technology, which will allow newspapers, previously a mass medium for news and advertising, to be delivered electronically and tailored for each recipient. Some newspaper companies are responding, while others are not. Dow Jones, for example, is now getting a substantial portion of its profits from electronic information services, and the Hartford Courant has started a night-before one-page "Fax-paper" ($600 per year, 5 days a week) -- but The New York Times has sold off most rights to its electronic archives to Mead Data Central, and McGraw-Hill is closing down its electronic news services.

Two countervailing forces in the environment are human resistance to change among both vendors and customers, and concerns about privacy and the morality of effective advertising (ineffective advertising is less threatening).

Newspapers are the prototypical information business. They should be the business of the future, if they can properly understand their business to be information, and not the production of annotated sheets of paper. In fact, the typical newspaper business now performs three tasks, which will all be transformed by new technology and competition over the next few years. These are: gathering and refining information; delivering information; and providing a medium for advertising.

Unbundling the services and the roles

The three services performed by newspapers fit together naturally in the past. The information and the physical delivery medium were tied, and the package provided a fine vehicle for advertisers. Now, however, electronic media are changing the economics and the very nature of the information business. They are also transforming the marketing business, as mass economies of scale are overwhelmed by the new potential of direct marketing to individuals whose characteristics and purchasing behavior are known.

Gathering and refining information will change as access to electronic information and automated ways of massaging that information become widely available; facts will be cheap, although determining and explaining their meaning will still be a high-value capability. Delivery of information will change as customers gain electronic power and start to play a greater role in determining when and which information they receive. Finally, much marketing will become a targeted, interactive process. (Image advertising will persist, but otherwise the ad and the purchase will converge: As you watch the ad, push a button or speak a command and you've ordered it.)

What does this mean for the role of the mass media, not just in marketing, but in defining social issues, creating communities and fostering consensus?

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2 For example, we see that the television networks may pool their resources to conduct a single exit poll during elections. But it's the prediction based on the poll, not the actual poll data, that gives each network its edge (or embarrasses it).

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Oddly, the reaction to the global community seems to be fragmentation into smaller, tighter, more personal communities, not the global village at all. Moreover, not just the communities but the people within them are becoming fragmented. Each individual is part of several communities, showing several faces (not just public and private) to different worlds.

Information gathering and refining

The gathering of information is least susceptible to change as a business, although the implementation details will change -- if only because the most valuable information is always that which is hardest to get. As electronic databases come into wide use, the relative, differentiating value of using them will go down (although the value of owning one will probably increase as customers learn to exploit and value them). In the world of the future, with a plethora of organizations issuing press releases, backgrounders and data, news will be available in realtime direct from the source -- as long as it's a source that wants the publicity, and as long as there are recipients who want it (as defined in their news-filtering profiles).

But there will still be a role for news reporting to get the facts and meanings that are inadvertently or purposely obscured, and to provide the color that news sources rarely offer. (Ever try getting a casual, lively quote from a PR department?) Reporters will have full access to electronic databases, both textual and structured, to assist in their work, but initiative, imagination and intelligence will still count. Valuable information will be the kind that isn't explicitly found in the databases -- either the kinds of connections that can be derived through heavy-duty electronic processing, such as third-order links discovered with a Connection Machine or predictions and simulations, on the one hand, and old-fashioned investigative reporting, feature stories, interviews and personality pieces on the other.

There's also a need for intelligent editing -- both to shape stories, to define a newspaper's personality, to draw connections among seemingly disparate events, trends, personalities. There's only so much that filtering can do. Until we all get Connection Machines, most electronic editing is reductionist: It simplifies and eliminates, whereas good editing creates; it finds connections, notices analogies and links, organizes structures, draws conclusions.

Setting the agenda

One important job of the press is to draw attention to issues -- to set the agenda. Should the country care about the war on drugs or the deficit? The homeless or the illiterate? Donald and Ivana or Juan and Alice? The school board elections or the antics of the deputy sheriff? How much coverage is a product from Mitch Kapor worth, versus an equivalent one from someone totally unknown? Who will remind us of companies' or politicians' promises when they forget them later? Who decides whose opinions are worth attention?

Take the old icon of newspaper provincialism: the Newsday story, "Long Island Man Killed in Nuclear Holocaust," or the more modern Computerworld version, "MIS Manager Killed in Nuclear Holocaust." Any intelligent filter could find these for the appropriate audience. But suppose no one of immediate interest to your subscriber profile happened to be killed. Would your news filter still give you the news?
To be sure, it wouldn't be too hard to construct a filter that could -- the death of an MIS manager is worth 100 points; that of a vendor, say, 300 points; while that of a single individual might be worth only 0.1 points. But multiply that 0.1 by a million, and you probably pass through even the tightest filter with the equivalent of 1000 MIS managers disappearing.

In the customer's hands

Of course, it doesn't require a traditional paper-based news operation to set an agenda. In part, setting the agenda is a task arrogated by presidents, marketing people, talk-show hosts and other (would-be) opinion leaders. The press's claim to that role is its lack of bias and its putatively superior knowledge of what's going on.

So what happens now? In a world of filtering, data analysis software, news triggers and other automated ways of de facto agenda-setting, who really gets to set the agenda?

Why not go to a society of direct voting on every issue that comes up -- now that we have the technical capabilities to do so? Because along with the voting on each issue, there needs to be some guarantee of consistency; we can't have both lower taxes and higher spending.\(^3\) That is why, more or less, we vote for representatives who presumably have the wit and wisdom to assess conflicting priorities and make the judgements we would make if we devoted our full time to studying the issues.

In the news business, we rely on editors and reporters for the same wisdom-by-proxy: We trust them to weigh the facts and report their conclusions -- without wasting our time on all the research, false leads and spurious arguments they had to go through to reach the "truth" they pass on to us.

Currently, television seems to be setting the agenda, while newspapers are taking on more and more of the role of feature/self-help coverage (cf. The New York Times' Living and so-called Having, or Home, sections). Newspaper coverage (with exceptions) is becoming annotations of the news you watch on television, hear on the radio, or read in your newswire filter service. You could call it hypertext documentation, with profiles of leading figures in the news, time lines, maps, charts, and features. This is great stuff, sure, but it's not daily news; it's current-interest background.

Juggling priorities

In the news business, newspaper "brand names" are already giving way to magazines' brands in specific areas of interest. Readers turn to narrow-audience publications for agenda-setting in domains such as fly-fishing, right-wing politics, holistic health care and Hollywood celebrities. The assumption is that an editor or editorial board properly represents their

\(^3\) A more subtle example of conflict appears in the results of our all-time favorite poll (source and exact numbers forgotten): Eighty-two percent of respondents believed that good drivers should get a discount on their driver's insurance; 79 percent, however, felt that drivers with bad records should not be penalized because the bad records might not be their fault.
interests and leads a community that they can be part of. From identifying with the community they live in, many individuals have moved to be part of a multitude of communities, only a few of them defined by geography. In fact, many of them are defined most easily (and lucratively) by purchasing behavior: For example, we are in the computer business, a member of the American Airlines Admirals Club and AAdvantage program, a PC/Computing reader, a Decathlon Club member, and an American Express "member" (as the marketing campaign proclaims).

In a world of electronic filtering, people will develop their own filters. They will either do so actively or (as is already happening) their behavior will guide suppliers of information/advertising in building such filters automatically with software that monitors behavior and establishes criteria.

These filters, agents for the advertisers who build them, will increase the fragmentation of the information people receive: You may get your theatre criticism from The New York Times, your gossip from The San Jose Mercury and The San Francisco Examiner, your business news from The Wall Street Journal, your commentary from The National Review and your stock analysis from Volpe, Covington. Or you might decide to follow several individual analysts at a number of firms. Or you could elect to read everything Juan and Alice read, or to see reviews of all the books that Gwen likes.

In the end, each of these sources is a "brand name," in the sense that you select the identity, rather than the particular information each happens to be providing that day. You're leaving it to them to decide what it is you'd want to know. You're not buying Procter & Gamble, but you're not walking into a store with specs for toothpaste either. You'll buy the familiar brand name because it's what you trust.

Customer-aided information engineering

Despite the presence of brand names and advertiser filter/agents and agenda-setters, the customer of the newspaper of the future will no longer be a passive reader, but an active participant in the process. Editors will edit individual chunks of information, and perhaps assemble them into some kind of a package, but the reader/user will increasingly take an active part in determining the content, presentation and refining of the news he gets.

His contributions will include everything from creating simple filters to following links in hypertext or even hypermedia to background on breaking news in Eastern Europe, for example, or to opposing opinions to an editorial on legalizing drugs. A story on EPA auto ratings will allow him to select his own model of car, plug in his average monthly mileage and what he usually pays for gas and compute his monthly cost, compared to the car his step-daughter wants to buy. He can call up movie reviews linked to the local neighborhood movie-house listings, with a summary of opinions of his favorite reviewers. For the immediate future, much of this may come on fax (see below, page 15); long-run, it will be on terminals or pcs.

But note that there may be a difference between what you can do and what you will do; Russell Neuman of MIT's Media Lab, for one, doubts the claims of "technological determinists [that] people's personalities will change along with the technology."
Delivering advertising: The conflict escalates

Two big things are happening to advertising: It will become much easier for advertisers to identify potential or actual customers and interact with them to consummate a purchase, and it will become much easier for customers to identify and filter out advertising. This is pretty encouraging for both sides, since it means advertisers will spend their money more efficiently, and consumers will get less advertising related to products they don’t want. (In ALife terminology, this is known as coevolution, where two species both improve their fitness as they compete with each other; in military technology, it’s escalation.)

On the other hand, "inefficient" advertiser spending has been the chief source of financing for much of the news we now receive for free. The big spenders have been subsidizing those of us who watch and read but don’t buy. Pricing will show up too. You can pay $5 to watch the movie with no commercials, or watch it for free with a scene of the hero drinking Diet Coke slipped in. (A 50-cent coupon for Diet Coke could be a rebate of sorts -- and when you use it, your purchase and your identity will be recorded.)

Aside from privacy (below), this raises interesting sociological questions. Who pays the freight for public-service advertising, when those most in need of education are typically the least appealing consumers? Will Mercedes-buyers charge advertisers for their time? As our media become more efficient, there will be fewer crumbs spilling off the table for the have-nots. Just as there’s the concept of lifeline telephone service, restrictions on utilities’ capability to turn off heat and light, will there be some presumption that everyone has a "right" to a minimum of media? For example, Manhattan Cable TV is promising a lifeline low-price cable option if it gets its license renewed. This is how these things start: not through legislation but through suasion.

On the other hand, the current furor over targeted advertising of cigarettes to blacks and young blue-collar women who like tractor pulls is just the start of issues that will become more troubling. Is it unfair to persuade the persuadable? Can we persuade them to buy perfume but not cigarettes? Useful clothes but not frilly, useless things? What about targeting soft porn at men (aren’t they overly susceptible)?

The best of all possible worlds?

In the new world, people will get more of the information that they want and less that they don’t, for better or worse. Those who don’t buy much won’t get much, although some vendors will go after the non-consuming rich in hopes of changing their behavior. What we called "agenda-setting" in the news business has its counterpart in advertising, where an advertiser sends you a message that might not match your filter precisely: "You didn’t ask, but you might want to know," Just as newspapers exaggerate the gravity of an event -- "a watershed," "unprecedented" -- to get you to read about, say, Donald’s divorce or an election in a place you never heard of (and buy the paper). If you ask for hotels in Pebble Beach or Ventana, for example, a hotelier software agent might ask if you’d also consider Bodega Bay. If you’re a regular buyer of Folger’s coffee, an advertiser agent might offer to print out a coupon for Peet’s Premium on your fax machine.
Meanwhile, back at the paper ranch...

But there's a near-term approach, too. In addition to current selectronic binding (where magazines are assembled with different contents for different demographic groups), individual personalized newspapers and magazines can have ads bound in or just inserted as the mailing labels go on. No need for special printing: Just follow the label machine with an inserting machine that knows the demographics of the person on each label.

In short, a more powerful form of direct-mail, direct-response, targeted marketing will be the medium of the Nineties as mass marketing was the medium of the Fifties and Sixties. In the Seventies and Eighties we passed through the intermediate stages of ever-refining segmentation, starting out with upper, middle and low and resolving into ZIP codes, psychodemographics and other proxies for knowing exactly whom you're talking to.

With debit cards and electronic purchase records at the grocery store, telephone caller identification and on-demand cable TV, the masses will become individuals once again, even if the only thing that really knows them is a computer program. (Even as purchasing things with cards becomes easier, look for a proliferation of cash liquor stores and other places where people can indulge in their nasty habits privately!)

Should you give your intellectual property to someone you meet at a party?

Who owns the names and the demographic information about them? One name is public information; millions are an asset. Williams-Sonoma, for example, has a large customer list; Bon Appetit has a subscriber list. Together, they could make wonderful music... As with any kind of information, a merged database may be more valuable than the sum of its parts.

There are already an estimated 10,000 to 15,000 lists available for rental (like software, they are rarely "sold"), and new companies are jumping in. General Foods, for example, is now starting to use coupons that ask for the user's name and address; lots of companies are starting to keep records of who writes in for the stuffed animals (three proof-of-purchase seals and $2.95 -- and your name and address). Credit-card issuers such as American Express, airlines tracking frequent flyers and catalogue sellers such as Lands' End and L.L. Bean are already analyzing purchase patterns: Do people who eat out a lot also buy expensive cookware to use at home? Do first-class flyers rent fancy cars? Do people who buy sweaters tend to buy mittens? In fact, many "marketing" businesses now forming are more in the business of collecting customer data than of selling things; that will be up to their customers, who will use their lists or rent their media. (The more appealing, enduring potential is not just capturing prospects, but maintaining a close relationship with your customers -- a smart business approach in the long run. That, indeed, should be the philosophy behind the upgrade-management business, but that's another story.)

"We were talking about database potentials in the Sixties and Seventies," says direct marketing veteran Joan Throckmorton. "Now, in the past year, we're finally starting to do something about it." The reasons are many -- new technological capabilities, pricing of those capabilities, and mostly a realization among marketers that it is now necessary. The competition may already be doing it! The big gating factor will be political -- concerns over privacy and predatory advertising -- not technological or financial.
A number of information suppliers have tried producing personalized newsletters, with varying degrees of success. "The customers still don't know how to value filtering," says one publisher, who doesn't want to be named or share too much of the wisdom he is gaining. He just can't get enough people to sign up to his high-priced service.

The readers figure that they should get the trade-press items for free, as they generally do in print -- even though not getting all of them saves them several hours a week. In response, the publisher has moved the trade-press abstracts to the back of the book, with press releases (which tend to be timely) and government filings (which he gets direct from the agencies) upfront. But now he's looking to the usual suspects for funding -- advertisers. "We're doing this because we can't afford a user-paid service," he says. But attitudes may change; the recent furor over call-screening is just one more example of filtering reaching the public consciousness.

What are the economics of advertising in these personalized newsletters? In cpm -- cost per thousand, say $31 per thousand for Time or million -- they sound ridiculous at 25 to 50 cents per reader. But that's about on a par with direct mail which may or may not be opened, and comparisons should only get better as postal rates go up and fax costs (relatively) go down. It all lies in the quality of the reader -- and with direct mail and personal media, that can be determined exactly. However, at this point the most eager advertisers seem to be the kind who run classifieds now -- not the big space ad buyers for products such as cars, computers and household goods. They -- and their advertising agencies -- are not used to buying in such small quantities.

We expect to see both the rise of multi-publication ad sales (all the men who own Ferraris selected from these nine publications) and a proliferation of targeted ads from narrow-casting advertisers such as retailers, firms trying to offload empty space or surplus inventory, and personals -- employment ads, deals available, etc. Vendors still don't feel comfortable doing image advertising to such small audiences -- even though they'll gladly hold seminars costing thousands of dollars for equally small audiences. (To be sure, the seminar attendees' attention is virtually guaranteed, once you get them to show up. Maybe this is a good medium for advertising these seminars, which are frequently marked by direct mail, targeted by location, job title, or bingo-card responses.)

Longer-run, as increased competition drives prices down and more readers get their media filtered, economics will work in favor of a medium that for now still seems a little strange. The major challenge is to get advertisers to believe what they have always said about quality and demographics in a world

4 Fax lists, for direct mail rather than advertising within a fax publication, are still expensive. It costs about $1 per name to get a phone list, and an additional $2 per name to confirm fax numbers. Most fax numbers are linked to companies or departments rather than individuals, at this point. Then, when you send out the faxes, you get three times the response -- so it's about break-even.

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where people are still counted as units rather than valued for their purchasing power. (Some may find both distasteful.) In general, people count what they can measure; the advent of better tracking of purchase behavior should change advertiser attitudes over time. Interactivity and personalization isn't just for the user's benefit; it also means the vendor gets a faster purchase decision and direct knowledge of the purchaser.

Please take note:

We received your Immediate SatisfAXtion request, but our computer could not read the return address information. Please check to be sure you completed all fields with a dark pen or pencil and resubmit the request.

Thank you.

This is what we got by return fax when we sent in an incomplete form.
Interactive facsimile is a market that shouldn't exist. E-mail is more efficient, more open to automation, and cheaper. But it's tough to use, and each system is tough to use in a different way. By contrast, fax has reached critical mass with an installed base of more than 3 million machines in the US. And, as the study of artificial life shows, local optima can persist for a surprisingly long time. We reckon fax volume may stop growing by the end of the decade -- but by then it will be a huge business.

One early player is Interfax, founded in 1989 with $2.25 million from Xerox Venture Capital and others by William Houser and Paul Baran, a man with short attention span who also founded Telebit, Metricom and Packet Technologies/Stratacom and Equatorial Communications. (Unlike many entrepreneurs, Baran knows when to leave.) The premise is quite simple: Sellers of product will start using fax to do so -- and customers will respond by fax. The variety of forms in which this can happen will be great, and Interfax wants to be in the middle.

Who needs Interfax? Anyone with enough volume to need economies of scale. Interfax is working on all the pesky logistics, from having enough phone lines and storage capacity to handle peak loads, to linking servers to fax boards and phone lines, deciphering cryptic handwriting, selecting items to promote, building mailing -- er, faxing -- lists, consolidating text and images and doing "fax-merge." All these are involved in interactive fax. Many companies will no doubt do them themselves, with no need for middlemen such as Interfax.

Leave the faxing to us!

But it turns out, Interfax says, that although fax is easy to use for users, it is not quite so foolproof to handle at the back end. Unless you need only a small, slow service where people can handle the incoming faxes, you need to hook up computers to read the incoming faxes and perform the appropriate actions -- select some sales literature, create a personalized newsletter, check a credit card and send an order to the shipping department, register someone for a seminar and send a memo to a salesperson for follow-up. Interfax has spent a year (with two growing to nine people) developing software to read fax input (forms, mostly), to integrate its fax machines, workstations and pcs, and to set up file servers to hold the sales literature, news articles and other materials that get faxed out in response to customer input.

In all of this, fax is simply a user-friendly form of input or output. From the customer's perspective, it's halfway to interactivity: You can get an immediate response, but you get to fill out the fax form at leisure without a screen glaring or a cursor blinking at you. Likewise, you can read the fax you receive at your convenience. Moreover, fax is "friendlier" than a computer. "You only need two parameters," says MIT's Neuman. "Telephone number, and how many pages."

Interactive fax applications are almost anything a company could do in interacting with its customers through any other medium -- telephone, mail, bingo cards, even E-mail. For example, although the bingo-card service we describe below (and picture across) now sends out standard information, it
wouldn't be hard to send out a fax with the recipient's name embedded in the copy of a sales letter.

Interfax will probably follow the traditional route of many technology pioneers: First you sell it as a service, while customers are loath to commit seriously to a new untried technology and where you take the responsibility of ironing out bugs, finding qualified suppliers and making the whole thing work. Then, when the concept is proved, equipment is cheaper and both competitors and your own customers start to compete with you, you start to put your own customers into the business, providing them equipment, installation support and continuing service.

Fax this end first!

One early customer is EDN, a 140,000-subscriber Cahners publication for electrical and electronic engineers and management with the usual array of ads and reader service cards. But, as shown on page 14, its reader service card is different; it uses a fax machine instead of a mailbox. And the customer gets his information right back -- as long as he fills in all the information required. "The advertisers are enthusiastic," says editor Jon Titus, and he expects the readers will like it too. "They don't want to wait six weeks; they like the information right away."

Another early Interfax customer was Tax Analysts, but it has since taken the task in-house, at least for now. A Washington-area-based (of course) publisher of newsletters for tax professionals, Tax Analysts was using Interfax's FaxTex system to deliver on customer demand the full text of tax-related news, filings and documents culled from daily government pronouncements, regulations, transcripts and other outpourings which total hundreds of pages per day. No one would want all this stuff (except perhaps a library). However, the customer base was the 130 subscribers to its daily fax newsletter, Daily Tax Fax, and they generated only a couple of requests per day (and they can get the same information from Lexis, which resells it for Tax Analysts). That much, Tax Analysts decided, it could handle in-house, by asking customers to telephone instead of filling out forms and faxing them back, says systems coordinator Trevor Burroughs. But he holds open the possibility of returning to Interfax if volume picks up, and stresses that the system works fine.

Fax design

So much for that. Despite such start-up glitches, Interfax is likely to get other customers with more automated ways of assembling personalized documents for end-readers, whether newsletters matching a customer's preferred profile, or marketing literature selected based on a customer's purchase patterns or other demographic information. Interfax's attitude is, "Give us your software, and we'll run it."

Alternatively, Interfax can work with customers to develop filtering or database marketing tools. Sensibly, it's glad to help with anything that will generate service revenues down the road. The company hopes to develop unique expertise in areas such as profiling, filtering, customer database maintenance, selective document assembly and even advertising copy and design. "So many people don't understand that even fax can look good or bad,"
says Interfax chief marketeer Phil Sih. Design is just as important for fax as for a space ad or direct mail.”

So far, the service is too new for Interfax to have much data about usage (even if it were willing to divulge it). But we see a huge market for Interfax and its competitors as two trends converge: the use of fax on the one hand, and the use of automated marketing and customer-support systems on the other.

Interfax provides an appropriate intermediary. Consider the other options:

- Touch-tone systems are slow (on a different time scale, because you feel they should be faster) and limit the range of user responses.

- Voice-recognition systems are failure-prone, because customers may not know what to say or they may say it unclearly (and may not like talking to an automated voice).

- On-line systems require the presence of a computer or at least a terminal, but the installed base of computers, let alone a universal mail system, doesn't yet exist. Moreover, computers still intimidate many people.

- Regular mail is slow. By the time the information arrives, you forget that you asked for it, or certainly why, and you probably think it's unsolicited junk mail and throw it away.

- Systems with a human standing by are expensive and may be hard to keep consistent or friendly. Frequently low-paid humans sitting at terminals taking customer calls are no more "friendly" or responsive than machines -- but customers expect them to be and are disappointed when they're not.

Fax systems, by contrast, are ideal; the busy executive can fill out a fax form at his convenience, and the (equally busy) secretary can fax it. At the other end, a machine can interpret it and take appropriate action.

Yes, technologically interactive fax is not as efficient as E-mail or on-line communications. But it illustrates the point that client-server systems need only be interoperable; they need not be compatible. Just call Interfax a protocol translator!

Software Developer's Company's FastFaxts and Benefax

Another vendor offer a fax-response service is Software Developer's Company, the parent of Solution Systems, which sells Brief, most developers' favorite

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5 Another believer in this philosophy is Stan Rice of Autospec, a company melding content and form with PostScript-based output tools tied to content-management systems. He is currently designing an on-line catalogue for publishers, so that they can easily respond to requests for a certain kind of book -- something about plants in Germany, for example -- without needing a title or an author.
editor\textsuperscript{6}, of Programmer's Update, a monthly magazine, and of Programmer's Shop, a software tools reseller. SDC is offering two similar services, FastFaxts and Benefax. FastFaxts is a service offered in the Programmer's Shop catalogues, whereas Benefax is a reader-response-by-fax system in the magazine. They use the same server at the SDC site, but keep separate records for accounting and measurement and demographic data.

The system is similar to Interfax's -- input linked to a giant server that faxes stuff out on request. But the input is touch-tone phone, not fax. Callers phone in with a touch-tone phone and select items by number, also keying in their own customer ID number -- no number, no service. (In principle...we keyed in 000000 and got our faxes back right away anyway.) The data -- spec sheets and pitches, mostly, sits on a half-gigabyte image server (now loaded with 300 megabytes, with about 75K per 200-dpi page, with PostScript output soon) that downloads to fax machines on request, with one pc managing four phone lines (for a total of 12 lines currently). The server sits on a Novell network, managed by a pc attached to a touch-tone board, says Programmer's Shop information services manager John Hutchinson. The system currently handles about 500 calls per day with capacity for 50 to 100 lines.

SDC gets normal distributors' margins for any sales it makes through FastFaxts, and goodwill from advertisers for each inquiry through BeneFax; it provides a list of them to each vendor, just as bingo card services do. There is no noticeable impact on revenues, as yet, says Hutchinson; "Only one out of ten customers even knows it exists." But the company is now highlighting the service, he says. "It's good positioning; it's in line with our reputation for giving the best service in the country. Customers like it. Advertisers like it."

Hutchinson plans to start a lease-a-line service -- which is actually more of a virtual line. A customer company can have its own virtual line for $50 to $100 per month, and supply whatever information it desires. This needn't be just sales information requested through SDC's publications; it could be support tips, add-on offers and other information offered direct or through competing publications. SDC will in turn give the vendor a list of all respondents, including address and phone number, and what they asked for.

The internal software, FaxFacts, was written by Copia International, and sells for $2000 for up to four lines, with computer and fax board extra. Overall, you can install a workable system for well under $10,000, according to the ad we received from Copia via Benefax.

\textsuperscript{6} Brief is to programmers what XyWrite is to journalists.
SOFTWARE DESIGN MANIFESTO

One of the more interesting events at the PC Forum was the self-organization of a special-interest group on the issue of Software Design, following Mitchell Kapor's "Software Design Manifesto" speech. Kapor's premise is that there are schools and courses that teach programming and languages and even software engineering methodology or the use of particular tools, but the issue of software design has somehow slipped through the cracks.

Software design, says Kapor, is still primitive. For starters, we don't think about it enough, focusing instead on technical issues and superficial appearance. We lack enough experience with software to know what good design is, and still carry over approaches more appropriate to other media and tools. He cites the example of printing, where it took 50 years after Gutenberg first printed books for the technology to start being used appropriately. "The first books were [treated] just like manuscripts -- big beautiful heavy things chained to library tables, with 'circulation' limited to scholars and clergy. They had limited impact on thinking -- or on the low level of literacy," recounts Kapor. But over the next half-century things improved. Books got smaller, so they could fit in a saddlebag, someone came up with the page number7 to organize the data, and the readability of fonts improved. Aldus, not Gutenberg, put it all together, and at that point large numbers of people took up reading, and books started to circulate widely.

In the same way, we're still thinking linearly, still thinking of media as presentational (not interactive); we think of things as existing in one place at a time.

Software design is not merely the question of user interface, but the whole gestalt of a program, says Kapor. A program must have firmness -- it must be consist and robust; commodity -- it must be worth using; and delight -- it must be a pleasure to use.

Malleable metaphors

A program is more than just a collection of functions (take that, you object-oriented fanatics), just as a document is more than a collection of paragraphs. Did someone consider the purpose of the program before he began coding? What is the fundamental metaphor? Is the metaphor consistent with the tasks to be performed? Are the parts of the program consistent with that metaphor? A good metaphor will render a program intelligible and comfortable to the user, suggesting things he can do.8 It may also suggest follow-ons, such as Xerox's Rooms -- built on the idea that a user uses collections of different windows: This is my room for product management; this

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7 Would this rate as patentable today?
8 But too strict a metaphor can also be confining; for example, you can file a document only in one place in a file cabinet, but you can file it in many places electronically. The notion of copying the document works for a while, but what happens when you modify a single copy? Deciding the proper approach to take is an issue of software design -- not programming or engineering.

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is my room for doing budgets; this is Gwen’s room for music composition, which I can enter with her permission; and I take my personal calendar with me from room to room. (Under the name of Community, Coordination Technology will have a product with a similar metaphor, where the user moves from desktop to desktop.)

How is the program organized? How is it to be used? What’s the menu structure? How much does it lead the user, and how much respond to his agenda? And finally little things like windows, icons, typefaces, language, color -- the things that the user sees and that are just one part of design.

After Kapor’s talk at the PC Forum, where he propounded the notion of software design and suggested that it should be honored as a concept and taught as a profession, about 70 people showed up at a Special Interest Group meeting. Biases and agendas were varied (people were sitting in different rooms?), but interest was high. Software designers such as Andrew Singer (Radius) wanted recognition and a professional identity; users and academics wanted better-designed software.

Kapor has started a software design conference on the Well, a private online conference run by the Point Foundation. It will include subconferences on tools, resources (books and people), and a design studio, where people can critique products or projects. Kapor is now studying the charters of other professional societies (a fundamental tenet of good design is judicious borrowing). Interested people are invited to write to him at One Cambridge Center, Cambridge, MA 02142; fax him at (617) 225-2347 or E-mail him at mkapor (MCI) or Kapor (AppleLink).
BUDAPEST I AND PC FORUM XIV: SOME PRELIMINARIES

The next EDventure Holdings conference will be the East-West High-Tech Forum in Budapest, Hungary, next October 21 to 24. We are planning a small, high-level event, and have booked only 150 hotel rooms. Please let us know if you are interested, since we do not intend to advertise the event widely.

The East-West High-Tech Forum will be more marketing-oriented than the PC Forum, with a focus on market conditions and needs rather than the technology itself -- although we will certainly discuss technology developments as well. Specifically, we plan to have native speakers from East Germany, Poland, Hungary, Czechoslovakia and the Soviet Union, each discussing market and regulatory conditions in his or her country. In addition, executives (government and corporate) from East and West will talk about their experiences conducting East-West business.

While this is no trade fair, we do hope it will result in tangible business among parties attending. There will be a strong focus on actual business conditions rather than market forecasts which are unreliable anyway in this rapidly changing part of the world. What do customers need? What can vendors supply? How can the two sides get together? How can Western vendors convert profits into hard currency -- by importing Eastern technology, setting up Eastern assembly operations for export, engaging in counter-trade?

About one-third of the attendees will come from Eastern Europe, one-third from Western Europe, and one-third from the US or Asia.

Platforms for Computing -- The Fourteenth Annual PC Forum

We will also hold the Fourteenth Annual PC (Platforms for Computing) Forum next year (1991), March 10 to 13. By popular demand, we will be returning to the Westin La Paloma in Tucson -- although at a slightly warmer time of year! Invitations will be mailed to subscribers next winter.
RESOURCES & PHONE NUMBERS

Joan Throckmorton, Joan Throckmorton Inc., (212) 308-6677
Stan Rice, Autospec, (408) 649-0890
Steve Hersee, Copia International, (708) 682-8898, fax: (708) 665-9841
Don McLagan, Desktop Data, (617) (617) 890-0042
Bill Williams, Hartford Courant Faxpaper, (203) 241-3858
Yosi Amram, Individual Inc., (617) 734-4471
Paul Baran, Phil Sih, Interfax, (415) 329-1989
Doyne Farmer, Los Alamos National Labs, (505) 667-9186
Russell Neuman, MIT Media Lab, (617) 253-6630
Mitchell Kapor, ON Technology, (617) 225-2345
Susan Wider, Santa Fe Institute, (505) 984-8800
John Hutchinson, Software Developer's Company, (617) 740-2510
John Clippinger, Starr King Communications, (617) 876-4533
Trevor Burroughs, Tom Field, Tax Analysts, (703) 532-1850
Danny Hillis, Dave Waltz, Thinking Machines, (617) 876-1111
Cliff Reid, Verity Corporation, (415) 960-7600

SUGGESTED READING


"The Future of the Mass Audience," by Russell Neuman. Harvard University Press, in press. Neuman argues that human nature is much slower to change than technology, and that human habits provide a countervailing force to technology. "Maybe people will watch specialized information 20 percent of the time instead of 1 percent now, but that still leaves 80 percent of the time for the Cosby show," he argues.

COMING SOON

- Software hygiene.
- Nucleus -- self-tuning database.
- Seybold conference round-up.
- On-line services.
- Eastern Europe distribution deals, including ComputerLand, Microamerica/Softsel and MicroAge activities.
- Network navigation.
- Douglas brothers -- Hofstadter and Lenat.
- Application servers.
- And much more...

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RELEASE 1.0 CALENDAR

February 26-March 2  TechDoc - Santa Monica, CA. CALS, SGML, GOSIP, ODM... What is the meaning of these strings? All about hypertext, CD-ROM, markup and other issues in documentation and large-scale text manipulation. Call Patty Hill at (703) 841-8160.


February 27-March 1  CEPS '90 - Computer and Electronic Publishing Show - Chicago, IL. With Daniel Cheifetz (Odesta Corporation), Larry Miller (Caere), Bert Sheingate (HyperVision), Larry Liebson (Xvision), John Scull (MacroMind), Robert Williams (Verity), Betti Steiger (Xerox), Liz Bond (Electronics for Imaging). Contact: Sue Rizvi, (800) 255-7798 or (203) 964-8287.

March 1-4  West Coast Computer Faire - San Francisco. A hardy perennial. Sponsored by the Interface Group. Call Jackie Murphy at (617) 449-6600.

March 5-9  *Seybold Seminars '90 - Boston. ...moves east. Call Kevin Howard, (213) 457-5850.


March 6-8  Interface '90 Plus - Dallas. Sponsored by BusinessWeek and the Interface Group. Keynote by Bill McGowan of MCI. Contact: Jackie Murphy, (617) 449-6600.

March 12-13  Advanced Workshop in Computer Access and Use for Persons with Disabilities - Pompano Beach, FL. Sponsored by Trace R&D Center. Contact: Gregg Vanderheiden, (608) 262-6966.

March 12-13  Creating The information appliance conference - New York City. Sponsored by Arlen Communications and Jupiter Communications. With Allen Daley, Bell Atlantic. Call Gary Arlen or Joshua Harris at (212) 941-9252.


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March 27-29  1990 AAAI spring symposium series - Stanford. Case-based reasoning, text-based intelligent systems, AI & molecular biology, other neat topics, with all the right people. Sponsored by the American Association for Artificial Intelligence. Call Carol McKenna Hamilton, (415) 328-3123.

March 27-29  DB/Expo '90 - San Francisco. "Databases, Tools & Connectivity." With Chris Date, Richard Finkelstein, Vaughan Merlyn, Michael Stonebraker. Contact: Dana NeNardi at (800) 2DBEXPO or (415) 941-8440.


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March 31-April 1  Conference on participatory design - Seattle, WA. Come participate in a conference devoted to figuring out how to bring customer self-service to design. With Lucy Suchman, Xerox PARC. Sponsored by Computer Professionals for Social Responsibility. Call Paul Cyzewski, (415) 967-7079, or Jeff Johnson, (415) 586-5285. Cleverly scheduled to precede...

April 1-4  CHI'90 - Seattle. "Empowering people" with better, more intelligent interfaces to functional systems. Sponsored by ACM SIGCHI. Call Toni MacHaffie, (503) 591-1981.

April 1-2  1990 Computer Game Developers' Conference - San Jose, CA. Call Dave Menconi at (408) 942-0387.


April 2-4  Patricia Seybold's Technology Forum - Cambridge, MA. Distributed network computing and object-oriented environments. Call Deb Hay, (617) 742-5200 or (800) 826-2424.


April 2-4  Symposium on Principles Of Database Systems - Nashville, TN. Sponsored by ACM SIGACT-SIGMOD-SIGART. Contact: Daniel Rosenkrantz, (518) 442-4274.

April 5-7  MicroVision Summit 1990 - Newport Beach, CA. For people with something to sell, to meet people looking for something to resell. Group and private meetings with US and overseas resellers such as ComputerLand (Ed Anderson), Inacomp (Rick Inatome), MicroAmerica (Peter Brumme & Jack Littman-Quinn), MicroAge (Jeff McKeever), Ingram Micro D (David Dukkes), Metrologie (Alain Schwartzmann). Call Micky Dude, (603) 888-5626.

April 6-7  Advanced workshop in computer access and use for persons with disabilities - Toronto, Ontario. Sponsored by Trace R&D Center. Contact: Gregg Vanderhelden, (608) 262-6966.

April 9-12  *AIIM - Chicago. The annual conference of the Association for Information and Image Management. Sessions on new topics such as image compression, digital paper and transaction processing as well as vertical markets. Call James Breuer at (301) 587-8202.

April 9  *Software Law '90 - San Francisco. Hot topics this year, planned to lead right in to MacWorld: Patents, copyrights, viruses & liability therefore. Sponsored by Elias & Goodman and Wes Thomas PR. Speakers include Adam Osborne; Esther Dyson; Sue Morgan, SoftView; Jeff Cherniss, Advanced Software (owners of DocuComp and the "redlining patent"); Bob Kohn,
Borland. Call Karen Thomas at (516) 266-1652 or Paul Goodman at (212) 421-6000.

April 10-13

*Macworld - San Francisco. Later this year. Call Peggy Kilburn, (617) 326-9955.

April 11-12


April 18


April 18-20

Sun Expo Europe '90 - Netherlands Congress Center/The Hague. Sponsored by The Sun Observer Europe. Call Brona Stockton, (512) 331-7761.

April 22-24

Million Dollar Awards Conference & Ceremonies - Coronado (San Diego), CA. Sponsored by International Computer Programs. Contact: Nissey Welke, (317) 844-7461.

April 23-25


April 23-26

First international conference on systems integration - Morristown, NJ. Sponsored by ACM and IEEE groups. Keynotes: Arno A. Penzias, AT&T Bell Laboratories, Robert Berland, IBM. Call Peter Ng, (201) 596-3387.

April 23-28


April 24-26


April 25

Massachusetts Computer Software Council's Spring Membership Meeting - Boston. Call Joyce Plotkin at (617) 437-0600.

April 25-27

Conference on office automation systems - Cambridge, MA. Sponsored by ACM and IEEE groups. Call Joan Staunton, (212) 869-7440, or Robert Allen, (201) 829-4315.

April 27


April 30-May 3


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May 1-3  Amy Wohl's office systems and networks dialogue - Cambridge, MA. "The office is re-inventing itself." With Bill Campbell (Claris), Bill Crow (Hewlett-Packard), Tony Mondello (IBM), John Scull (MacroMind), Alan Hald (MicroAge). Call Karen Krebs-Wellnerstein or Florence Wohl at (215) 667-4842.

May 1-3  Second annual conference on innovative applications of artificial intelligence - Washington, DC. Sponsored by the American Association for Artificial Intelligence. Contact: Julia Munde, (415) 328-3123.

May 4-5  Advanced workshop in computer access and use for persons with disabilities - Madison, WI. Sponsored by Trace R&D Center. Contact: Gregg Vanderheiden, (608) 262-6966.


May 14-17  *Expert Communication '90 - Austin, TX. Sponsored by Graphic Communications Association and Davis Review. With John Clippinger, Paul Doebler, Mills Davis, Esther Dyson. Call Mills Davis, (202) 667-6400, or Patty Hill, (703) 841-8160.


May 21-22  LAP & PALMTOP '90 - New York City. Call Peter O'Connor at (212) 682-7968.

May 22-24  *Second annual executive UniForum symposium - Santa Barbara, CA. Sponsored by Patricia Seybold's Office Computing Group in conjunction with UniForum and X/Open. "The applications development environment of the 1990s: Can Unix set the innovation agenda?" With Jay Wettlaufer, Visix; Alfred Spector, Transarc, among others. Now that the UNIX market is emerging, it needs its own conference without a trade show; this is it. Call Judith Hurwitz, (617) 742-5200 or (800) 826-2424.


May 22-25  Visualization in biomedical computing - Atlanta. Sponsored by Georgia Institute of Technology and Emory University. Co-chair: Ed Catmull of Pixar. With topics such as "Trends in molecular modeling," "Chaos and fractals in electroencepha-
lography," and "Visualization and man-machine interaction in clinical monitoring tasks," and "Linking a relational database of biological features to computer-aided reconstruction of tissue." Contact: Mary Simmons, (404) 894-3964.

May 28-June 1  Avignon '90 - Avignon, France. Tenth international workshop on expert systems and applications. Sponsored by ARC, ECCAI and JSAt. The major European expert system event. Call Jean-Claude Rault, (331) 47 80 70 00, or fax, 47 80 66 29.

June 3-6  Spring Comdex - (back in) Atlanta. Sponsored by the Interface Group. Call Elizabeth Moody at (617) 449-6600.

June 3-6  *ADAPSO Conference - Washington, DC. With an international flavor this year. Call Ellen Kokolakis at (703) 522-5055.

June 5-7  EuroInfo 90 - Rome, Italy. Sponsored by SEAT and Learned Information. Contact Dr. Georgette Lubbock, 39 6 8494714.


June 6-12  Computex '90 - Taipei, Taiwan. Sponsored by Taipei Computer Association and The China External Trade Development Council. Call (886 2) 725-111 or fax (886 2) 725-1314.


June 14-17  *International Computer Club inaugural conference - Moscow. Scheduled to lure people east from the SPA event in Cannes. For information, call Esther Dyson at (212) 758-3434 or Levon Amdilyan in Moscow at 921-09-02.


June 19-21  PC Expo - New York City. Sponsored by H.A. Bruno. Contact: Steve Feher, (201) 569-8542 or (800) 444-EXPO.


June 24-28  Design Automation Conference - Orlando, FL. Sponsored by IEEE and ACM groups. Call P.O. Pistilli, (303) 530-4333.

July 2-6  ACM symposium on parallel algorithms and architectures - Crete, Greece. Contact: Tom Leighton, (617) 253-3662.

July 10-16  *PC World Forum - Moscow. Sponsored by IDG. An exposition, with a software development conference. Contact: Frank

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July 16-18  

July 27-29  
**ComputerLand's 1990 vendor fair** - Dallas. Contact Dianne Travailini at (415) 734-4160.

July 29-August 3  
**AAAI-90** - Boston, in the heart of AI-land East. Sponsored by the American Association for Artificial Intelligence. Contact: Claudia Mazzetti, (415) 328-3123.

August 6-10  

August 13-17  
**International parallel processing conference** - St. Charles, IL (25 miles from O'Hare). Sponsored by Pennsylvania State University. Contact: David Padua, (217) 33-4223 or Benjamin Wah, (217) 244-7175, or Roger Anderson, (415) 422-8572.

September 5-7  
**Breakaway 90** - New Orleans. Sponsored by ABCD. With a panel featuring Mike Shabazian, Mike Pickett, Mike Swavely, moderated by Esther Dyson. Contact Jeff Rosenberg, Computer Emporium, (914) 565-6262.

September 9-12  
**18th mini/microcomputer industry conference** - Boston, MA. Sponsored by Cowen & Co. Contact: Amy Burns, (617) 523-3221.

September 10-13  
**NetWorld '90** - Dallas. Sponsored by H.A. Bruno. Call Annie Scully or Mark Haviland, (201) 569-8542 or (800) 444-EXPO.

September 23-25  
**Agenda 91** - Laguna Niguel, CA. ...enhanced by a great new place. Sponsored by P.C. Letter/PCW Communications; staged by Stewart Alsop. Call Tracy Beiers, (415) 592-8880.

September 25-27  
**International expert systems conference and exposition** - London. Focusing on mainstream concerns: applications, integration, reliability and quality. Sponsored by Learned Information. Contact: Jean Mulligan, 011 (44 867) 730275 or fax (865) 736354.

September 25-27  
**PC Expo** - Chicago. Sponsored by H.A. Bruno. Contact: Steve Feher, (201) 569-8542 or (800) 444-EXPO.

September 30-October 3  

October 3-5  
**Seybold Conference** - San Jose. Call Kevin Howard, (213) 457-5850.

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<td>October 7-10</td>
<td><strong>CSCW '90</strong> - Los Angeles. Computer-supported cooperative work, with a slight (but lessening) academic flavor. Sponsored by ACM. Call Frank Halasz (back at PARC after a tour at MCC) at (415) 494-4750, or Tora Bikson, (213) 393-0411.</td>
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<td>October 18</td>
<td>Massachusetts Computer Software Council’s fall membership meeting - Boston. Call Joyce Plotkin at (617) 437-0600.</td>
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<td>October 21-24</td>
<td><strong>EDventure East-West High-Tech Forum</strong> - Budapest, Hungary. By popular demand. Explore the problems and opportunities of high-tech business in Eastern Europe. Sponsored by Edventure Holdings, with a roster of speakers and attendees from both sides. Call Daphne Kis, (212) 758-3434.</td>
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<td>November 4-7</td>
<td><strong>ADAPSO Management Conference</strong> - Phoenix. Contact: Ellen Kokolakis at (703) 522-5055.</td>
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<td>November 14-16</td>
<td>Pacific Rim international conference on artificial intelligence '90 - Nagoya, Japan. Sponsored by Japanese Society for Artificial Intelligence. Special sessions for &quot;AI in Engineering&quot; and &quot;AI and Large-Scale Information.&quot; Contact: Shigero Sato at (813) 479-5535 or fax (813) 479-7433.</td>
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<tr>
<td>December 5-8</td>
<td><strong>CASE '90</strong> - Irvine, CA. The fourth international workshop on computer-aided software engineering. Sponsored by Index Technology, IEEE and several academic institutions. Call Ron Norman, (619) 594-3734.</td>
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1991

March 3-7  *Seybold Seminars '91 - Boston. Call Kevin Howard, (213) 457-5850.

March 10-13 **EDventure Holdings PC (Platforms for Computing) Forum - Tucson, AZ (again). Sponsored by us! Contact: Daphne Kis, (212) 758-3434.


Please let us know about any other events we should include.
-- Denise DuBois

*The asterisks indicate events we plan to attend. Lack of an asterisk is no indication of lack of merit.
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Daphne Kis
Associate Publisher

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