THE ATTENTION SOCIETY

For some time we’ve been reading a little-known newsletter called Letter on Post-Industrial Issues, edited and produced by Michael Goldhaber at his Center for Technology and Democracy. (For most of us, Goldhaber is best identified as the cousin of Sitka/TOPS founder and venture capitalist Nat Goldhaber, as well as a former physicist and social scientist.)

Goldhaber’s oeuvre centers around the notion of "attention" as the new organizing commodity of society, complementing financial capital in fostering productive (?) activity. This isn’t the theory of public relations and advertising or of account control, but it helps to explain their ascendancy. Why don’t profits motivate people the way the economists say they should? In a world of abundance (the First World, basically), physical goods and people no longer compete only on their innate value, but also on their ability to gain "attention" that will somehow add to their value and the satisfaction of those who pay them attention. (Circularity intended.)

Like Michael Rothschild’s vision of capitalism (outlined in his speech in the 1990 PC Forum transcripts or his book Bionomics), Goldhaber’s theory isn’t an ism -- or a moral code -- but simply an attempt to explain some interesting, otherwise unexplained phenomena. For all Goldhaber’s work on attention, he has gotten far less than his ideas deserve.

The appropriate response to attention economics is up to the beholder. Is the attention society one we want to live in? Is capitalist society? Maybe, maybe not. But this is not the issue: We are in such a society. The issue is how we use this perception to make society better.

What Goldhaber posits, the attention society, does not replace the money society, but complements and supplements it. In the same way, we once had a land society, where power depended on ownership/access to land. Peasants belonged to the land; the land belonged to the lord. Things weren’t fluid: You couldn’t sell or buy land, and peasants couldn’t easily move around. The new class of money-oriented merchants and later on capitalists had wealth, but there were certain things they couldn’t do. Much the same applies to birth or status: Women could move up or down the social scale to some extent, but men had to stay in their place. House servants could share much of the lifestyle of their masters and know all their secrets, but they could never be their masters. Consider the scene in Lady Chatterley’s Lover where Constance undresses blithely in front of the gamekeeper, since she regards him as not quite human.

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Money has changed that, but not completely, as intimated in Norman Mailer's *The American Dream*, where the hero's well-connected father-in-law tells him (in paraphrase): "Kid, there's my kind of million dollars, and there's your kind, which will buy you a million dollars' worth of groceries!"

Profits are no longer the motivator we once thought they were. Just as we are disengaged from the means of production of most products we consume, so that we don't understand their costs (in resources, pollution, and statistical dangers mitigated by insurance), so we are now also increasingly divorced from financial costs in measuring value and satisfaction. Yes, we count money and use it, but most people don't operate only to maximize income (to the despair of economists) or financial efficiency. They want leisure time, brand names, conspicuous consumption -- in short, attention and attention-getting goods." It's "lifestyles of the rich and famous" that so many want to emulate.

Andy Warhol's dictum that "in the future everyone will be famous for fifteen minutes" misses the mark. Fame matters, yes, but it will not be equally apportioned. Like money, attention allows for a more mobile society, but like land or birth, it is not a commodity that can be easily acquired or transferred. It has its own dynamics and its own economics; certainly money helps you get attention, and attention can help you make money, but they're not directly convertible. Your mother's attention isn't as valuable (by this reckoning) as the attention of a large audience -- or of a single star.

Goldhaber's framework applies to and explains a variety of modern phenomena, from trade (where the US gets far more attention than we give) to education, warfare, politics, family life, science -- and software. As he explains below, software is a tool for gaining attention -- call it the capital equipment of the attention society; electronic mail (in addition to mass media) is a medium for it. Remember the missing productivity gains we discussed in our September issue? Some of those gains were applied to productivity in attention-getting, gains not recognized by traditional economic measures.

Now read on...

ATTENTION AND SOFTWARE

by Michael Goldhaber

To conventional economists, pcs are something of a paradox. Their production has been an admirable growth sector, but their consumption or use seems to serve little purpose. As discussed in Release 1.0, 9-91, while millions of pcs found their way to corporate offices in the Eighties, they seemingly did nothing for overall productivity. Yet pcs are more than a fad. If people in offices didn't use them for compelling reasons, not just as fun toys, demand for them would have faded well before now. A correct economics should be able to explain the role they play. Over the past few years, I have been trying to put together an economic theory that can do so. This is a report with special relevance to software.

Though we hear the term less now, in the Eighties we were assured that pcs would take us further into the "Information Age." The amount of information stored, transmitted, developed and processed continues to rise astronomical-
ly, but it is not clear why. Most people have simply taken it for granted that more information is good for business, but standard measures of growth don't reflect the explosion in information: As information took off in the past few decades, conventionally defined productivity growth turned flat.

Furthermore, people are just as likely to experience the growth of information as a problem: "I can't keep up," "There's an information glut," and so on. If information were valued in itself, like normal commodities, a glut would cause us to cut back sharply on its production. Instead, we keep increasing exponentially the amount of information we put forth.

The satisfaction is in giving, not receiving, information

The question is why we keep producing more information. My answer: We do so because through it we hope to get attention. It is the economics of attention that can explain the value of pcs in today's offices.

Note that in this respect pcs are very different from mainframes; they serve as vehicles for personal communication, as opposed to mainframes or pcs used in mainframe-style tasks such as accounting, which generate data for business processes rather than for people. The following applies to personal computing, however it's accomplished, rather than to pcs per se. Streams of data are not attention-getting in themselves; it is the information in those streams of data that may garner attention, if it is either interesting or attractively presented.

Had we infinite attention to give, we might look at a data stream. But attention is scarce: Each of us has just so much capacity to pay attention and wants to use it to good purpose. One definition of economics is the science of the management of scarcities, so an economics of attention makes sense, in a way that an economics of information, which is open-ended and unlimited, would not. [What is scarce is the unique understanding or knowledge of information that gives you some competitive advantage, but that's another story. -- ED]

The micro level: Attention barter

To start at the micro level, attention might seem an evanescent thing: You look at this, you look at that, and then you look at something else. If Mr. Jones gets your attention for ten minutes, what good does it do him in the long run -- immediate gratification aside? The answer is that attention can generate further returns for the receiver -- give Jones ten minutes of your attention today, and therefore you remember him a week from now, a month from now, maybe even a year from now. Attention is accumulated in the form of other people's memories and in their willingness and desire, on the basis of that, to pay attention again.

Of course, Jones can wheedle ten minutes of your time and then blow it. You may remember him but with aversion; you have no inclination whatsoever to pay attention again. As an economic transaction, from your perspective, Jones took more attention than he gave back, so you certainly don't owe him any more (in fact, you feel taken advantage of). If he talks for ten minutes about something of no interest to you -- say, his back pains -- you will stop paying attention well before he stops talking.
But if you happen to have a serious backache yourself, you might interpret Jones's remarks as an expression of sympathy, offering attention to you and your needs, an attention you might reciprocate by talking about your own aches. Each of you would feel that the other is giving as well as taking, that the conversation is an equal exchange, and that it leaves you feeling slightly better.

No knowledge of any practical value need be exchanged -- no cures or doctors' names, just commiseration between fellow sufferers. This is not an information transaction; it's an attention transaction. The next time you're in contact, you will both remember your talk favorably and willingly exchange a little more attention. Through such more or less equal exchanges friendships are built. Each person comes to occupy a more and more important place in the mind of the other, as each conversation leaves some trace in memory. [You could also look at this as a neural-net phenomenon, sensitizing people or machines to familiar patterns. -- ED]

Beyond barter: Return on attention investment

From an attention-economic standpoint, equal two-way conversations are the not-very-interesting barter level, which has presumably been around many millennia. We have now gone far beyond this through a widening array of technologies of attention; they are the means by which some people accumulate far more attention than they can pay back. The ultimate such technology today is global TV broadcasting. The major such avenues in the past were press, musical performances and theatre; the sleeper of the future is electronic mail in all its forms.

Kristi Yamaguchi got a staggering fraction of total world attention -- albeit for just a few minutes.

Well over a billion people sometimes pay attention at the same time to a single person -- such as Kristi Yamaguchi as she won the figure-skating gold in the recent Winter Olympics. In those few minutes, Yamaguchi was accumulating attention that she may draw on for the rest of her life. As well as appearing in ice shows, she can call on our good will by endorsing commercial products, political candidates or causes, acting in movies, running for office herself, becoming a society fixture, drawing attention for her family, her love life, her favorite recipes or summer resort; well-nurtured, some of this attention can remain for her children and grandchildren.

Now, Yamaguchi was not paying attention to each individual in her audience, as she had no knowledge of most of them beyond mere numbers. In that sense, she already has gotten far more attention than she gave. Yet as a result of getting that attention she can expect to get still more. Just like capital, attention can be accumulated and used to generate more.

Attention exchange

To explore the dynamics of this transaction, let's go back to an ordinary two-person conversation: When it seems like a fair exchange, there is no clear division between attention given and attention received. As one person speaks, he or she must continue to pay attention to the needs of the
The new economy, globally

One reason that conventional economics worked as well as it did in the past is that there is a universal medium, money, that can be exchanged for goods of any type; people with finite amounts of money must choose what to buy. (See also Release 1.0, 11-91.) Likewise, as a rule, people must do something to keep the money coming in.

Attention is also a universal item of exchange between people, but it has no independent medium -- or embodiment of value -- outside people's minds. It is a commodity in the sense that it can be bought or sold (although the attention is usually of low quality when such a transaction is explicit), and somewhat fungible in the sense that attention focused in one direction leaves less for all others.

With today's technologies, attention is increasingly integrated into the broader world. Two centuries or so ago, in the transition to industrial society, much work that had been done within families or on a barter or favor exchange basis within communities was replaced with factory production of equivalent goods (but more of them) to be mass-produced and sold on local, national, and ultimately global markets. Today, similarly, much attention that might have flowed within families, among friends or within communities, is captured, augmented and mass-induced to flow in an overall global pattern through the leverage of mass media -- the capital equipment of attention.

Just as happened in the case of the industrial economy, the attention economy is an increasingly important reality in more and more people's lives. But just as mass-produced goods lose their value, through an attention effect, so may commercial mass attention...

Since the production or consumption of any good or service involves a flow of attention, it can even be argued that the attention economy subsumes within itself the old industrial money-based economy. While the attention economy includes the exchange of money for goods, a substantial proportion of the attention economy is independent of flows of money. A star capturing attention on television can cash in on that in many future ways, for example. Conventionally, this is inadequately counted in comparisons of wealth, in estimates of international trade balances and so on.

Is the US really losing out to Japan? The Japanese watch more TV than anyone, and are still much, much more aware of American stars than we are of theirs. "Our" stars can cash in on that awareness, for instance by making personal appearances in Japan, releasing records or publishing books there, or drawing fans to visit the US. It's no accident that Sony paid hundreds of millions of dollars to hire two attention-getting American movie producers to head their new studio -- Jon Peters and Peter Guber. (Also ironic: Many Japanese exports are consumer entertainment devices -- TVs, VCRs, Walkmen, cassettes -- that end up being used all over the world to watch American movies and TV programs and to listen to our music. Thus the Japanese make money by producing vehicles for US stars -- increasing rather than decreasing US global audience-attention dominance.)

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other: Is the listener interested? Is the speaker’s meaning clear? Is the listener in proper suspense about what happens next, and does the speaker satisfy the listener by continuing the tale or the argument suitably?

Both the listener’s and the speaker’s needs are attended to at each instant. From earliest infancy, through thousands of mostly two-person interactions, we learn the pattern of reciprocity in the barter of attention: It becomes pretty much automatic and unconscious to feel a pull, having received attention, to give an equal amount in return. Even an utter narcissist usually learns to fake an interest in the other person when he wants something.

Attention leverage: The attention illusion

Turn now to a characteristic audience situation, intermediate between a conversation and the Yamaguchi case: a speaker before a large group. The audience members unconsciously continue to try to interpret what is taking place according to the model of a person-to-person dialogue. This unconscious distortion leads them to experience a feeling of owing the speaker further attention.

Imagine yourself to be a member of such an audience (pretending if necessary that you are not a star yourself). As long as the speaker is skilled enough to keep holding your attention somehow, the parallel with the dialogue situation sustains the unconscious illusion -- the attention illusion -- that the speaker is paying direct attention to you, your needs, interests and reactions, even though the speaker may in reality be ignorant of your very existence.

If you were alone with the speaker, and each thought the other of equal importance, you might feel that the flow of attention was indeed equal, and you would probably interrupt to direct the flow of conversation by questions or nods of encouragement, at the least. A skilled speaker tries to create the feeling of such interaction through a presentation with its own interaction built in, perhaps setting up questions and answering them, telling jokes and making asides, building up suspense, pressing toward an emotional catharsis and making you feel that you are about to hear just what you want to know. A skilled speaker also scans the audience so as to seem to focus
right on you, meeting your gaze, even though in fact she or he is "gazing" at everyone. Likewise, sound amplification can promote the illusion the speaker is talking to you in conversational tones, even though she or he could not hear you speaking in a normal voice.

**Audience of many ones: The audience effect**

Thus you unconsciously feel yourself in intimate dialogue with the speaker. Yet at the same time, by dint of the fact that many people are listening to the same person, his or her importance is magnified. The speaker appears to be reciprocating all the attention he or she is getting from the entire audience, even while his or her attention seems also to be focused on you alone. This is the **audience effect**. As this attention is far more than you as an ordinary person can immediately reciprocate, you can end up feeling indebted. You can be far more grateful for being spoken to as a member of a large group than for hearing exactly the same words delivered to you alone by someone of no special fame. Of course, a private conversation with someone who you know has a large audience seems even more privileged; the star or attention-getter carries the magnified status around.¹

To sum up, the interplay of the attention illusion and the audience effect engenders the feeling that you got much more attention than you could have returned, and, through normal feelings of reciprocity, you sense a substantial attention indebtedness to the performer. Neither the attention illusion, the audience effect, nor your commitment to reciprocity has to be anywhere near complete for this to work.

**A note about the word illusion:** The case of TV should make it plain that any attention you feel yourself to be getting from a star can be completely illusory, but an attention economy is not thereby less worthy or even less genuine than older economies. Illusions or misperceptions or differing valuations also are present in ordinary economic transactions -- for instance, they color what participants consider to be a good deal: Each side can feel it is taking advantage of the other. Ideally, both can be right: Each gets what it values more (although not always).

¹ The audience situation doesn't have to be exactly like a conversation. Back at the barter level, if you happened to know a skater but knew nothing about skating and didn't follow sports, you might find her performance of some interest, depending on how much you could empathize with the physical effort she was making. A good figure skater, like a good speaker, would know how to obtain empathy -- drawing you into her motions, so that you would feel suspense at each turn or jump and satisfaction in her smoothness, continuity, and rhythms; instead of mental questions, you would be connected through imagined parallel motions of your own body. Still, even experiencing all this, without a context for measuring her performance or her attention-getting prowess, you may feel you're doing her a favor to watch. Later, you find out that your friend Yamaguchi has won the Olympic gold, and your feelings about the transaction most likely change sharply. Suddenly you feel indebted for the privilege of a private show by one who you now know can command a huge audience; you belatedly realize that what you saw, apparently staged for your benefit, was far out of the ordinary.
Attention debt and investment

To discharge their sense of obligation, audience members may write fan letters and look with interest at commercials or ads featuring the performer. They may go to considerable lengths to see her in person -- travelling long distances, waiting in long lines and paying substantial admission charges, waiting in line again to get her autograph. Or if she should make a local appearance they are willing and even honored to perform all manner of services for her, from getting her a glass of water to performing sexual favors or putting her up as a house guest. Since the audience effect gives the performer an aura of importance, these further contacts can bestow overflow, derived attention on the fan, leaving the fan with further feelings of indebtedness to the star.

PCS IN THE ATTENTION ECONOMY

I've been using the terms star and fan respectively to denote people who get more attention than they give, attention getters, and people who give more attention than they get, attention givers. Stars include not only the usual roster of singers, actors and other performers, but also journalists, chefs, politicians, architects, authors, scientists, even ceos -- whoever has been in a position to build up an audience of fans. Not all stars are as famous as major media stars. The attention economy also works on a smaller scale.

This is where pcs fit in. They are one of a number of tools that both have extended and deepened the penetration of the attention economy, particularly over the last decade, allowing far more people to become stars of sorts, or try to. In this context, a pc is an attention-getting device, a sort of personal broadcasting station or publishing house for its user. Beyond that, software helps the user to project a specific image, acting as make-up for the mind.

While the term "spreadsheet" was taken over from the supposedly unglamorous world of CPAs, it's no accident that among the main selling points of new spreadsheet packages are their "exciting" graphics displays and output.

Popular kinds of pc software (word processing, spreadsheets, graphics programs, databases, e-mail, dtp, to say nothing of explicitly named "presentation" tools) enable users to get more attention for ideas, projections, products, knowledge -- but also ultimately for the users themselves. These programs permit their users to "produce" more, but what they produce tend to be memos, reports, articles, letters, materials for presentations. The output (electronic or paper) is not designed to be sold or even directly to generate profits; ostensibly, it helps in making decisions and communicating them, clarifying the company mission, fostering teamwork. In fact, this output is designed to attract the attention of co-workers, customers, investors, competitors, bosses, underlings -- even reporters and through them the general public.

This of course is the promise of software; some users, rather than getting outside attention, probably short-circuit -- they feel they are getting attention from their computer, or they focus on perfecting their work for im-
aginary audiences; see Sherry Turkle’s *The Second Self*. The whole notion of attention *from* software rather than *through* it is intriguing. Then attention -- at least, ersatz attention -- would no longer be scarce. This of course is happening with automated support lines, voice-recognition tools and other devices; see the first item below. However, in order to feel good about attention from a computer -- or a doll, for that matter -- you have to feel it is a real being, and therefore in need of attention from you. In effect, any attention to you comes *from* you.

Software for attention

A major way conventional economics assesses performance is productivity -- output divided by input. You can measure attention productivity the same way -- attention received divided by attention given. Last September's *Release 1.0* gave a number of reasons why pcs don’t increase conventional economic productivity. Here, I explain how they do increase attention productivity, and a few measures for assessing it.

When you measure attention productivity, you face all the caveats and conditions that apply to financial measures of productivity. For example, do you count the attention the user expends? How do you account for the attention illusion and the fact that one user may be more productive than another in gaining attention with a product? And so forth. But even though you might not be able to measure them precisely, the ratios are real -- and they may explain why conventional productivity doesn't seem to budge: People are more interested, consciously or not, in high attention productivity.

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Software is fundamentally different from most attention-getting products for personal use in that it’s a kind of capital good. It doesn’t just generate attention for the user; it allows him to simulate attention to other people -- the attention illusion -- in order to win attention back. It is also a tool aiding in the production of innovations that "deserve" attention.

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The attention required to produce software includes that of the designer and programmers, as well as producers, marketers, resellers, trainers and other ancillary people. The user also "spends" attention on software (as someone might spend attention to wear a fetching dress properly), installing it and learning how to use it. Note moreover that the attention the user spends learning a product is an investment that lowers future attention needs, while the attention required to use it is more like current expenditure (cf. ease of learning vs. ease of use).

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\text{value produced / resources applied} = \text{productivity} \\
\text{attention produced / attention spent} = \text{attention productivity}
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Measures of attention output

There are at least four forms of attention output from pcs and software:

- **First, the tools can create an attention illusion.** An obvious example is the mail-merge function of most word processors. This enables you to create the illusion that you are sending out personalized letters
and memos, when in fact you are paying far less attention per letter than an untutored recipient would realize. While companies have been using similar technology for a long time, the illusion is enhanced when the writer is a known person, but not so famous as to be a completely unlikely correspondent -- Ed McMahon or Philippe Kahn (at least on the subject of an upgrade to Quattro Pro). Incidentally, Kahn is a master at leveraging MCI Mail to give and solicit attention.

Likewise, some software can prepare different versions of the same basic text or assemble boilerplate components for different audiences to promote a similar illusion. So does software that permits push-button preparation of "personalized" graphs, plans, lists and other items for clients; ditto for databases that permit users to "refresh" their knowledge of their correspondents.

A fundamental question: How much does the software enable the user to leverage his attention beyond the creation of an attention illusion? In other words, can you pay more attention to more people if you send them all e-mail? (Or is attention measurable only in terms of undivided minutes?) Conversely, what happens when the illusion is complete -- when is there no human attention behind the tool at all? When does leveraging attention end up leaving the attention-giver unknowingly communicating with a computer?

- Second is the ability to create an audience effect. Desk-top publishing software combined with laser printing does this fairly well, because most people today are still used to a world in which only documents printed in runs of a hundreds or thousands would be set elegantly in type. A desktop-published document provides the illusion that it has gone through the hurdles of editing and layout that in the past only an authoritative document would have received. (This effect has now diminished for people who have been exposed to dtp for some time.) Well-finished video and graphic communications create the same effect. On a smaller scale, so does scheduling software that shows off how busy the user is, or e-mail with lots of cc:s (although that can destroy the attention illusion, which is harder to create through text media than when the star seems to be gazing at you).

- Third, the computer output can project marks of your personality that make you recognizable in (or from) a different setting. The idea is to build your audience by creating a sense of you as a person different from anyone else that attracts attention (this is what brand names do, generally less effectively, for products). Book authors do this, for example, when they make the talk-show circuit, give newspaper interviews and appear in photos on book covers.

Of course, there are prevailing but changing norms that cannot be carelessly defied. For instance, including your picture on your letterhead is now technologically easy but is too blatant and crude in most contexts. But
you can sneak your picture into a report, perhaps as part of a larger photo in context, or it can openly appear in a newsletter without seeming inappropriate. On e-mail systems, people who contribute regularly to particular bbs conferences broadcast a sense of their personal style; within these communities they become recognizable stars -- people whose comments the cognoscenti always want to read. (They are not always recognizable when you meet them in the flesh!)

- Fourth is the inherent attention-grabbing, embellishment capacity of the tool. Graphics, color, animation, sounds, unusual fonts, bizarre screen-savers seen by co-workers, clever choices of words from a thesaurus, and even striking information massaged from a database, scary projections in a spreadsheet, original thoughts developed with an outliner. The promise of something like hypertext is that it creates a whole new genre in which to star, but it has a limitation in its need for specialized skills from its audience. (Hypertext in particular is an inexpensive way of sharing credit, drawing attention to other ideas or contributors in context.)

Attention grabbing-capacity involves the previously unavailable power and versatility of a software program, or the degree to which it can enhance existing modes of communication. Hypertext would rank high in the former but low in the latter (because there is a limited audience knowledgeable enough and equipped to use it). Animation is an example of hard-to-use power at present; not only is there no convenient way to transmit animated graphics, but even where modes of transmission such as mailing a videocassette do exist, few typical audience members would be inclined to get to the point of looking at the video so that their attention could be grabbed. On the other hand, easier drawing or CAD capabilities facilitate graphics that can attract attention even in ordinary letters.

You can also consider the basic information-handling power of software here: Does it help the user find new and useful facts, discover relationships, follow the news so as to impress his friends or cause them to come to him for advice or information?

Product cycles and pricing

Early in the life of a product, designers, production workers and others involved in getting the newly designed product to the purchaser spend a lot of attention on it. Later on in the life of the product, productivity measured in conventional terms goes up, as does attention productivity. But meanwhile other vendors are coming up with even more productive products, so the relative productivity or attention value of the old product falls.

You can factor all this into software pricing. Marketing and upgrading strategies should differ for different attention-productivity curves. A product that's easy to learn (or imitate) should get "conventional" pricing, highest at introduction and then progressively lower, together with some substantial sales effort at the outset. On the other hand, a product that's hard to learn but highly productive should start with low initial pricing or a broad beta campaign; pricing can be maintained thereafter (but probably not increased) through increasing sales efforts, and continued upgrades.
E-mail is the PC technology that seems to hold the most promise for democratizing attention. It overcomes the problem suggested by the old populist saying, "Freedom of the press belongs to those who own one." In other ways to get attention, such as appearing on TV, writing for magazines or publishing software, you have to win the approval of the gatekeepers to have a shot at the audience. By lowering the threshold sharply, e-mail provides new opportunities for recognition to people with unconventional viewpoints and modes of expression, and with varying levels of articulateness or presence.

In their current form, e-mail and bulletin boards and other electronic communities provide relatively low-cost message sending and the capability of addressing large numbers of recipients or readers. They are also minimalist: short ASCII messages, no fancy packaging, no emphatic type, no theme music -- nothing obvious to set up an audience effect that separates stars from non-stars as message senders. Still, just because it is so stripped-down, this medium is not equally good for everyone. It favors those who can express themselves briefly in typed words -- or short programs -- and is of little help for more subtle or non-verbal messages.

Of course, with everyone having his own "press," demands on attention quickly increase; increased supply of attention-getting material meets constant demand. (Personally, I belong to the WELL, but I use it sparingly, because conferences divided into hundreds of topics with hundreds of entries each are usually just too daunting. I haven't found a good way to filter out what might interest me from what doesn't.)

Gatekeepers of attention

One possible e-mail gatekeeping system that seems to preserve democracy is text-search software; mail recipients or scanners of the net can use it to find items of interest. Of course, search criteria will include not only keywords and the like, but authors, editors or endorsers. "Anyone my star is a fan-of, I'm a fan-of." You will want to know what your stars have to say, or whom they're reading.

Thus, gatekeepers in some form will come to the fore to filter public information and to ward off junk e-mail, after all. One can hope though that the gatekeeping can be more democratic and egalitarian than for older forms of attention-getting, which were based on either rigid bureaucratic institutions -- e.g. government as a whole or the public school system (in endorsing textbooks or ideas) -- or vast private capital (Rupert Murdoch or Time-Warner). These gatekeepers tend to be especially receptive to stars or would-be stars comfortable with established interests; perhaps the "net" will afford less advantage to incumbency.

Stars on the net

As noted, the importance of the audience members -- that is, how much attention they have accumulated -- in creating the audience effect is crucial; a minute of a star's attention is worth much more than a minute of an ordinary person's, because attention circulates: There are many ways stars can pass along some of the attention of their audiences (endorsements, introductions, forwarding e-mail or posting it, name-dropping, invitations, photo opportun-
ities, mentoring). A conference coordinator who filters what gets on also becomes a kind of star; you choose the conferences whose personalities you feel attend to your needs. Software that helps grab such people's attention would obviously be quite valuable, but this audience is of course usually quite sophisticated, and especially reluctant to give out valuable attention too easily.

Meanwhile stars who aren't professional net-watchers will eschew e-mailed demands on their attention; they will end up filtering with extra care. Thus e-mail communities will also have their own inequality of attention.

Nonetheless, network communities will allow people who might be boring to the world at large to find people who share their own special interests, increasing mutual attention between people who otherwise might not find each other. A dud on the cocktail circuit might be a star of sorts, or at least a respected member, in a special-interest forum on bat-watching or dyslexia or the intricacies of PageMaker scripting sequences. Moreover, the audience effect on a listener is magnified when the audience is composed of people the listener respects.

Attention and counterattention

Other uses of e-mail to get attention involve the entrance of outsiders. For example, last June's Release 1.0 proposes a kind of counter-advertising. Instead of looking through ads to find what you want, you announce yourself as interested in something: "I earn $100,000 a year and I'm looking for a fast car." Would-be sellers then approach you through return e-mail with offers. A problem in such e-mail uses is the would-be seller's lack of certainty of your purpose; do you really want to buy or are you just testing the market? (Of course, sellers in stores have that same problem, and they have learned to endure just-browsers. Sometimes the browsers even buy in spite of their intentions.) To test sincerity, sellers might devise additional filters or not treat requests very personally.

ATTENTION IN CORPORATIONS

New groupware such as Lotus Notes and e-mail may help companies increase the coherence and unity of their "personalities;" on the other hand, groupware might turn out to provide new kinds of stages in which individuals within a corporation can star in the world at large at the expense of a unified company image.

Corporations have already become major stages on which to get and hold attention. But the average corporation is not filled with people acting in dramas or comedies unrelated to the business; rather, people try to capture attention through their work, which ostensibly is of value to the business. Yet a company as such is poorly equipped to know what it needs, except through the presentations and evaluations of the very people who can use it as a stage upon which to star.

It's a little like professional baseball: Players become stars by doing just what everybody thinks they should to make their team a success. Yet boasting a star or many stars doesn't guarantee that a team will win the pennant -- or even make money.

Release 1.0  26 March 1992
Just as baseball stars are evaluated by umpires' and the media, most corporate stars are judged by outsiders such as investors, customers, analysts and competitors -- all givers and receivers of attention. The would-be corporate stars also promote the very ideas on which they will be judged; they can create new categories of performance and make them into industry standards if they are successful.

The same decade of the Eighties that saw pcs sweep into offices also saw a doubling in conferences in semi-public places such as hotels or convention centers; teleconferences, previously rare, proliferated, along with fax and cellular phones -- ways to transmit and receive attention more broadly and frequently. It saw a vast increase in "luxury" hotels, in business travel, in desirable office space in striking post-modern buildings. All these are media for attention-getting by a vast array of would-be stars.

Profits are no longer the major measure of corporate standing. Typically the people who control a corporation are not the owners, but rather the managers and players on the corporate stage (although they may own some stock). They bask in the attention they receive rather than the profits the company earns. (They can also use this attention to justify their salaries, of course.) What does Lee Iacocca really want: Profits for Chrysler, or air-time for himself? What does Bill Gates really want: Profits for stockholders, or attention/power for a company that he identifies with?

Even financial valuations are smudged by the economics of attention: What gives a company a high p/e ratio? The attention of analysts, of course.

Stars do well in corporations

A successful corporate star, like any other star, is successful because he or she generates attention from the audience in question -- in this case within a company or within its market. An employee who obviously showboats or lies would be discounted. Clearly, some corporations operate with more sophisticated and astute audiences (including their own top executives) than others. But as the S&L and junk bond debacles suggest, it's easy to overestimate such astuteness; the high officials and many of the commentators on them are stars in their own right, and they create that image by generating high profits or the expectation of high profits for just long enough.

As the corporate world becomes more of an attention economy, innovative behavior earns a premium. One does not get that much attention by proceeding, however well, on a steady, unchanging course from year to year. Indeed, the attention economy is self-propelling, even within companies supposedly dedicated to the pursuit not of attention but of profits.

Some old-line companies may resist, of course; to avoid such subversive goings-on, they would have to limit sharply the degree to which their employees could communicate with each other and with the outside world, restricting all the forms of communication mentioned above -- and more. Alternatively they would have to control internal behavior with an iron hand, limiting innovation and losing their stars. That approach made sense in the
heyday of large-scale mass production of limited sets of goods, but the world today is too swamped with goods of that kind for a corporation to remain viable for long if it sticks to such a model. In general, rigid companies are worse off than the former USSR was because the country could prevent its talented people from leaving, while a company cannot.

PR people and agents help you to garner attention; they also make people better at doing attention-generating things. They are the missionaries and educators of the attention society. Note John Sculley's blossoming friendship with Hollywood agent Michael Ovitz.

A corporation that fails to let its own stars develop will generally get less loyalty from its employees than one that fosters their stardom. To keep attention focused as much as possible on the company and its goals, the company has no choice but to share the limelight with its own employee stars. There is no choice but to cooperate with would-be attention getters. After all, most top management likes the attention of its own employees and its community; they too want stars and to be stars. (Except for pathological cases, executives know that managing stars enhances one's own stardom.)

Corporations don't do so well as stars...

Corporations want and need attention for themselves as entities. But while they are distinct conventional-economic entities, they are usually not attention-economic entities. A corporation can make things, and can buy and sell, much in the way a real person can. But a corporation per se cannot make a public appearance, act in a movie, or appear to be paying attention to a particular person in an audience. It lacks the coherence, the recognizability, the key traits that make persons into personalities, that fix them in our memories.

The Elizabeth Taylor who recently held her 60th birthday party at Disneyland is remembered by many as a young girl in the movie "National Velvet" and a queen in "Cleopatra," the woman who "stole" various husbands and had many of her own, ran benefits for AIDS, has perfume named for her, has been near death several times, has gone on various diets and so forth. We might recognize her face, her gait, her voice, if we saw her walking down the street, and fans would do many things to get her attention or please her. General Motors spends far, far more effort on publicity than Taylor does, but how many people know comparable amounts about its origins, its early years, its crises, its aspirations?

A company can however, hire people to do appear and act on its behalf through sponsorship and other tie-ins (see Release 1.0, 6-91). Indeed, companies generally spend huge amounts for the attention they do get. They advertise in TV, radio, newspapers or magazines; they try to gain attention through public relations, direct sales efforts, meetings of ceos with stock analysts, support for museums or schools (many such efforts are sincere). They put out press releases each time they open a plant or promote a customer-service manager.

The reason attention matters to a corporation is of course that attention remains scarce, and a corporation needs it to attract and satisfy manage-
ment, workers and customers. Once hired, workers who have the company’s needs and interests in mind are likely to work more effectively and consistently for it than if they focus on rock or movie stars, talk-show hosts, columnists, religious or political leaders as they work. Similar considerations hold for attention from customers, investors, suppliers, distributors and so forth. But real attention can neither be coerced or bought; it has to be won and held in competition with everyone else’s efforts to capture it. As stars get better and better at capturing attention for themselves, corporations have to compete for their share.

...but some do better than others

Even though it is questionable whether a corporation can ever get attention as efficiently as an individual, some are better at doing so than others. Corporations that can do best at getting attention as a whole are those that innovate, which keeps them in the news; have a readily identifiable set of products or services; have as distinct as possible a corporate culture or persona; and are strongly identified with a certain set of stars who may be their own executives or spokespeople, or even their own creations -- e.g. animated characters.

The Walt Disney Corporation, Nike and Apple Computer are among the best examples of star-corporations. In Apple’s case, its attributes include not only the celebrated Macintosh interface "look and feel," the distinctive shape of the original Macs and the company logo, but also the romantic, suspenseful story of the company, including the famous clash between Sculley and Jobs, along with a number of other colorful figures such as Guy Kawasaki and Jean-Louis Gasse. The story continues to be a cliffhanger, with fans continually suspecting that now, finally, the company has "sold out," giving up its uniqueness for what is taken to be impersonal IBM bureaucratic norms. The suspense itself no doubt adds to the interest and clarity of the image, just as juicy gossip about Taylor’s relationship with Richard Burton on the set of "Cleopatra" helped her image remain vivid -- and helps her sell her perfume now.

Attention-getting corporations face the difficult task of remaining innovative and changing their mix of products and services while retaining a clearly defined images and continuing to reinforce the memories of the corporation that fans have stored up. At the same time, they must strive to maintain at least the illusion that they are attentive to their fans’ needs.

Conglomerates with poorly defined images are particularly poor at retaining audience attention. Consider ITT or W.R. Grace: Only experts can keep track of what they do; as they buy and sell subsidiaries, even well-paid employees must have a hard time staying loyal. Few computer companies, even IBM or Siemens, have that diffuse an image; most have at least fairly distinctive cultures and somewhat coherent sets of products. But they, and many software companies as well, have not done what they could to maximize the attention they attract.

MAXIMIZING ATTENTION FOR SOFTWARE COMPANIES

Just how do software firms fit into the general picture of corporations offered here? Is Bill Gates more like John D. Rockefeller (as one publication had it) or Madonna: capitalist or star? Despite an apparent avoidance of
Glamor and hype, Gates is a star -- known for strategic brilliance not only
in building Microsoft but for setting the trajectory of mainstream software.
Gates is a billionaire, based on the value of his Microsoft shares. But if
Gates were to announce he is pulling out and sell his shares, Microsoft,
deprieved of his star status, would suddenly be worth a lot less, and Gates
himself would be worth less as a capitalist.

However, should Gates next decide to start a new company, his accumulated
attention would ensure him numerous eager investors, employees, and cus-
tomers. [See also the note on David Liddle, page 21.] Mitch Kapor is now
using the attention he earned at Lotus to draw interest to the Electronic
Frontier Foundation (and Lotus earlier suffered when he left); Steve Jobs
took his luster with him to NeXT. Contrast this with Rockefeller or Car-
negie or their present-day heirs in old-line mass-production industries.
When these people left or died, their companies lost little value. Without
their founders, the companies might not grow as rapidly as they once had,
but the factories, oil wells and railway cars were all still there and could
continue to pump out product without a particular genius at the helm.

Ironically, the authors of software books and software critics
are much better known than many of the developers who have ex-
ercised real genius at times. Author Danny Goodman has proba-
bly drawn more attention for Apple than all but a couple of its
employees.

Like other "software" industries (such as music, movies, videos, advertising
and publishing), the pc software industry depends heavily on creative ex-
pression. Yet software companies (aside from Electronic Arts) generally
avoid creating programmer-stars known to the general public. While the
founders and top executives of computer and software companies -- Gates,
Kahn, Jim Manzi, Steve Jobs -- are often stars, quoted and gossiped about,
most of their employees are familiar only to insiders or near insiders. Not
only do these internal stars fail to get the public acknowledgement they
deserve, the companies are failing to develop an important resource that can
help attract and keep customers, employees and investors.

To find out the author of a book, glance at the cover; publishers sell books
this way. But if the developer's name is on the cover of a software pack-
age, he or she probably owns or at least started the company (Steve Wolfram,
Peter Norton, Tommy Rettig). Long after Noah Webster's death, American dic-
tionary publishers are avid to declare their works Webster's. Similarly, we
have Roget's thesaurus and Bartlett's quotations. Webster, Bartlett and
Roget each invented particular collections of information that are akin to
particular categories of software today.

The software industry will likely find similar ways to credit pioneers.
Personal styles in software design could be strongly noticed and encouraged.
Fans of existing software stars will be more eager to try the stars' latest
brainstorms, and younger developers will have something besides immediate
cash and the respect of their immediate peers to look forward to. Stars who
have turned their hands to other things can still lend luster to companies
that list them as advisers, much as Peter Norton still does for Symantec/
Norton or Andy Tobias (never a developer) does for Meca.

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Let there be stars!

Software firms would be wise to credit employees involved in software design as precisely and visibly as possible, and in such a way that the knowledge gets through as well as possible to actual and prospective users of the software without distracting them unduly. Programs' opening screens could include pictures and names of key developers and others involved, much as movies open with names of stars, writers, directors and other contributors.

A major program could also include additional information of the sort found in theater playbills, such as brief biographies of key players, or a summary history of the origins and development of that particular program, explaining just who did what and when. Details could be in a pamphlet included in the box, with key names and pictures on the outside. This kind of information is already found in computer (fan) magazines, but now casual shoppers too could look for familiar names.

Many programs such as word processors are evolving towards greater customizability such as choice of screen fonts or menu styles, but in the end it's also nice to find a package with a style that just suits your personality without your having to experiment.

All this, of course, contradicts the trend towards electronic distribution of software and modularization of applications into object-oriented components. On the other hand, that makes attention for the components as the product of a personality even more important, since otherwise they will get lost in the shuffle.

Service: another name for commercial attention

An important component of the software business is service -- the component widely credited for the success of WordPerfect, for one. Service, of course, is an explicit act of attention-giving; call it the productization of attention (as opposed to the embodiment of attention in products).

In the software business, factory-type production in the old sense -- copying the software onto disks and packaging it with manuals -- is a small part of the process anyway. But revisions, updates and new products all require attention to the wants of users or prospective users, often through direct communication over service lines. Rather than a problem, that is an opportunity. The more the software firm can make its customers aware of the attention it is (apparently) lavishing on them, perhaps using attention-illusion software tools, and the more it can leverage that attention by linking it to its recognized stars, the more customers will recognize that attention and feel obligated to return it. In addition, the software that emerges from any genuine interactions and customer feedback would likely intensify loyalties by fitting very well to the customers' personality types. Similar customers could also then be drawn in.

The royalty problem diminishes in an attention economy

As pcs and other attention technologies are incorporated into an ever denser telecommunications web, getting attention is facilitated, but how are attention-getters to be paid? Release 1.0 frequently points to the need for payment mechanisms in information-dissemination systems, or attention-
getting systems from my perspective. Payment systems are always problematic, because it remains difficult to prevent inventive people from finding ways to circulate data without paying.

However, if the reward for producing interesting information is the attention of fans, and if fans connected to networks are able to offer useful services in enough variety to major or minor stars, payment may eventually become secondary. [Should we pay for software, or only for software support--i.e. personal attention--as suggested by the League for Programming Freedom? See Release 1.0, 4-90, on Cygnus Support.] Fans would have reason to be attentive to the needs of stars because they would benefit not only directly from the feeling of closeness with the stars, but because slight personal acquaintance with stars would be worth something to the fan. There would be no "free rider" problem, because a star benefits from the mere presence of audience members, and such members would have no reason to hide their presence; in fact, they would like the star to notice them.

Attention dissolves the walls

The rise of attention technologies has helped break down the walls within which corporations traditionally operated as entities defined by physical and financial strictures. The more intense interconnections of the attention society may well dissolve these walls. Corporations would tend to disappear in favor of supply networks, markets and ad hoc working groups, held together by attention, not contracts, with common goals and interests (perhaps only temporarily). A foretaste of this pattern may be the numerous intercorporate alliances now flourishing in the computer industry, where success frequently depends on the attention paid to would-be standards rather than strictly financial or production clout.

ATTENTION SATURATION

All productivity is attention productivity in the sense that all goods ultimately require someone's attention (to the machinery that created them, at least) to come into existence or to be found and offered for sale. Conversely, if something consumed or purchased doesn't get any of our attention, directly or indirectly, it adds nothing to our lives and is not worth having. [Where does that leave all the copied software that is collected but not used?] But because attention per capita is clearly limited, there will come a point when for practical purposes attention productivity cannot rise any more--when goods are produced almost automatically and every bit of our attention is taken up in as finely divided ways as possible. After that point, what once looked like progress could equally well be viewed as change--whether for better or worse is a subjective judgment. An example is clothing fashions: Are this year's designs progress over last year's, or just different?

Ultimately, the same limitations may hold for software. New software would allow grab attention differently and therefore permit new people to have shots at stardom, but it wouldn't increase overall attention productivity.

However, the value of the attention can keep on increasing for some time. Maybe a better measure is how much--and what value--of attention each person can receive. [Do we really want a society where it's considered a drag on things for someone to look off into space instead of gaze at a star?]

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There's also the fallacy that organized, filtered, commercial attention is somehow worth more, but we've now come to value Mom's cooking; maybe we'll also value her attention. -- ED

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Imagine Mom's Home Attention Parlor: "Just give us your credit card and your own personal Mom will come right out and find you in the waiting room. She'll ask about your health, let you know she cares, even complain that you don't send her e-mail. For a small extra fee, Mom will even tell you the secrets you'd really like to hear -- 'You're smarter than your sister' -- or cook your favorite soggy vegetables." -- ED

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Aside from being organized -- whether this is desirable or not -- so that you get attention from a broader range of people, attention can be upgraded by coming from a star. Thus the attention society will continue to raise the "value" of its output, even if it remains flat measured in minutes. As more people become stars, the more "value" they can offer with their attention -- or attention illusion.

Thus, we keep moving towards the point of saturation of attention by organized means, squeezing more attention from our own society and getting more from the rest of the world. (Although most of the rest of the world is too concerned with material welfare to be part of the attention society per se, our stars and their own are saturating their attention far faster than our goods are filling their houses or huts. Generally, they purchase unbranded goods or make their own.)

We're not there yet; there are still many empty spaces, dead times, times when people are staring out the window instead of at some planned message or graphic display. But we are headed in that direction at quite a pace. Is it where we want to go?

If this essay intrigues you or provokes you, you may want to reach Michael Goldhaber or subscribe to The Letter on Post-Industrial Issues. You can call him at (415) 648-5742, or send him e-mail at mgoldh@well.sf.ca.us.

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DAVID IN WONDERLAND: PERMANENT PARKING?

Among other things, David Liddle is the great-grandnephew of Alice Liddell, for whom Charles Dodgson wrote Alice in Wonderland. (Spelling changed over the years, but Liddle is still pronounced Liddell.) Like Alice, he has a habit of wandering into exciting territory.

After a brief sojourn at IBM, he has now left to start a new research institute funded by Paul Allen, co-founder of Microsoft. The goal of the laboratory, Interval Research, is to do the same sort of research PARC once did -- not pure research, but not products either. Interval will not commercialize its ideas itself, but will license technologies to third parties or fund start-ups to develop and market them. Although it's for-profit, Allen sees it as a way to give something back to the industry -- not just money, but some new ideas.

For Liddle, the man behind the Star (and all its successors) and an early proponent of component software (see Release 1.0, 2-91, among others), graphical user interfaces and object-oriented programming are already passe. Like any true innovator, he's moving on. Here are Interval's major areas of focus, although they slide into each other:

- **domain-specific software**, such as components for, say time series (months and net present value calculations), to give a simple example of something that has just been included in the new release of Excel (and was already in Javelin and Improv). A more complex example is standard accounting objects such as taxes, tax credits and depreciation. Another example might be object-oriented human resources objects such as those built by Hewitt Associates (see Release 1.0, 12-90).

- **user interface**, not in the graphics sense, but along the lines of specific forms of data representation for specific tasks, such as ways to illustrate org charts, how to generate and modify information queries, or how to represent hypertext in three dimensions. The idea is for the front-end to "understand" the data and tools it presents to the user.

- **systems and tools for high-bandwidth communications.** That is, not the communications themselves, but the kinds of interfaces and tools that could make use of them. Examples include information-retrieval tools, attention-getting and filtering tools, synchronization and reconciliation problems, work on the social aspects of video phones, and so on. This area also includes ubiquitous computing, with computers in a variety of form factors that can be worn, hung on walls or perhaps even carried into the bath. Issues include how to subset data and present it effectively in small chunks on small screens.

Interval is already beginning to seek out and identify collaborators. The first of these is Doug Lenat of MCC and Stanford, who is continuing work on his ambitious knowledge base, Cyc. "At Xerox," says Liddle, "we piled all these ideas on the intellectual loading dock, and now they've pretty much all been taken away and delivered" -- although mostly not by Xerox. "Now I'd like to fill up another loading dock with a set of fundamental ideas and technologies for the next twenty years."

David Liddle, The Lab, (415) 903-2271; fax, (415) 903-2274 (pro tem)

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### Release 1.0 Calendar

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<td>April 6-9</td>
<td>SunWorld Expo - Santa Clara. Sponsored by World Expo Corporation.</td>
<td>Call Ron Toran, (508) 879-6700 or (800) 545-EXPO.</td>
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<tr>
<td>April 15</td>
<td>New York PC user group meeting - New York City. Sponsored by NYPC.</td>
<td>With Terry Myers, Quarterdeck. Call Jim McMullen, (914) 245-2734.</td>
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<tr>
<td>April 22-24</td>
<td>*Asilomar microcomputer workshop - Asilomar, CA. By invitation only, featuring some of computerdom's more original minds. Sponsored by IEEE.</td>
<td>Call Brian Berg, (408) 741-5010.</td>
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<tr>
<td>April 25-29</td>
<td>Computer game developers conference - San Jose. Sponsored by CGDC.</td>
<td>Call Ernest Adams, (408) 374-4340.</td>
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<tr>
<td>April 30</td>
<td>New York PC user group meeting - New York City. Sponsored by NYPC.</td>
<td>With Bill Gates. Call Jim McMullen, (914) 245-2734.</td>
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<tr>
<td>May 3-6</td>
<td>ITAA (ADAPSO) spring management conference - New Orleans.</td>
<td>Call Shirley Price, (703) 284-5355.</td>
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<tr>
<td>May 3-7</td>
<td>Human factors in computing conference - Monterey. Sponsored by ACM.</td>
<td>Call Rachel Greiper, (212) 869-7440.</td>
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<tr>
<td>May 5-7</td>
<td>Nat'l online meeting &amp; CD-ROM gallery - New York City.</td>
<td>Call Rob Seitz, (914) 632-5686.</td>
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<td>Collaboration '92 - San Francisco. Sponsor: Graphic Communications Association. Call Marion Elledge, (703) 519-8160.</td>
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<td>June 1-4</td>
<td>PenExpo - Santa Clara. Co-sponsored by Boston University Corporate Education Center and Pen Magazine. Call Bob Bevan, (508) 649-9731 or (800) 733-3593.</td>
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<td>June 1-5</td>
<td>FGCS '92 - Tokyo. Sponsored by the Institute for New Generation Computer Technology. Contact: Hidehiko Tanaka, 81 (3) 3456-3195; fax, 81 (3) 3456-1618; e-mail, <a href="mailto:fgcs92@icot.or.jp">fgcs92@icot.or.jp</a>.</td>
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<tr>
<td>June 7-11</td>
<td>International joint conference on neural networks '92 - Baltimore. Sponsored by the International Neural Network Society and IEEE. Call Gail Reed, (615) 453-6222.</td>
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<tr>
<td>June 15-18</td>
<td>*International Computer Forum - Moscow. Sponsored by the International Computer Club. Call Levon Amdilyan, 7 (095) 921-0902, or &quot;levon&quot; on MCI mail at 439-1034; or Esther Dyson at (212) 758-3434.</td>
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<tr>
<td>June 15-19</td>
<td>Artificial Life III - Santa Fe. Sponsored by the Santa Fe Institute. How to grow your own. Call Christopher Langton, (505) 984-8800.</td>
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<td>June 29-July 3</td>
<td>ECOOP '92 - Utrecht, Netherlands. Sponsored by Software Engineering Research Center. Contact: Gert Florijn, 31 (30) 322640; fax, 31 (30) 341249; e-mail, <a href="mailto:eco92@serc.nl">eco92@serc.nl</a>.</td>
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<tr>
<td>June 30-July 1</td>
<td>*First international conference &amp; exhibition on advanced service and HelpDesk automation - Strasbourg, France. Sponsor: Applied Workstations and ServiceWare. Contact: Jeff Pepper, (412) 826-1158; Tim Lewis, 44 (306) 77331; fax, (306) 77696.</td>
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<td>July 14-16</td>
<td>AAAI/IAAI '92 - San Jose. Sponsor: American Association for AI. Call Mary Livingston, (415) 328-3123.</td>
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<tr>
<td>August 1-4</td>
<td>*GroupWare '92 - San Jose. Sponsored by Lotus Development and SRI International. Keynote by Jim Manzi. Speakers include Irene Greif, Thomas Malone and Esther Dyson. Call David Coleman, (415) 282-9151 or (800) 247-0262.</td>
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Please let us know about any other events we should include. -- Denise DuBois

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