SMART RECOGNITION: THE BRAIN BEHIND THE SCREEN

Consider the situation where you hear people talking without knowing what language they are speaking. It's all an undifferentiated mess of sound. Once you discern the language, you can usually start to pick out words, even if it's only one or two such as da or nyet, oui or non. And if it's a language you know, you can understand the conversation as the sounds come into focus as recognizable words and phrases. Computers think the same way: Give them a dictionary for the right language, and they get much better at recognizing words.

This is the concept behind dictionary-based handwriting recognition; the software isn't looking to recognize characters, but words. It illustrates the importance of the intelligence -- and knowledge -- behind a text-recognition interface, in addition to generic pattern- or even character-recognition algorithms. You need a context -- or a frame of reference -- to match those patterns to. The better-defined the context, the higher the recognition performance in both speed and accuracy.

Two vendors (among others) have developed licensable technologies around this approach. They are ParaGraph of Moscow, which recently signed a non-exclusive license with Apple Computer for its cursive-text recognition technology, and SuperScript of Cambridge, MA. SuperScript demoed its PenSieve, which operates as a complement to a text recognizer, on its own tablet at the Microsoft booth and elsewhere at Comdex.

SUPERSCRIPT'S PENSIEVE -- SITUATIONAL INTELLIGENCE

The word "context" is something of a reserved term in the AI world, and it generally refers to an overall model of the world, complex to define and complex to implement in all its nuances. SuperScript has demystified this concept into something practical which works within (Pen) Windows and which it should be able to license to a number of pen platform vendors (although it could also be used with an individual application). SuperScript founder John Kulp, who was also vp of R&D and a founder of Symbolics, originally planned to build its own high-end pen system based on a Symbolics chip and a proprietary operating/development environment (see Release 1.0, 6-90). But this time around, he has bowed to the rigors of the market -- and people's reluctance to adopt nonstandard technology.

FORUM INVITATIONS HAVE BEEN MAILED; LET US KNOW IF YOU MISSED YOURS.
SuperScript's PenSieve is about as unobtrusive and standards-oriented as you can get. Implemented as a Windows Dynamic Link Library but written in C and easily portable to other environments, it manages the contexts for an application and provides the appropriate word list for each context in order to enhance the performance of a text recognizer. It's a fairly simple idea, but there are enough tricks and little quirks to give SuperScript hope of licensing it to other vendors. SuperScript simply has to make it easier and cheaper for others to buy than to make it themselves.

The system doesn't do anything exotic to determine what the "context" is; it leaves that up to the application -- that is, the application developer. The simplest approach is some static link, such as a defined context for each field on a form. (This is much like a pick list, except that the user doesn't see the list he is "picking" from -- in reality, matching to. (If the context is very tightly defined -- the fifty states, for example -- you'd probably use a pick list. But if there are 2000 part numbers, it makes more sense to give the computer a list to match against what it thinks the user has typed.)

More elegantly, the application could infer the context from something the user is doing -- what he's entered into a previous field, a statistical analysis of words he's used up to that point, or the most recent customer name the system recognized. In fact, determining the context rather than applying it may be the better potential application of AI.

Make me a match

As input, PenSieve then takes the resident recognizer's best guess at the text string the user has entered. (It doesn't deal with the ink directly, nor does it use character-specific logic such as "an 'i" could also be an 'l'." Such character-specific intelligence doesn't seem to improve performance much.)

Then PenSieve compares the input string to the context, which is a set of matched pairs of text strings and data elements or objects. The application doesn't need to take the recognized string and then look it up in a table; the pointer to the actual record or object is already there. After all, what the user is entering typically is not just strings of text, but references to objects managed by the application.

How is this different from a dictionary, such as a spell-checker, which is frequently used to aid text recognition? In principle, it's more or less the same idea, but with far more situation-specific word lists. The smaller the range of possibilities, of course, the faster you'll recognize the right answer -- or at least the one the user intended.

Find me an object, not just a string

Moreover, as noted, both conceptually and practically the system is not trying to recognize a text string or a simple attribute such as M or F for male or female. It already "knows" the objects and is just trying to discern which one the user is referring to -- which customer, which appointment, which chapter, which memo.

Obviously, for now PenSieve's approach doesn't do much for free-text entry, although we could imagine a cleverer system that could in fact discern the
context from what the user had written. But PenSieve can speed up performance and accuracy for the majority of semi-structured tasks, including broad "horizontal" ones such as calendars, contact-management and mail, where the user has his own set of familiar objects. Contexts could include dates, people with whom you frequently have appointments, locations, common topics, etc. The application vendor now has to think a little, and provide training opportunities in the application. For example, you may have to prompt the user to specify when he wants to enter a new contact rather than an existing one; he'll probably be willing to print carefully once, if the system will recognize that customer thereafter. Also, you could offer an explicit learning mode to let the user add new items to the context list.

PenSieve is the sort of tool that could be added to any pen operating system. (You could also add it to an application, but it's generic enough that it makes more sense in the platform. Only the contexts are application- or user-specific.) Sure, most platform vendors will want to do their own, but it makes sense to have a standard API for such a handy, generic technique. Windows, with its DLL capabilities, is open for such additions and more. PenPoint, likewise, can easily accommodate extra modules.

In the illustration across, the context is "states," based on the field where the user is entering data. Once "Georgia" is recognized, the context for the next field will be not "cities," which is the default, but "cities in Georgia," a much shorter list that will speed the recognition -- and certainly improve its accuracy. Of course, if the user picks a smaller city not on the list, he will have to print carefully after rejecting the system's best guess. Nonetheless, chief systems architect Rick Bryan points out, that still makes the system seem smarter, because it asks something sensible, like "Huntsville," instead of "Nnnm1??tc."

General data flow of a PenWindows application using PenSieve.
ParaGraph, a Moscow firm that has assembled many of the city's best programmers, has an abundance of technical skills but lacks the people and infrastructure (for now, anyway) to develop finished business products and sell them in the West. Thus technology licensing is an ideal way for this firm (and many others) to exploit its talents. Compared to PenSieve, the ParaGraph technology is a little more technology and less a discrete module, but it too could easily fit into other vendors' platforms.

ParaGraph's handwriting-recognition technology is implemented as CalliGraph for recognizing text from pen input (based on the sequence of strokes), and ParaScript for reading from still images. It works by recognizing words rather than individual characters -- which underlies its ability to work with cursive script rather than unconnected hand-printing. (There's also ParaFax, for low-quality faxes -- a big market in the East especially.)

The software looks for sequences of features -- mostly, strokes of a pen -- that make up sets of three letters or full words, rather than for individual characters. The base technology could also be extended to look for syllables or other word components. The dictionary could be either a word list or a more complex structure that knows about prefixes and suffixes, or it could be limited, changeable lists a la PenSieve. And the tool could also focus its search on the most frequently used words first.

It's unclear exactly how Apple or other potential licensees will use and extend ParaGraph's technology. Obviously, the performance of any particular implementation will depend on the details.

Separately, ParaGraph is also working on a scheme to implement its feature-recognition locally and the word-matching system on a server, so that, for example, you could send handwritten e-mail which would be interpreted at a more powerful server. The feature recognition takes only 10 percent of the time, so that perceived performance improves dramatically. Finally, ParaGraph has a dictionary/grammar that can parse mathematical formulas.

Model for modules

Why all the fuss over these clever little tools? They exemplify the continuing trend to modular software in platforms as well as applications. In both cases, problems arise when the context is broader than the word list used -- or unpredictable. Thus the technology probably applies best to specific applications rather than to fully generic tools such as memo creation. On the other hand, as performance improves, it will become possible to manage ever-broader contexts with little evident impact on performance.

But the overall message is that you no longer need to be a Microsoft to make improvements to operating systems if you can find a way to make them in discrete modules so they can be added incrementally. That, more than pens and handwriting, is what the new object-orientation being fostered by pen computing is about.
Momenta kicked off October's pen madness with its product announcement early in the month. The tumult continued at Comdex, with vendors of hardware and software alike protesting loudly the pen-readiness of their products. Meanwhile, GRiD quietly announced the opening up of its PenRight! development/operating environment -- perhaps a more momentous event in the end.

Momenta is curiously two-minded about things. Its product, the Momenta, suffers both from a lack of commitment to pens, and, even on the pen side, a lack of commitment to its own operating environment. This is especially odd given that marketing vp John Rizzo handled the Macintosh -- this industry's premier example of passion overcoming prudence. (Yes, the Mac did have the Apple // to fund it through the rough spots, but that's another story. Momenta has VCs.)

First of all, the Momenta can operate with either a pen or a keyboard. That's very handy, but it means that in the end Momenta will be competing with just about every DOS laptop vendor on the market, since they will all fairly quickly sprout pens. Pens will be this season's means of differentiation, which means they won't differentiate anything at all. Yes, Momenta may be optimized for the pen, but it will be competing with cheaper machines that still have pens, coming both from classy outfits like GRiD and NCR and Dell, and from the fiercest of the clone-commodity vendors.

Theoretically, Momenta's software -- including its delightful Command Compass -- should help it compete, but Momenta's support for it isn't single-minded enough. Although the company has spent $13 million or so on it, it undermines its case with equal-time support for Windows for Pen Computing. Rizzo says that the company can't afford to forgo the Windows-dependent customer base; we think that's taking the easy way out -- right into a false exit.

Part of the problem is that for now the Momenta environment is available only on the Momenta machine. Yes, Momenta's environment based on DOS and on Smalltalk, which is widely available and portable, but not so widely used. Rizzo notes that GO has had a two-year lead in rounding up licensees, and Momenta would be happy to license its environment to anyone too. (And to be fair, GO's PenPoint isn't really available anywhere yet, except for long-suffering developers. But its platform support is broader.)

But in fact, the real issue is hardware -- Momenta's hardware. GO made the tough decision long ago to give up hardware in order to put its soul fully into its software. That's the kind of passion and forsaking-all-others commitment you need.

By contrast, Momenta's positioning is muddy. It's the machine for people afraid to make up their minds. The Momenta people certainly have passion, but more for their company than for the uniqueness product.

GRiD opens up

Meanwhile, GRiD's decision to license its DOS-based PenRight! development and operating environment to other hardware vendors works against a different background. You could argue that GRiD would have been more successful...
had it opened the system up earlier, but until recently it was the only vendor around with a working pen system. Its failure to open it was probably more neglect than conscious strategy; GRID was a pen hardware company at a time when software wasn't a differentiator but just a necessary component to make its platform usable. PenRight! is more like a database and screen manager than the sort of horizontal, object-oriented environments GO, Momenta and even Microsoft are offering. PenRight! has been a modest success, along with the GRiDPAD itself; it has some 250 developers and an installed base over 10,000.

Thus GRID, successful as a hardware company, is broadening its market and appeal by allowing clones, while neither Momenta nor GO has the luxury of being first into the market. That's why they need to be more focused from the start.

JUAN AND ALICE GO PEN-CRAZY

Everything's coming up pens... PENt up in the serious world of everyday work, inPENitent Juan and Alice have a PENchant for wasting time: coming up with all the words that can be derived from "pen" -- exPENSive, hapPENing, PENsi(e)ve, PENsee, PENpal, PENultimate, oPEN, PENTagon, PENCil, PENPoint and so forth. Many of these words (real or not) have already been taken by canny developers.

But others have not yet been grabbed, to our knowledge. PENitently, Juan and Alice list some here as a public service. You're welcome to use them -- or fight over them; Juan and Alice would just appreciate credit if you saw them here first. Games are the easiest: PENdemonium; PENemy, a war game -- or maybe it's serious after all; PigPEN, or is that for high-tech farmers?; PENball; PENguin, taken by Pensee (another penworthy name) for its outliner for text and ink; PENTathlon, and lots of other five-thinged things.

But let's get serious. There's also perPENdicular, a CAD program; PEN-American, an airline downsizing case study complete with spreadsheet templates and route maps; PENitentiary, for corrections management (or maybe it's another game); BullIPEN for editorial groupware; patent PENding (a support tool for inventors); PENHandler (the high-end version of patent PENding, for those looking for venture capital); Love me PENder, which generates personalized mushy faxes from boilerplate texts; PENergetic, with multimedia exercise demonstrations and input forms for recording your times and scores; PENdulum, an old-fashioned clock accessory; PENTastic (if Artisoft hasn't claimed this already it should get on the pen!); sPENd it!, a user-friendly interface to an online catalogue service; PENny Wise, Pound Wise, a home-accounting package; and PENury, a low-budget accounting package. And let's not forget outliers like PENtbrush, a graphics package; and start-up Pin Computing in Texas. Finally, a free pen to anyone who comes up with a proper application for PENdulous.
TRILOGY DEVELOPMENT GROUP: THREE TIMES NICE

When the industrial revolution began, people made things one at a time for other people nearby. One-of-a-kind was standard. Came the factory, and economics favored long production runs. Now we're heading to yet another era, where people buy custom systems configured from standard modules. The trick now is to configure systems properly from an escalating number of modules and options. Add to this complicated pricing schemes, interacting components and flexible frameworks, and you end up with a challenge to current information technology.

A good, increasingly familiar example of the problem is not the simple car with a color and a few options for interchangeable parts, but your typical pc system, with peripherals, device drivers, fonts, network software, operating system, applications and other components, all of which interact or conflict. What goes with what? How much extra memory do you need for the text recognizer? If you have three of these and four of those, what happens to the price? (We described some low-end, less general tools to handle such issues for Macs in our August issue.)

Configuration is the information economy's equivalent of discrete manufacturing: You add value to components by selecting them, fitting them together, and perhaps machining, gluing or otherwise slightly finishing them. Writing code is equivalent to process manufacturing. In the information economy so far, we've used the job-shop approach. CASE and the much-vaunted Japanese software factories are assembly-line process manufacturing, with some automation at each workstation. Configuration, by contrast, is a way to automate almost the whole process. You specify what you want, and the system assembles the proper components with the proper construction rules.

Of course, this is a somewhat vaporish view of what's actually possible. CASE slides into object-oriented programming, which (when you achieve full reuse, rather than when you're building the initial class libraries with code) is simply the assembly of information objects. In short, we're not saying all this has arrived, but it's a useful way to look at things.

A tool to build a tool

Trilogy Development Group is a start-up devoted to handling configuration in general rather than in particular. Its initial product, SalesBUILDER, is a configuration-management-system development system targeted at companies configuring their own products for sale to customers. Its second business, NetBUILD, is an executable configuration object base of multiple vendors' products for use by resellers and system integrators, is neither a figurative razor nor a blade, but a shaving service -- but with an edge. The edge is that the service includes information too difficult for most users to collect directly. Trilogy ultimately should get a cut on each shave.

By, for and in Silicon Valley

The company was founded by Joe Liemandt, now 23 years old, two years ago, along with Stanford buddies John Lynch, vp R&D; Chris Porch, vp sales; and Tom Carter, vp engineering. John Price, vp marketing, was technical marketing director at Neuron Data and sold the company the copy of Nexpert Object with which they built a prototype.
Trilogy is partly your typical Stanford-student start-up -- just like Sun Microsystems -- but with a few peculiarities of its own. Liemandt's father is Greg Liemandt, president of General Electric Information Services and ceo of Uccel before it sold out to Computer Associates. "I spent a lot of weekends at [GE chairman] Jack Welch's house absorbing business strategy when I was growing up," says the younger Liemandt. He financed the business with profits from the sale of his first company, Fourth Connection, started while he was still at Stanford; it built sales databases on Acius's 4D database for Silicon Valley customers.

"At Stanford, we kept getting all this free equipment from all these manufacturers, but nothing worked together," says Liemandt. "So we really understood the configuration problem! We looked at Digital's XCON and Rolm's AutoQuote [for its own PBXes], but you couldn't maintain them."

System architecture

Traditionally, configuration systems have been built as expert systems, with rules about requirements and constraints. This is fundamentally the approach taken in XCON/XSEL, the venerable configuration and sales system developed by Digital Equipment 12 years ago, in Rolm's AutoQuote, and in Andersen Consulting's much more recent Expert Configurator, usually configured as part of Andersen's MAG-PAC manufacturing system.

Such systems work fine as long as they are developed right, but they are notoriously difficult to build and maintain. It's tough to predict the interactions of the various rules, and it's tough to get a clear understanding of what's going on, in a large-scale rule-based expert system. Such a system may uncover unexpected conflicts only when they arise in operation -- not in testing beforehand -- and there's no easy summarization of what's happening. Moreover, there may be unexpected results -- for example, when percentage and absolute discounts collide.

The trouble with the expert-system approach is that there's no model of the products and components and how they fit together -- just a set of rules. The developer may in fact have a model in his head, and use sets of rules and other techniques to modularize the system, but that's good development practice rather than something inherent in and supported by the software.

Objects for order

Following honorable tradition, Trilogy first approached the configuration as an expert system challenge, using IntelliCorp's PC Kappa and Neuron Data's Nexpert Object to build prototypes. However, developer John Lynch rapidly discovered the problems outlined above, and started exploring a more object-oriented design.

Fundamentally, what objects and the class hierarchy give you is a better way of organizing your code and your thinking -- one that more closely mimics the real world and is easier for people to understand, modify and validate. The underlying rules are the same as in an expert system, but they are expressed and organized as methods (constraints) belonging to objects in a class hierarchy. The class hierarchy provides a more natural, less redundant way of expressing and applying the rules and exceptions. When you add a new product, it's easier to define it in terms of existing products rather

Release 1.0  31 October 1991
than create a new set of rules, or to hunt around finding which rules to change. For example, does the red-label rule apply to all widgets, or only to widgets larger than four inches around? How do you price the 11th item in a set? Does Juan’s customer discount apply to Alice from the same firm?

Object-orientation is key to easy maintainability. Most new products are variants of existing ones -- subclasses of existing classes, to use object-oriented terminology. This means that one does not need to generate new rules, but merely to apply new parameters or conditions to existing rules, which makes things both faster and simpler.

Stealthy start

Trilogy launched SalesBUILDER quietly last year to a small number of customers with which it is working closely. It is a flexible tool for developing a customized product configuration system, not such a system itself. (As in most of data-processing, the trick is not to solve the problem once, but to figure out how to solve it over and over.) During initial development, the customer/developer models the products to be configured and sets up the rules about how components can be combined and priced. Then the customer hands out multiple copies of the resulting system and runtime software to its sales force, and perhaps ultimately to big customers.

SalesBUILDER comes in three modules: Configurator for developing the configurations, Manager for sales tracking and other administrative procedures, and Administrator for developing models and rules, maintenance of the system and defining reports, etc. Pricing is negotiable, of course, but it usually works out to less than $10,000 per seat (including hardware); it’s generally worth it as long as you have a requisitely complex product line and more than 20 or 30 people selling it. The Administrator development tool costs $50,000; the user runtime systems start at $2500 each and drop with volume. The system runs on UNIX workstations, Macs and PCs; so far all the customers have chosen UNIX for the server. It works best with an SQL database on the server, although it can also retrieve data from flat-file databases.

Long run, we expect Trilogy will move to an object-oriented database to support more complex functions, as outlined below, but for now integrating into existing environments works best -- and is an easier approach to sell.

The underlying system is in C++, extended with Trilogy’s own constraint language -- sort of a 4GL for configuration applications. The system user defines the products to be configured as a hierarchy of objects; constraints and requirements are expressed as the objects' methods. Thus, it’s fairly easy to add new products or line extensions, most of which fit into the existing model. SalesBUILDER also has the requisite GUI interface, class-library browsers, menus and so forth. You can also build graphical representations, so that users can see cards slide into cabinets -- or insufficient space overflow. Of course, there’s more to it than that: Conflicts must generate useful error messages; requirements must generate appropriate dialogue boxes asking the customer, for example, "And what kind of a monitor would you like with your system?" or, "You need an extra cabinet to house the additional components. Okay?"
The economic imperative

Consider the possible progression of business uses of such a configuration tool. First, obviously, is a single manufacturer providing it to salespeople so that they can take -- and more importantly, solicit -- orders properly. You have the cute little pentop in light blue; would you like a matching carrying case to go with it? If you order the 120-MHz version we can give you on any memory upgrades you order over the next 30 days. The word-processor you want needs a special filter tool to work with the DTP package you’ve selected; we’ll include that, of course.

This not only sells more product, a desirable end in itself; it also avoids misorders, underorders and other mistakes that usually cost the manufacturer money. Indeed, the benefits extend beyond the sales cycle. As Trilogy’s customers are discovering (see below), rationalizing the configuration process also affects pricing on the one hand, and customer satisfaction and product delivery costs on the other. Instead of handling exceptions, SalesBUILDER eliminates exceptions that average a point of gross margin, vp John Price calculates. "Across the board," he says, "all the companies we talked to were losing 0.8 to 1 percent of revenues on configuration problems. That includes the extra cost of doing it the old way, the cost of rework, and the cost of no-charges, where the customer gets more than he ordered." Moreover, he points out, existing customers are the easiest to sell to -- but upgrades to complex existing installations are the toughest to configure. SalesBUILDER can keep those existing installations on-line.

Further ahead, it’s a short step from allowing salespeople to do configuration electronically, to allowing customers to do the same thing (much as they now place simple orders electronically). A customer could fax in a machine-readable form with requirements checked off, and get back a configuration and quote in semi-interactive fashion. Alternatively, he could dial into the system to interact with it directly for more complex systems.

Configuration is only a subset

The basic approach is simulation rather than expert systems: What happens if you put these objects together? How do they interact? In the long run, configuration is only a subset of the possible applications of Trilogy’s technology. The methods could be actions, not just constraints. You could program such a system to do anything, of course -- suggest the special of the week, look through a database to find customers with Windows 8.0 who might like an upgrade to 8.2, or send a letter to everyone who purchased a component that the manufacturer has discovered conflicts with another component that they are using. Any particular combination might also trigger a text/image database to produce appropriate, sequenced installation instructions or documentation. (Think of Interleaf’s Active Documents technology in this context.)

One could imagine the tool being used not only for configuring a system for ordering, but actually (in the case of software) installing it, or printing or displaying assembly instructions (as Trilogy is building a module to do for a customer), or driving robots to assemble it. A vendor such as Dell, for example, could use it to pre-install factory software based on individual customer request, as it is already doing by other means. (This is another advantage of Dell’s direct-sales approach over the dealer...
channel -- until dealers start buying the system themselves, including the accounting module to make sure the software vendors get paid!

Then the system could maintain itself over a network. As people added new software, it could manage the installation and upgrading process. It might even start asking, say, for more hard disk space, or for an extra processor. For example, you could implement Xerox PARC's Spawn self-organizing computing system with this approach; see Release 1.0, 89-6.

SOME CUSTOMER EXPERIENCES

Trilogy is an interesting company, an intimate part of the community it serves. (Or perhaps this just illustrates the point that we're becoming an information economy.) Although its three initial customers are hardware companies, an important component of their products is system configuration, an information-intensive activity if ever there was one. Interestingly, says Trilogy, its customers want not only to use the system, but also to sell it. The company has received requests for porting as well as for implementation from many of the non-UNIX vendors they've shown it to.

LSI Logic

LSI Logic's basic business is ASICs (application-specific integrated circuits), which come in a hundred varieties, with a hundred kinds of packages and other options. The company is known for its clever use of proprietary (but licensable) design tools to design systems to customer specifications, which it manufactures in its own foundries in quantities from 100 to many hundreds of thousands. But for all its design-tool prowess, the specification/configuration process was woefully unautomated -- as shown on page 12.

"Trilogy's configuration system is a strategic weapon for us," says LSI Logic's Dion McCormick, a product marketing engineer who helped improve his own job by bringing in the Trilogy system a little more than a year ago. At that time LSI Logic's 14-person marketing team was suffering from overwork and was shrinking. The team's primary task was preparing price quotes and configurations for salespeople to give to customers, a job that took hours for each quote. Some combinations work and others don't, depending on pin counts, power requirements, size and other factors -- and also what the customer is trying to accomplish with a system. A customer would specify his requirements, and then a product marketing manager would draw up a spec and quote to meet them. "You had these big catalogues; you'd go through the books, check what combinations would work and be valid for a customer. And then if a customer said, 'I'd kinda like this other configuration,' you'd have to spend another hour," says McCormick.

Backlogs were up to two weeks, and marketing team members were quitting from stress and frustration. The team is now down to eight people, but they're handling more work -- and winning more business. What used to take two or three hours now takes 15 minutes. Earlier, some customers had walked away in frustration at the two-week wait; now, LSI guarantees an internal response time within 72 hours, and is averaging 24. The team's rate of business wins out of total RFPs has gone up 15 percent since installation of the system, says McCormick.
In the bad old days, the salesperson in the field prepared a request form with the customer's requirements (above left). A specialist, using a database query tool (below) that supplied data but not rules, laboriously prepared a quotation/configuration by hand (above right).
In the nice new days, LSI's Quote Configurator generates the quotations automatically and faxes them to the salespeople in the field (left). Moreover, the information is stored and can be analyzed later on. Specialists can interact with the LSI Quote System itself (below), which automatically reflects changes in pricing, products or configuration rules.
Moreover, the accuracy of the configurations has improved dramatically; salespeople don't quote systems that don't work, nor do they erroneously underprice by specing insufficient components. "We'd be forced to give them something better, but we couldn't charge for it because we hadn't quoted it," says McCormick. "We lost a lot of margin that way."

Pricing also benefits in another way. The prices are set (and the configuration rules defined) by another group, who now have more time because it's also easier to update the rules and pricing with the configurator; you just specify the new parameters because the system knows how to apply the rules to new cases. With their extra time, these people are doing more reports and analyses, and can make the pricing more responsive to changes in costs on the one hand or demand on the other. Also, they're getting better data back from the field, because it's represented electronically.

Originally, a teammate of McCormick's had produced an Excel-based prototype, but that system was simply overwhelmed by the complexities. Now, the system has been so successful that other groups within LSI -- microprocessors and digital-signal processors -- want and will get their own, as part of an expanded corporate database.

Silicon Graphics

Silicon Graphics doesn't have its system up and running yet, but it's equally excited. George Jaquette, project manager for SGI's Quote Configurator (based on SalesBUILDER), has been working on it for ten months, using it to replace a HyperCard stack that wasn't up to the job (to put it mildly). So far, he has entered models and rules for three product lines out of twelve, starting with the toughest first -- support and software will be last.

Jaquette plans to install a beta version in the first sales office in December, and roll it out over the next six months. He anticipates clear benefits: About one out of three purchase orders written by SGI salespeople need to be changed. What this means is that orders can't be processed automatically; instead, they're checked and re-entered by a headquarters group of 25 people who spend their lives catching up on orders. "Everything flows through a group who retypes everything," says Jaquette.

The group catches most mistakes at the low end, but misses problems in one out of five of the high-end orders, which usually get changed on the manufacturing floor. The worst mistakes are those caught latest in the process -- when they cost even more. Either SGI discovers the mistake and has to ship the customer more than he committed for to make the system work (at SGI's own expense), or, worse, the customer discovers the mistake and complains. Then SGI bears both the cost (extra equipment plus shipping) and the customer dissatisfaction. Says Jaquette: "We're always in danger of trying to build a system that's not buildable, installable or shippable."

Also, he says, sometimes the salespeople end up working with rules and products that are two months old. Thus the system will help with a final step in continuing innovation -- actually bringing products to market. Just like a tree falling in a forest, a new product means nothing if salespeople and customers aren't aware of it. The Quote Configurator provides the necessary electronic "awareness" in a world where there's just too much detail about rules and products for anyone to keep in his brain.

Release 1.0

31 October 1991
To derive the rules for the Quote Configurator, Jaquette is working with both marketing and manufacturing -- an interesting process in itself. "To a certain degree you discover pockets of knowledge that you have to formalize," he says. "You have to integrate across the company an understanding of what is what is and is not a true product. For example, we have rules about how much power you need for a certain configuration, how many terminals a server can support. Some of these upper limits are flexible, and the experienced sales people know how much give there is to make a less robust but still technically correct system. But a customer, or a new sales rep who asks someone in manufacturing, may get different answers. The Configurator gives you consistent application of technical constraints." Likewise, the system can handle discounts more flexibly, working either with the aggregate of line-item discounts or working backwards from a final dollar amount. Jaquette concludes: "I don't have to sell it to anyone; our people are asking for it."

Pyramid Technology

Rich Layhe, director of application development within Pyramid Systems' MIS group, sees much the same benefits from SalesBUILDER as the other two customers cited. Pyramid is using it in field test in one of its sales offices to "provide the sales force with accurate, up-to-date information about products," and plans to roll it out to several more over the next year. The company is using it with Oracle, where it already keeps most of its sales and product information.

The company explored some alternatives in a conceptual way, looking at write-ups on XCON and considering Andersen's Expert Configurator. "But Andersen has have no plans to port it to UNIX, and we have no plans to buy an AS/400," quips Layhe. "The porting issue was enough to halt us." Pyramid also considered developing a custom expert system, but SalesBUILDER saved the company that effort.

A NEW BUSINESS MODEL: CONFIGURATION INTERMEDIARIES

That's the story so far. However, we see Trilogy's technology -- and its approach, for it will surely generate competitors -- as the foundation for a new kind of business. Much as American's Sabre has a lock on its market (along with Apollo), because customers want to deal with or choose among more than one supplier, so could a configurator-middleman service help a customer or a systems integrator configure a system of components from diverse sources.

As it happens, Trilogy's next product, NetBUILD, will be a fully loaded a configuration system for pc and network configuration, targeted for sale to resellers for a low entry price of about $2000. The real business will be the sale of periodic updates, either online or on disk. Pricing for the service is not yet determined, but it should be profitable, since most vendors will ultimately find it in their interest to work with Trilogy and supply their product information at low or no cost. Trilogy is currently signing up product vendors to be included in this multi-vendor, executable object base, but won't reveal their names yet.
The initial market for such a service is dealers, VARs and systems integrators. It's easy to see why they'd like to buy and use a multi-vendor-product service such as Trilogy's NetBUILD. They can use it with the particular products they sell, entering their own prices and other rules. But why would the vendors want to supply information to it? Wouldn't they rather supply information only on their own products to their own captive VARs?

Well, that's the sort of thinking that put many of the Eighties' proprietary high-fliers under. To go back to the airlines model, the first vendor to welcome strangers' product information may well develop a powerful market AAdvantage. Both system integrators and end customers will demand multi-product object bases, with constraints and requirements (including prices) applied across vendors' lines.

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Ask someone to name some successful strategic computer systems, and chances are American Airlines' Sabre system will be high on the list. Its edge, as we noted in our September issue, is not that it owns information, nor that it acts as an information-delivery vehicle, but that it consolidates and integrates information from a variety of sources.

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That argues, of course, for third-party services, rather than vendor-sponsored ones (in contrast to the airline industry). We don't see any vendors with the market clout to make such a system work in the way that United and American cornered (more or less; the FTC is watching!) the US reservations business. However, Novell looks like an obvious candidate, expanding its current Technical Support Alliance with other vendors for help-desk support, to include configuration.

Vendors would probably refuse to give the information to a (potential) competitor, but might give it to a third party to promote their products. As in the airlines business, it might become a competitive necessity to be listed with the top three configuration services.

Meanwhile, those configuration services would attempt to sign up resellers and systems integrators, just as Apollo and Sabre sign up travel agents. The configuration service would also sell the development tools -- to define object classes and their methods (or requirements and constraints) to vendors. All this would of course force vendors to use standard terms and components so that they could more easily match other vendors' constraints and users' requirements.

As in the airline business, more information better distributed will lead to more competition and faster market interaction among vendors. (Just look at airlines' overall profitability -- and compare it to the profits of Sabre and Apollo -- to get some idea of what we're talking about.) In the same way, people who are willing to buy anything that fits a loose requirement -- any 386 will do -- will be able to search for rock-bottom prices, whereas those who want something specific -- the computer equivalent of a non-stop Monday-morning flight booked the Friday before -- will have to pay up.

Trilogy will be demoing its products at PC Forum in February.

Release 1.0
31 October 1991
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COMING SOON

- Costs and transactions by Phil Satin.
- Network navigation.
- Machine-assisted translation.
- Constraint tools.
- Case-based reasoning tools.
- And much more... (If you know of any good examples of the categories listed above, please let us know.)

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