OBJECTS FOR REAL

"If I hear about one more graphical object that knows how to draw itself on the screen I’ll go bananas," Alice confided to us recently. A long-suffering corporate programmer, she’s more interested in re-using applications code than icons at a time when such screen trinkets are a dime a dozen. Where are the class libraries of employees, customers, payments, products -- the things business deals with instead of the things computers (and programmers) deal with? Programmers may be productive in producing code, but are they productive in getting an organization's work done? Class libraries will ultimately enable systems analysts and non-programming designers to reuse more code from fewer programmers, making those programmers de facto more productive even if the amount and quality of their code stays the same.

Well, just in time for Christmas we found someone working on precisely such a class library. The project isn’t done yet, and the resulting class library won’t be available on the open market (unless current plans change), but the story is instructive and inspiring anyway. It concerns Hewitt Associates, a company with deep expertise in a particular, rapidly moving field, which is now embodying that expertise in object-oriented software for easy reuse. Indeed, its class libraries and the promise of easy reuse and modification may enable Hewitt Associates to address a much larger base of smaller customers who could not be effectively served the old, one-at-a-time-from-scratch way.

We also look at HumanCAD, with its almost-object Mannequins, and Echelon, which is using low-end microprocessors to make household devices and factory and office equipment into smart objects that can interact.

Hewitt Associates

Hewitt Associates, based in bucolic splendor just north of Chicago, has a long-standing reputation as the source for employee benefits and compensation consulting. Its clients include 75 percent of the Fortune 500; it provides data-processing services for about 500 clients as well as benefits and compensation consulting for about 5000 clients overall.

Hewitt Associates is the outfit you see quoted in yearly surveys of bonuses, pension-plan trends, and so forth. Unlike most consulting firms (with notable exceptions such as McKinsey, KPMG and Andersen Consulting), the firm invests heavily in R&D that isn’t directly billable. For example, in the seventies, it was a driving force behind flex (cafeteria-style) benefit plans, which allow employees to select from a

NEW, IMPROVED, SHORTER!
variety of benefits as long as they total less than a specified maximum. Think of the processing challenge of keeping track of all these individual plans with all their individual parameters! Computers made them possible.

Founded as an actuarial firm in 1940, Hewitt Associates some years ago took on the benefit administration task for many of its clients, offering both economies of scale in operations and the quality and speed of software development that come from doing similar projects over and over. By now, the firm has 500 administration-services clients, each with its own customized software, and is growing the business as it becomes more complex and less appealing for clients to handle inhouse. Not only does Hewitt have to tailor systems for each of these clients, but it has to apply updates to each client’s software each time Congress changes the tax laws or the IRS reinterprets them or issues new regulations; each time the tax court makes a significant ruling; and each time some insurance company comes up with some new product that gets widely adopted. The result was clear, says project leader Tim Hilgenberg: "Fear of maintenance. As we amassed clients, we were building up a big liability in future maintenance obligations, changing hundreds of tailored systems a year. We didn’t want to spend all our time on maintenance."

But with all those customized systems, that was a real possibility.

A problem’s an opportunity if you can solve it better than the next guy

Call it a heavy burden -- or a huge opportunity. For if Hewitt Associates can build software and modify it more quickly and more effectively than the competition (or inhouse efforts), it will have a huge competitive advantage. Accordingly, the firm decided a year ago to switch from building each client’s system one at a time to a way to assemble them from modular, modifiable components. "We needed a way to manage change better," says Hilgenberg.

The traditional approach, of course, would be to build a large, modifiable application, which could be customized for each client. The problem was, clients really didn’t even want all the same applications -- the range of benefits, plans, options, and administrative procedures just varies too much from company to company. Some companies administer these things centrally, out of the treasury; others, out of human resources; some, from headquarters, others, within each division, plant or whatever. Some have mainframes and terminals; others have minis, pcs or networks hooked into Hewitt’s computers. Some pay their employees weekly, others twice a month, and so forth. And of course the benefits vary widely, from various insurance plans to a variety of perks and benefits, including day care, subsidized housing, education plans, and various complicated bonus or profit-sharing schemes.

The answer: relevant objects!!

Certainly, there should be a lot of code you could share, to say nothing of the knowledge accumulated by each of Hewitt Associates’ professional employees, but how to organize it all?

You can only reuse code if you can define it properly and find it to reuse. But in the typical system, the code is all over the place. When the government changes a regulation, it usually has impacts on a variety of aspects in a variety of plans. How do you find all those places to make the fix? And how do you limit the side-effects of the changes you make?

Release 1.0 28 December 1990
The obvious answer, for any modish firm, is an object-oriented system, with everything represented as objects. And indeed that's the approach Hewitt Associates took, in a project led by Hilgenberg, a partner who has been with the firm since 1978. The team built a quick prototype in Smalltalk, which looked appealing and proved the object-oriented concept, but it was only a demo. Since Hewitt's clients are mostly COBOL users, it wanted something that conformed to IBM's SAA, including CUA (Common User Access) specs, supported DB2 and other SQL databases, and had a graphical user interface.

The project represents a substantial commitment for Hewitt Associates, with 60 people drawn from its three benefit administration services, plus its own MIS group. The goal (which is not the case currently) is that all three administrative practices will use the same underlying software, sharing many class libraries and providing a single interface to the user. This will enable much better communication among different systems, and help Hewitt Associates both in cross-selling and installing incremental systems.

Long-term, we assume, client payroll and accounting departments, with whom the Hewitt systems now communicate mostly by large-scale file transfers, will somehow share Hewitt's classes so that such systems can be better integrated. In the same way, in other industries, clients of service firms or software users may share objects representing various kinds of products and services, ranging from building supplies and machine components to mortgages or various grades of shipping or cleaning services. (EDI, which sets standards for invoices, payment terms and the like, is an example of such standards, but they aren't represented as objects yet.) But all that's a long way off.

Class-consciousness

Right now Hewitt Associates has defined the object classes, and is working on the implementation details. The three main classes are employees (with salaries, hours, employment histories, dependents, tax status, eligibility, medical conditions), plans (with rules, policies, conditions, constraints, applicability, required contributions and payouts) and events (payments, contributions, loans). All these are fairly abstract and guide the logic of the program. A second consideration is implementation and interface: On what platforms are the programs executed and how do they communicate with users? And, for each function, are the users the actual plan participants, who would use it once in a while, or dedicated people in human resources who could be expected to learn an application and want shortcuts?

The idea is to build a collection of functional objects and implementation systems that can be assembled to meet any client's particular needs. Second, when the inevitable rule changes occur, only those modules affected need to be changed, and will be easily reachable. For example, restrictions on benefit payouts or a change in administrative procedures might cut across a variety of plans in Hewitt's entire installed base, while a change in a single company's definition of eligibility for retirement benefits would require wholesale modification of that client's software -- and might be restricted by laws or union contracts in various jurisdictions.

The reality of dealing with objects

The big disappointment, Hilgenberg says, is the lack of tools to do all this. Hewitt Associates decided to build its own object-oriented COBOL, with a pre-
processor that converts it into regular COBOL to be compiled the normal way. (Micro Focus plans to offer one, but there's no announced date and it will run only on pcs with DOS, OS/2 and UNIX. Hewitt Associates needs to address a much broader variety of client systems. There's also a standards committee sponsored by Codasyl developing a spec for object-oriented COBOL, but there's no product out that meets it yet -- contrary to a lot of standards which are just ratifications of a market leader or gang wars against a market leader.)

Once compiled, the COBOL applications are fielded normally. The difference is that they are much more easily changeable, either because of external regulatory changes or because of changes in policies or procedures by clients. Obviously, the appeal to clients is that they're still dealing with familiar-looking COBOL; however, Hewitt Associates discourages them from changing the code, because such client modifications don't get retained in subsequent versions of a system (see below).

<table>
<thead>
<tr>
<th>Heredity versus environment in object classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consider the object classes to be the genes, which (through pre-processing and compilation) result in executable applications -- the bodies that implement the genes. You can alter the source code and add things, but unless you go back and change the original classes, you will just be changing one implementation -- much as you can cut off someone's arm with no impact on existing or future children. But the real benefit is that you can go back and change the gene pool and grow new systems as quickly as you can compile them. This lets build new systems that are organically whole and consistent; simply patching the system may have unintended side-effects. Of course, the person fixing the genes/classes has to know what he's doing. In fact, that's likely to be the case: He's probably a specialist, rather than a random programmer with incomplete knowledge of the business and regulatory issues, since he's doing it once for hundreds of systems.</td>
</tr>
</tbody>
</table>

Thus, consider the Hewitt system a special sort of CASE tool for generating traditional applications, rather than an object-oriented environment for users. Its job is to make it easier to design benefit administration systems. The output is an application which goes off and does its work. When things change, the tool is used again to assembled a new system with only a few of its parts changed -- and changed correctly to work together smoothly.

As noted, these objects embody detailed regulatory knowledge, business rules and procedures about how people earn salaries and benefits, get sick pay, select plans, schedule vacations and so forth. But the construction of the objects is only part of the challenge. Building an individual system also requires a way to define precisely what system should be built. Which objects do you want to use? Which rules do you want to embody?

For that part of the process, Hewitt Associates is designing an expert-system configuration tool, using Aion's Aion Development System. This tool is a traditional expert system which runs the designer through a dialogue, eliciting the necessary information on the specific policies and procedures.
to implement. It knows what choices are compatible, and which objects to use to represent them. Questions start out from the basic -- how many and what kinds of plans? what pay periods? -- to the complex, from how compensation is determined, how benefits should be calculated, and so forth.

The output of the expert system selects the objects (modules of source code to be compiled) to build the system, and provides the proper parameters. The resulting system is "cooperative": Both application code and data will reside in an IBM/DB2 environment on a mainframe, cooperating with an OS/2 front-end using PM screens implemented with Choreographer from GUIDance Technologies. (Prototype screens were built with Asymetrix ToolBook.) Someday, of course, such a cooperative architecture could just as easily support a telephone voice-response system or a kiosk in an employee lounge.

Hewitt Associates had originally thought to build "client-server" systems, with database servers, and object-oriented applications and GUIs on the front-end. But it soon became clear that keeping the applications centralized made more sense, thus sharing the application logic as well as the data and making administration easier. Although each client's application set is unique, it is generally implemented only once, allowing for sharing of the implemented system within a client application, as well as reuse of the objects across clients. What Hewitt is creating is "application servers," with the application implemented as class methods. (Cf. Sybase's Open Server for MVS, Release 1.0, 90-9, which similarly encapsulates mainframe applications and transactions and allows front-ends to share not just data but business knowledge implemented in applications.) Local differences, concerning platforms and interface details, are implemented locally, in the front-ends.

A head ahead

Hewitt Associates won't say when it plans to launch the resulting systems, but we suspect it will be at least a year or two. At that point Hewitt Associates will probably be leading the pack with an actual system, although many of the ideas it's pursuing now will be more widely accepted if not yet implemented. But even with the so-called miracle of object-oriented programming, implementation and knowledge is a large part of the game. Hewitt's edge is still the expertise that it can now resell and reconfigure easily, not its coding skills. Object-orientation simply makes that body of experience easier to exploit.

Consider Hewitt Associates a new-form publisher, interpreting the government's ever-changing regulations. Its medium is not binders full of descriptions of policies and advice on procedures; it is executable systems that will do the work in the way and on the machines the client finds most convenient.

Hewitt is not alone in the idea of using a hybrid of specific knowledge and (semi-)automatic system generation to produce easily customizable and updatable applications for a variety of platforms. TI has just announced a reconfigurable investment management package built using its IEF and a relational database. Andersen Consulting has a variety of such systems targeted at several industry-specific tasks, based on its Foundation CASE system. But no significant such tools, so far as we know, use object-orientation to the extent that Hewitt Associates does.

Release 1.0 28 December 1990
HUMANCAD: CLIP-PEOPLE

Here's another example of useful objects: HumanCAD's Mannequins, designed ultimately to be marketed and sold as active objects, rather than used for internal development. For the moment, they're still compiled internally and sold to the world as data files with an accompanying application, but the company's near-term goal (release 2, next year) is to ship working objects.

HumanCAD is a division of Biomechanics Corporation of America, a "quantitative ergonomics" consulting firm founded in 1986 by Cliff Gross, formerly an NYU professor and head of New York Institute of Technology's ergonomics department. Biomechanics clients include Ford, GM, DuPont, Procter & Gamble, and Lear Seating. Much like Hewitt Associates, Biomechanics has developed software to enhance and implement its services. BackSoft is a tool for clinicians to use in assessing back injuries and their implications: Can Juan still do heavy lifting? How much should we compensate Alice for her on-the-job back injury? ErgoBase is a database of ergonomic statistics on body sizes and body types, collected from a variety of population studies from a variety of government and commercial sources.

About a year ago, the company decided capitalize further on its expertise and created an independent division, HumanCAD, to embody and market its knowledge about human forms and structure. Gross's practice was based on ergonomics, but Biomechanics director Howard Morgan, a former academic and now a venture capitalist, broadened the scope of the project to a wider vision, including applications not just in product design but in training, publishing (both paper and electronic multimedia), advertising storyboards and the like. Morgan signed on as president, although the division is managed day to day by Ken Goodman, former marketing vp for Generic Software.

The resulting product, Mannequin, is a construction kit for 3D human figures that can be used with a variety of design, presentation and publishing software. Mannequin extends the clip-art concept (see Release 1.0, 89-1, on clip objects) to wireframe human figures that do more than just look good: They move properly, and have fields of vision, and reaches and grasps. Mannequin costs $699 and runs on a pc. It can export files to programs such as AutoCAD, Generic CADD, Corel Draw, PageMaker or MicroGrafx Designer, and supports most Mac graphics formats.

Mannequin allows a user to create a generic person of specific sex, nationality, age (3 to 12 or adult), and body type. (You can also specify precise dimensions for various body parts, and have the rest constructed to scale.) The figure thus created comes with the appropriate specs for joint movement and range of vision. Using Mannequin's language or a mouse, you can make the figure walk along a path you draw or specify, pick up an item of a particular weight and size and put it somewhere, look at a wall, and so forth. Once you've designed your hot new sports car with AutoCAD, for example, you can try it out on a 6-foot overweight French male before inflicting it on a real human (and paying in time and money for a prototype). Can the six-footer fit in the seat? Could a 5'3" Hong Kong female see out the window? Is the control panel conveniently placed? If not, it's back to the drawing board -- uh, workstation -- before much damage is done. Would the six-footer be comfortable in a cubicle with this arrangement of furniture? How would his movements block the lighting? The figures can be used to display the answers to such questions on the screen or on printouts.
Inside Juan and Alice

Mannequin also handles more complex matters: For example, it can calculate torques and stresses for people moving or lifting objects, including a repetition factor. It can deal with questions such as, Should a normal worker be expected to lift these boxes for hours at a time? Says Morgan, weighing his (intangible) words carefully, "We won't say whether or not someone of a certain stature can do a job, but we would give you information that might enable you to draw that conclusion."

With Mannequin you can automatically create lifelike simulations -- as opposed to the animations of other pc tools, where you basically have to build the system screen by screen, with the help of some functions such as tweening. Mannequin's figures are the forerunner of a new growth industry: supplying virtual objects for use in virtual worlds (see Release 1.0, 90-10). By supporting the AutoCAD format, they promise to be compatible with what will likely be a leading standard environment for virtual reality. Eventually, with third-party tools for rendering and the like, it should be possible to people semi-realistic worlds -- or make safety-training films.

New and to be improved

But the Mannequin objects aren't quite ready yet. For now, they are still program modules and data structures with some content rather than fully defined, active objects. Although the code was written in Borland C++, what the user buys is compiled C code (not C++ source) that can be modified only with parameters, not with additional code (or methods/behaviors) -- much like the classes Hewitt Associates is creating. The classes can be modified only by going back to the vendor (page 4).

In the case of Mannequin, the objects have inheritance and behavior (for calculating a field of vision, for example) when they're constructed, but their real-time behavior, such as walking, stays under traditional program control. There's a walking routine in the Mannequin package that knows how to make a human walk based on the object's parameters and position, but the routine is not stored with the object itself; it's part of the Mannequin application -- and thus not exportable when you transfer either an object or an animation sequence to some other program. Likewise, there's no easy way as yet to model and then execute interaction among objects on the screen. The objects move in response to Mannequin's directions -- only.

Morgan plans to change all this for the second release. The obstacle to true object-orientation in the first release, he says, is performance. The solution will be a total rewrite with tighter code, including the facilities of VROOMM (Virtual Real-time Object-Oriented Memory Manager; see Release 1.0, 89-6) within Borland's C++. In the next release, Mannequins will be standalone, independent objects that carry their code with them, rather than data files that come with an application.

In release 2, instead of selecting from a menu of body types as in release 1, you'll be able to fill in a spreadsheet to create custom people. In the long run, this will further the trend from mass production back to custom production, where an individual's parameters can be fed back into a design tool that drives a manufacturing system. But don't dismiss your tailor yet!

Release 1.0 28 December 1990
Echelon's new LonWorks is not being pitched as an object-oriented system (it has other marketing issues to contend with). But distributed control and modularity -- i.e., object orientation -- are fundamental characteristics of LonWorks, announced earlier this month after a long gestation. (LON stands for Local Operating Network.) In essence, LonWorks lets manufacturers or users turn a variety of home, office or factory devices into smart objects, and provides an object-oriented toolkit (LonBuilder) to program them.

LonWorks is not just a product, but a concept that drags along a whole new way of looking at things. Or call it tools, products and standards for a new infrastructure. The concept is distributed intelligence, with microprocessor nodes (Neuron chips) built into a variety of household, office and factory machines. The Neuron nodes collect, send and respond to data, communicating as necessary over a variety of media using a common network protocol, LonTalk. Echelon will make its money from royalties paid by chip-builders and OEMs who build the nodes, from Echelon's own transceivers to connect the nodes to different media, and also from LonBuilder, a PC-based development system used to program the microprocessors. Obviously, Echelon stands to win if it can create a big, standard pie; by sharing the pie, it is hoping to gain support from such vendors as Motorola and Toshiba, two early licensees for the chip design.

Echelon was founded in February 1988 by Mike Markkula, a key figure in Apple Computer's early history. (Contrast Echelon's approach with Apple's keep-it-all strategy, which may have outlived its time.) Later that year, he recruited Ken Oshman, a co-founder of Rolm, and together the two managed to raise $25 million on top of an earlier $5 million to bring the concept to market. In addition, there's an undisclosed amount of prepaid royalties and license fees from Motorola and Toshiba and others, for a total investment of roughly $50 million.

Just-enough intelligence

We consider the concept to be a no-brainer: Houses, factories, office buildings and the like should be automated from the ground up, with small amounts of local intelligence all over, rather than with a single control station trying to manage everything from a central, remote location.

This approach specifically does not mean personal computers all over the place, but rather small, just-enough microprocessors capable of handling just a few inputs and making a few decisions. If pcs were an improvement over minis and mainframes and created a larger market, something even smaller and cheaper (under $10) should be better and ultimately even more widespread. After all, you don't need a pc to control a light switch. You just need something that can sense current light conditions, occupancy and time, and take the appropriate action. On the other hand, with LonWorks you can avoid collecting redundant information for several different systems. The occupancy sensor's message could also trigger an alarm system. That alarm system could be turned off and on by other messages, from a guard's station, say. To the security guard, the front-end could be a pc with a menu selection: "Secure building, locations..." The application would send messages through its Neuron node to the appropriate LonWorks alarm nodes, using individual or group IDs.
So yes, there is a way of addressing locations from a central point, but most of the activity goes on locally. More fundamentally, each location considers itself the center of the universe, reacting to inputs and responding to outputs according to its own program, not at the command of some host somewhere.\(^1\) The system builder's and the ultimate buyer's purchase decision are also "local," in the sense that they commit only a few dollars extra -- $5 per unit wholesale is Echelon's near-term goal.

LonWorks comprises four key elements:

- the LonTalk protocol, a seven-layer communications protocol open to use by anyone (with payment of royalties) and implemented on Neuron chips;
- Neuron chips, comprising logic and I/O on three separate processors, plus associated memory, made and sold by Motorola and Toshiba, with royalties to Echelon (a European source is likely);
- LonWorks transceivers, which connect Neuron chips to standard communications media, available directly from Echelon; and
- LonBuilder, DOS-based, object-oriented development software to program individual Neurons and design LonWorks systems, with two LonBuilder Neuron emulators (so they can talk to each other), for $14,965.

Each LonWorks node consists of a Neuron chip and a sensor or actuator or both. The sensor could be a thermostat, the actuator a light switch -- i.e., the devices that are being made "intelligent" by the Neuron chip. The Neuron node can also connect its device through an Echelon transceiver to other nodes (and their devices) over a variety of media (twisted pair, coax, power lines or radio frequencies, whatever).

The Neuron's input unit interprets messages both from local sensors and from remote devices (such as the security guard's workstation). The logic unit (with its memory) performs simple tasks and calculations, responding to the inputs as it is programmed to. And finally, the output unit sends messages to local actuator devices, such as a light switch, a VCR or an automated scrubber on an assembly line, or to remote nodes, such as the guard's workstation, a distant water supply, another node that may also take action, or even to a personal computer equipped with a Neuron. Such a pc could maintain a database of system information, perform complex calculations or (attempt to) maintain more central control than the pure Echelon approach envisions. For example, you could control or reprogram the devices in your house through a pc with LonBuilder-designed applications.

We see a large market not only for little chips, but for software development tools and LonBuilder applications that can be further customized by VARs or users. As with object-oriented programming in general, LonBuilder programmers will have to learn to program for distributed control -- but that doesn't mean lack of intelligence. It's just that the intelligence is the result of all these locally applied rules and procedures.

\(^1\) Of course, this raises the fundamental philosophical question: Does an Echelon Neuron have free will?

*Release 1.0* 28 December 1990
Act locally and the globe will take care of itself

The Echelon system is designed to be minimal; the messages to be sent across the wires are short and quick, and the local intelligence is usually minimal too. In short, while the programming of each node is fairly simple, the whole system can be arbitrarily complex -- and seemingly intelligent. (See Release 1.0, 89-6, on self-organizing systems.)

Each individual chip is fairly simple to program; the interconnections are where it gets complicated. The logic is independent of the network, and both are independent of the sensors and actuators, which simply send and receive interpreted signals through the Neuron nodes, using Echelon's 50-odd defined "standard network variable types" (SNVTs) or their own custom SNVTs. SNVTs are implemented as IDs followed by a parameter, to communicate things such as event count, temperature, light, percentage of [whatever you care to measure], text strings, phone state (on, off-hook, busy, ringing, connected, etc.), pressure, flow, voltage, etc. System-builders or third parties can also define their own SNVTs; they just need to have nodes both to send them and interpret them, and logic to act appropriately.

In expert system terms, the individual nodes are generally brittle; they wouldn't know how to interpret (let alone handle) the unexpected. Each is designed to interpret a small number of inputs: temperature, a beam from an infrared device, a message or two from the master bedroom. The smarts lies in the overall structure of the system. How much of it is in the programmer's mind, how much in the development tools or a central control system?

The last centralized decision

Interestingly, for intelligence to be decentralized, certain technical decisions -- for protocols, programming conventions and real-world measurements -- must be centralized. Getting the world to make these decisions in its favor is Echelon's marketing challenge. (At least Echelon doesn't have the drawback of looking like a large, nasty monopolist -- yet.)

The difference here is that commercial decisions can be decentralized too, once the standards decision is made. One company need not provide everything; you can be a specialist in light dimmers, or energy management, or VCR programming, without having to provide the other services. Other vendors can provide complementary components, or software to make better use of them. Likewise, a customer can buy only the modules he needs (or can afford) at any particular time. He needn't buy a wired house all at one time (although it's a little cheaper). Most of the equipment can be added incrementally, with connections through existing electrical circuits or phone lines. (Since each unit has its own unique ID and knows what SNVTs it can interpret, there's no great difficulty in attaching new nodes.)

Accordingly, right from the start Echelon has been open, not just passively, but aggressively. It has gone out and found two second sources to build the chips (Neurons), and is inviting others to join. It is working with a variety of manufacturers to get them to incorporate Neurons into their products.

The sign-ups so far are impressive, but not yet critical-mass: Sony, AMP, Inc., Johnson Controls, Allen-Bradley and Steelcase are the best-known; others include Leviton, a major wiring maker, and Lithonia Lighting. IBM,
AT&T and Kodak have offered bland public blessings, but have made no firm commitments so far. Perhaps the biggest win is getting Motorola and Toshiba to make the chips; those companies, of course, will spend significant resources on signing up customers.

De facto versus de vapor

Right now the competition is fragmented; it consists of a variety of centrally controlled systems or small-scale would-be standards that work well for a particular environment or market, but aren't generalizable or reusable outside their own domains or markets. Figuratively, they're proprietary mainframe systems; Echelon wants to introduce a pc -- with all that this implies for broad licensing and ceding control to customers and third parties. One example is the Smart House built by the National Association of Home Builders, which is more of a demonstration than a commercial product or specs for one.

The most important potential competition (but for the home market only) is the Electronic Industries Association's CEBus standard, still in committee, which would offer roughly equivalent functionality to the Echelon protocols, but little else -- i.e., no implementations, no development tools, and no standard for authentication (CEBus assumes it's part of an individual application, while Echelon implements it at the transport level -- level 4, for you aficionados). Certainly these are likely to appear from a variety of sources once the standard is ratified. For better or worse, the standard is more concrete in the sense that it has particular appliances and the home market in mind -- but less flexible and less extensible to other markets for the same reason.

What Echelon brings to the party is simply a standard -- with industrial-strength, off-the-shelf implementations. Echelon wants LonWorks to be a commodity -- so neutral and broad it addresses all markets. In fact, anything that can interpret and send SNVTs is perfectly able to play. The Neuron Chips are simply devices to translate those messages into the formats required by the various physical devices; in essence, to give them all a standard interface.

Yes, there are lots of alternatives, but none of them has the dedication to standards and to breadth that Echelon has. This is one of those cases where spending upfront enhances the product itself. Yes, it's what AT&T or Motorola or any of the large firms should have done themselves, but it wasn't in their nature. At least some of them seem to have seen the wisdom of this approach -- and are willing to adopt it since Echelon doesn't look like a threat to anyone.

At Rolm too, says Echelon's Keith Raffel, "We were trying to change an entrenched way of doing things, fighting centralized, electromechanical systems in favor of local, computerized PBXes." Raffel is one of 20 former ROLM employees on Echelon's staff of 70. Rolm actually got into business building standard rugged computers for the military at a time when the military was buying mostly custom systems. Later on, it applied the same mini-computer technology to PBXes, replacing mechanical switches with electronics. Funny how history repeats itself. On the other hand, we doubt that Echelon will sell out to a monolith while Oshman's still around. Another obvious, if not complete, parallel is the role 3Com played for Ethernet...
The Fourteenth Annual PC (Platforms for Computing) Forum will take place in Tucson from March 10 to 13 -- two months later (and warmer!) than last year. The theme will be "Beyond the desktop: Networks, notepads and legacies." As a subscriber, you should have received your registration materials already. (If you aren't a subscriber and would like to attend, please contact us. We would be glad to sign you up for both the newsletter and the Forum. If someone else in your company -- not your PR agency or your investor! -- is a subscriber, you may be able to register through that subscription; two registrants per subscription.)

As it happens, each of the title items actually refers to a particular product on the one hand, and a topic area on the other. Networks is Lotus Notes, or information management. Legacies is Sybase Open Server for CICS, or application development and interoperability, and how to achieve them with object-oriented approaches. Notepads is GO, or new operating environments. Our goal is to provide more focus than in previous years by framing the discussion each day around a single product -- with ample input from competing products and alternative approaches, both from competitors and from resellers and users, who give the ultimate verdict.

But rather than a series of speeches about, say, "information management" on Monday, we'll have a centered discussion, a sort of compare-and-contrast that should provoke concrete, lively discussion. Products/approaches considered will include e-mail filters, Reach/Coopers & Lybrand's Knowledge Network, and the American Information Exchange.

On Tuesday, we'll address "legacies" not just as data, but as the applications and business rules and procedures that user companies want to represent (and execute) in software. Who controls them? How can MIS and PC users work together? Is it better to reverse-engineer, or to start over? Does it make sense simply to encapsulate mainframe applications (the Sybase Open Server for CICS approach; Release 1.0, 90-9), or to rebuild from scratch? What's the relation between servers and objects (see page 5)? Is object-oriented programming a solution to software complexity, or another cause of it? For vendors attempting to sell to large customers, these are key questions -- akin to the current fascination with providing connectivity between spreadsheets and mainframe databases, but on a broader, more technically challenging scale. Products and approaches will include object-oriented programming, reverse-engineering tools, and a new transaction-oriented development tool.

Finally, on Wednesday we'll discuss notepads. But just as networks are important not only as hardware but as a medium for information-sharing, so are notepads important not only as mobile computers but as the medium for a new approach to computing. They promise the possible emergence of a new operating environment not just for notepads but ultimately for the desktop; contenders include GO and Active Book, with desktop competition from Patriot Partners, NeXT and others.

Release 1.0

28 December 1990
Featured speeches will include Wang's Steve Levine on visualization of qualitative data such as text, priorities, workflows, data structures and program sequences; Ken Oshman on "Wiring the world from the bottom up;" and Intel's Andy Grove on "Power in platforms -- what for?" In addition, "Bionomics" author Michael Rothschild will provide a new perspective on competition and economic evolution.

Please plan to stay all three days, through the discussion of notepads and new operating environments on Wednesday. The conference will end that day at noon with a speech by Electronic Frontier Foundation co-founder (with Mitch Kapor) and Grateful Dead lyricist John Perry Barlow, who will both close the conference and kick off a limited-space tour of the Biosphere, the experimental self-sufficient ecosystem.

GENERAL SESSION SPEAKERS

John Perry Barlow
Bob Epstein
Bill Gates
Andy Grove
Hermann Hauser
Colin Hunter
Philippe Kahn
Jerry Kaplan
John Landry
Steve Levine
Dave Liddle
Jim Manzi
Dennis McEvoy
Ken Oshman
Ray Ozzie
 Vern Raburn
Michael Rothschild
Phil Salin
Mark Tebbe
Tom White
Andy Zimmerman
 Mike Zisman

Electronic Frontier Foundation
Sybase
Microsoft
Intel
Active Book
Hunter Systems
Borland
GO Corporation
D&B Software
Wang Labs
Metaphor
Lotus Development
Cooperative Solutions
Echelon
Iris
Slate
 Cambridge Meridian
American Information Exchange
Lante
Action Technologies
Coopers & Lybrand
Soft-Switch

...and others to be added.

Afternoon company demo sessions will include many of the products mentioned above, as well as others from AT&T (Rhapsody), NCR (Cooperation), Action Technologies (The Coordinator and beyond), Systems in Concert (Calypso), MCC (gIBIS), Coopers & Lybrand/Reach, Artificial Linguistics Inc., Eden Group, Clarity, Echelon, cc:Mail, Beyond, Agility, Individual Inc. (First!), Desktop Data (NewsEDGE), Hunter Systems, Keyfile, GRiD, GO Corporation, Slate Corporation, PenSoft, DB Software, ParaGraph, GRiD, the Whitewater Group and Fish Story.
LESS IS MORE?

Brevity is the soul of wit? Short is beautiful? As you’ve probably noticed (this may be the first time you’ve ever reached the resources page...), this issue is shorter than usual. A number of readers have suggested reducing its length. What do you think? If you feel strongly one way or the other, please let me know.

-- Esther Dyson

COMING SOON

- Axon.
- Resumes.
- Network navigation.
- Machine-assisted translation.
- The Douglas brothers -- Hofstadter and Lenat.
- Upgrades: Aftermarket comes into its own.
- The coming information crash.
- And much more... (If you know of any good examples of the categories listed above, please let us know.)

relEAST: e-mail in the Soviet Union.

Release 1.0 is published 12 times a year by EDventure Holdings, 375 Park Ave., New York, NY 10152; (212) 758-3434. It covers pcs, software, CASE, groupware, text management, connectivity, artificial intelligence and intellectual property law. A separate publication, relEAST, covers emerging technology markets in Central Europe and the USSR. Editor & publisher: Esther Dyson; associate publisher: Daphne Kis; circulation & fulfillment manager: Lori Mariani; executive secretary: Denise DuBois; editorial consultant and copy chief: William M. Kutik. Copyright 1990, EDventure Holdings Inc. All rights reserved. No material in this publication may be reproduced without written permission; however, we gladly arrange for reprints or bulk purchases. Subscriptions cost $495 per year, $575 overseas.
### Release 1.0 Calendar

#### Happy New Year!

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Location</th>
<th>Sponsor/Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>January 7-8</strong></td>
<td>Macworld International Summit - San Francisco. Sponsored by Macworld. Call Susan Carroll, (415) 978-3392.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>January 10</strong></td>
<td>Mass Software Council annual membership meeting - Newton. Solace for those who must miss Macworld and CES: Gil Williamson, NCR; Dick Shaffer; Dan Bricklin, Ray Kurzweil, Frank Ingari. Contact: Lisa Webber, (617) 437-0600.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>January 10-13</strong></td>
<td>Macworld Expo - San Francisco. All the usual suspects. Sponsored by Macworld. Call Diana McGowan, (617) 361-8000.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>January 14-15</strong></td>
<td>Pacific Market Forum - San Francisco. ...as seen by sponsor Apple Computer. Call Satjiv Chahil, (408) 974-4935.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>January 24-25</strong></td>
<td>Software support conference - Atlanta. Sponsored by the Institute for International Research. With Debi Fain, Lysis; Barbara Brzidine, Software Strategies. Call Audrey Wu, (800) 345-8016 or (212) 826-1260.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>January 24-28</strong></td>
<td>Third international Graphisoft distributor meeting - Budapest, Hungary. Sponsored by Graphisoft. Call Gabor Bojar, 36 (1) 251-1000; or fax, 36 (1) 251-1890.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>February 5-7</strong></td>
<td>The fifth annual technology investment symposium - New York City. For investors (if there are any left). Sponsored by Goldman, Sachs &amp; Co. Call Joan Pereira, (212) 902-6829.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>February 12-14</strong></td>
<td>NetWorld ’91 - Boston. Sponsored by Bruno Blenheim. Call Annie Scully, (201) 569-8542 or (800) 444-3976.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>February 12-15</strong></td>
<td>*Software Development ’91 - Santa Clara. Sponsored by Miller Freeman. Call Lynne Mariani or Angela Hoyte, (415) 995-2471.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>February 21-22</strong></td>
<td>Industry symposium on virtual worlds technology - Seattle. Sponsored by Human Interface Technology Laboratory. With Release 1.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
HITL sponsors such as DEC, Sun, US West, VPL Research. Call Bob Jacobson, (206) 543-5075.

February 24-26
Second conference on organizational computing, coordination and collaboration - Austin, TX. Theories and technologies of computer-supported work. Sponsored by EDS, MCC, RGK Foundation, University of Texas at Austin's IC2 Institute. Call Andrew Whinston, (512) 478-4081.

February 24-27
*Communication Connections 91 - San Diego. Public-access telecommunications: BBSes, e-mail, groupware, etc. Sponsored by Dimensions. Call Laura Fletcher, (415) 637-2300.

February 24-28

February 25-27
Sun Open Systems Expo - Boston. Sponsored by PCT. Call Brona Stockton, (512) 331-7761 or (800) 727-EXPO.

March 4-7

March 5-7

March 6-7

March 10-12
European cyberspace congress - Amsterdam, Netherlands. "Art and cyberspace; terrestrial cyberspace applications; fantasy cyberspace; technology forum." Sponsored by Sala Communications. Call 31 (20) 273198, or fax, 31 (20) 253280.

March 10-12
The fifth computer game developers’ conference - San Jose. Sponsored by CGDC. For gamers who take games -- but not themselves -- seriously. Wish we could go... Call Brenda Laurel, (408) 741-5865.

March 10-13

March 11-14

March 12-15

March 13-20

March 15-17
Networks for the 90’s - Tyngsboro, MA. Sponsored by Wang Institute, Boston U. Call Andree Fontaine, (508) 649-9731.

March 17-20
*Software Publishers Association spring symposium - San Francisco. With John Sculley and Andy Grove, and much of the pc software industry. Call Ken Wasch, SPA, (202) 452-1600.

March 18-20
The sixth international conference & exposition on multimedia and CD-ROM - San Jose. Sponsored by Microsoft. Call Jon Leibowitz, (203) 352-8224.

Release 1.0 28 December 1990
<table>
<thead>
<tr>
<th>Date Range</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 19-21</td>
<td><strong>AIS 91</strong> - London, UK. &quot;New technologies in today's business environment,&quot; including hypertext, object-oriented programming, expert systems, etc. Sponsored by Learned Information. Call Jean Mulligan, 44 (865) 730275, or fax, 44 (865) 736354.</td>
</tr>
<tr>
<td>March 25-28</td>
<td>*First conference on computers, freedom and privacy - San Francisco Peninsula. Sponsored by Computer Professionals for Social Responsibility, organized by Jim Warren. Intended &quot;to build bridges between the villages on the electronic frontier,&quot; this is a multi-ethnic event, with people from the FBI and government agencies as well as public and private lawyers, hackers, free spirits, and intellectual property rightists and leftists (whichever is which). Keynote address by Professor Laurence Tribe of Harvard Law School. Call Jim Warren, (415) 851-7075, or fax (415) 851-2814.</td>
</tr>
<tr>
<td>March 25-28</td>
<td><strong>DB/EXPO 91</strong>: The national database exposition and conference - San Francisco. &quot;Emerging technologies for the '90's,&quot; with Adam Green, E.F. Codd, Chris Date, Vaughan Merlyn, others. Sponsored by Norm De Nardi Enterprises. Call Dana De Nardi, (415) 941-8440 or (800) 2DB-EXPO.</td>
</tr>
<tr>
<td>March 26-28</td>
<td>Spring symposium series - Stanford University. Sponsored by The American Association for Artificial Intelligence. Call Carol Hamilton, (415) 328-3123.</td>
</tr>
<tr>
<td>April 9-12</td>
<td>People &amp; systems: The software development management conference - San Francisco. Chaired by Larry Constantine; sponsored by Miller Freeman. Call KoAnn Tingley, (415) 995-2472.</td>
</tr>
<tr>
<td>April 10-12</td>
<td>Summit '91 - Newport Beach, CA. &quot;Where distribution leaders get results.&quot; Participants include Ed Anderson, ComputerLand; Alain Schwartzmann, Metrologie International; Luther Nussbaum, Eternet Systems; Rick Inatome, Inacom. Sponsored by MicroVision. Call Mickey Dude, (603) 888-5626.</td>
</tr>
<tr>
<td>April 21-24</td>
<td><em>ADAPSO spring management conference</em> - Miami. Sponsored by ADAPSO. Call Ellen Kokolakis, (703) 522-5055.</td>
</tr>
</tbody>
</table>

Release 1.0

28 December 1990
April 26  Third Computer Bowl - San Jose. With Bill Gates, Heidi Roizen, Philippe Kahn, Dave Liddle, David House and Ed Juge from the West (including Fort Worth!); Pamela McCorduck, John Armstrong, James E. Clark (AT&T, not Silicon Graphics), Sam Fuller and John Markoff from the East. Sponsored by the Boston Computer Museum. Call Gail Jennes, (617) 426-2800.

April 28-May 1  *Borland languages conference - San Francisco. Come C what’s so exciting about languages! Call Kathy Bentley, (408) 438-8400 or (800) 946-TURBO.


May 7-9  National Online meeting - New York City. Sponsored by Learned Information. Call John Yersak, (609) 654-6266.


May 19-23  International DB2 users group: Distributing the experience - San Francisco. Sponsored by IDUG. Speakers include Chris Date, Codd & Date; Michael Stonebraker, UC Berkeley. Call Larry Fleischman, (312) 644-6610.

May 20-23  Spring Comdex - Atlanta, GA. Sponsored by the Interface Group. Call Elizabeth Moody, (617) 449-6600. Includes Windows World; coincides with...

May 20-23  Interface/91 - Atlanta. Sponsored by the Interface Group. Call David Kaminer or Victor Cruz, (617) 449-6600.


May 27-31  Avignon ’91: Expert systems & their applications - Avignon, France. Sponsored by AFIA, ARC, ECCAI & JSIAI. Call Jean-Claude Rault, 33 (1) 4780-7000, or fax, 33 (1) 4780-6629.


June 3-7  *Object World - San Francisco. Co-sponsored by The Object Management Group and World Expo Corp. Businesspeople’s answer to OOPSLA. Call Dave Bradway, (508) 820-8123.


June 9-12  *2nd annual SPA European conference - Cannes, France. Sponsored by SPA. Call Ken Wasch, (202) 452-1600.


June 25-27  PC Expo - New York City. Sponsored by Bruno Blenheim. Call Annie Scully, (201) 569-8542 or (800) 444-EXPO.
July 14-19  *AAAI conference - Anaheim. Sponsored by American Association for Artificial Intelligence. Also includes Innovative Applications of AI. Call Carol Hamilton, (415) 328-3123.

July 28-Aug 2  SIGGRAPH '91 - Las Vegas. Sponsored by ACM. Art meets computers: The place to see and be seen. Call Jackie Groszek, (312) 644-6610.


September 11-14  *Software Publishers Association annual conference - Orlando. Sponsored by SPA. Call Ken Wasch, (202) 452-1600.


Sept 30-Oct 1  Virtual Reality conference - San Francisco. Sponsored by the Meckler Corporation. Call Marilyn Reed, (203) 226-6967 or (800) 635-5537.


October 1-4  Computer publishing conference - San Jose. Sponsored by Seybold Seminars. Call Beth Sadler, (213) 457-5850.

October 6-11  *OOPSLA '91 - Phoenix. Sponsored by ACM. Call John Richards, (914) 784-7731.


October 15-17  NetWorld '91 - Dallas. Sponsored by Bruno Blenheim. Call Anne Sculley, (201) 569-8542 or (800) 444-EXPO.

October 21-25  *Comdex - Las Vegas. So wonderful they couldn't wait until November? Whatever the reason.... Sponsored by the Interface Group. Call Elizabeth Moody, (617) 449-6600.

October 27-29  The Classic - Monterey, CA. Sponsored by the American Electronics Association, for cute companies and eager investors. Call Flo Lewis, (408) 987-4200.

November 4-7  *ADAPSO fall management conference - San Francisco. Sponsored by ADAPSO. Call Ellen Kokolakis, (703) 522-5055.

November 10-14  **Second East-West High-Tech Forum - Warsaw (Prague in 1992). Sponsored by EDventure Holdings. With a roster of serious-minded entrepreneurs and vendors from East and West. Don't just come to listen to advice; come to mingle with the people making it happen. Call Daphne Kis, 1 (212) 758-3434 or fax (212) 832-1720; MCI Mail: EDventure, 443-1400.


November 19-21  PC Expo - Chicago. Sponsored by Bruno Blenheim. Call Steve Feher, (201) 569-8542 or (800) 444-EXPO.

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.

Release 1.0          28 December 1990
Please enter my subscription to **Release 1.0** at the rate of $495 per year in the U.S. and Canada. Overseas subscriptions are $575, airmail postage included. Payment must be enclosed. Multiple-copy rate on request. Satisfaction guaranteed or your money back.

Name __________________________________________________________

Title __________________________________________________________

Company _______________________________________________________

Address _______________________________________________________

City ___________________________  State _______  Zip ______________

Telephone ______________________________________________________

How did you hear about **Release 1.0**? __________________________________________

□ Payment enclosed.

□ American Express #_________________________ Expires _________

Signature _______________________________________________________

□ Please send me additional information on your multiple-copy rate.

Please fill in the information above and send to:

**EDVENTURE HOLDINGS INC.**
375 **PARK AVENUE, SUITE 2503**
**NEW YORK, NY 10152**

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

Daphne Kis  
**Associate Publisher**