CONTENT IN CONTEXT

Where can you go when the software business is dominated by giants? many smaller companies are asking these days. As we survey the pc establishment, we see discomfort and even despair over the increasing power of Microsoft. Build a cool application, the theory goes, and it will find its way into Microsoft's next OS or application suite. There's no way to win.

Of course there isn't, if you keep playing the same mug's game. This issue of Release 1.0 is about a new game, one of inherently fragmented, discrete markets where smaller players can carve out a lucrative, satisfying niche, markets where size bestows no advantage and where the absolute returns in each individual niche don't justify investment by a giant.

So, where can you go? One frequent answer is "content." Mention content to a computer person and she'll think of multi-media, video-based e-mail, virtual reality and other flashy offerings that may or may not be useful. Press on the usefulness angle and she'll admit that it will all happen in entertainment, advertising and perhaps training first.

Mention content, and you'll hear about Bill Gates again: He has personally invested in Dorling Kindersley, a UK book publisher, and has formed another company, Continuum (formerly Interactive Home Systems) to invest in electronic rights to artworks for the home -- for now.

However, there is more to "content" than that. It lies in what I'd call "business content" -- not jazzy multi-media that performs great demos, but useful business information embodied in software that performs actual work. Aside from its potential value to users, the appeal of content to vendors is that it may provide sanctuary and even opportunity for the smaller software company in a business dominated by giants. Content is inherently specific; the "content" market is really a collection of niches -- each one (its supplier hopes) too small to attract much competition.

Examples include on-line newspapers and classifieds, but there's more than that. There's executable content, and there's cross-owner data that is most useful when it is combined and massaged -- cf. AMR's Sabre, Trilogy (Release 1.0, 10-91), and potentially PRJ/QRS (page 10). There will be buying services that watch community buying behavior -- or that of certain early adopters who earn a fee for their data -- to guide promotions to their members. (See Release 1.0, 6-91, and the next PC Forum.)
It's hard to formulate an overall theory for these markets precisely because they're small, diverse and different from each other, so we have collected a few examples to illustrate the point. We solicit more examples, and perhaps someday we'll come up with a Grand Unifying Theory. (At that point, Microsoft will enter and investors should get out!)

For the moment, the closest thing to a theory is the Goldilocks test: A content market should be too small to interest Microsoft, but large enough to provide a customer base over which to spread the costs of collecting the data or designing the executable software. Of course, a market must also be definable, reachable, and able to comprehend the worth of your offering.

Software is a medium, not just a tool

As we've said before, the computer has progressed from a computing machine to become a communication and coordination machine. As such, it can be a medium for business knowledge, skills or expertise, as well as pure information. That is, you can do more with information than just publish it:

- You can build executable software (software content) with it. Expert systems typically provide advice; software-content tools execute the advice. Call them "clerk systems," which do dull but useful tasks.

- You can collect and manage a proprietary database of changing information and supply it to customers in a (uniquely) helpful way.

- You can combine and manipulate (public or marketing) information from a variety of suppliers in a uniquely useful mix. Vendors may be glad to supply it free or even pay you for helping them to reach their customers. You provide a unique channel for all of them to reach a broader market than any of them could afford to reach alone; meanwhile, the customers want the benefits of the combined information.

For software content, you typically work as an arbitrageur, not across different markets' prices, but across different ways of doing, organizing or representing information tasks. If the world were truly efficient, there would be no need for mediation: Each task would have a single solution, and a horizontal market for the software to do it. (There would still be vertical markets for certain tasks, but much variety would disappear. One nice horizontal example based on a de facto standard: Microsoft's Access produces output tailored for Avery labels, with permission from Avery.)

In our (fortunately) ever-changing world, moreover, there's also arbitrage over time between legacies and better ways of doing anything; progress always leaves room for incremental engineering, camouflaging layers and, yes, software content to make the old work with the new.

In the data content world, you can provide a variety of services. These include defining and finding the appropriate information; paying its owners or collecting "advertising" fees if appropriate (the task of negotiating such contracts is part of what the end customers are paying for); consolidating and combining information from different sources in clever ways (such as configuring a system with parts from several vendors or drawing up an itinerary with several air carriers); reformatting it or manipulating it with indexing, sorting, merging and other laundry techniques; and providing query tools to help users formulate questions as well as find answers.
Our four examples are:

MathSoft publishes scientific/technical formulas, techniques and rules of thumb in "living documents" that let users apply them directly to their data. This allows the company to leverage its installed base of tools with a broadening set of industry- and function-specific Electronic Handbooks for engineers, chemists, designers and other technical people.

TSI International, sells another kind of software content: the appropriate tools to handle communications with any of a range of 35 large buyers (going up to 200 shortly). Want to sell to Sears? Well, you can use the EDI standards, but you also have to provide the specific kind of information and invoice formats that Sears demands. For $295, you can buy from TSI a Trading Partner kit that automatically collects and manipulates the information appropriately for Sears or another buyer's unique requirements.

PRJ&QRS maintains a constantly changing database of product codes that its customers need to place their orders via EDI to many manufacturers. Call QRS the Sabre or OAG of the retail clothing business. It sits between producers and retailers and collects transaction fees for what is essentially a commodity service, and information fees for the use of a database it manages. The data in the database is free, in principle; but both sides pay QRS -- retailers for receiving it and vendors for distributing it.

Triad Systems is an almost traditional vertical-market systems company, but it has extended its business with a high-margin information service that supplies parts numbers and prices to its hardware and auto-parts customers.

Each of these vendors has its own story and its own business model, but each has a business that other vendors would find hard to enter -- a natural, if limited, monopoly. They are big, profitable fish in small ponds; what's more, within their markets they sell information with a reliably recurring revenue stream, not a commodity. In financial terms, their customers behave more like subscribers than product purchasers. They frequently buy directly from the vendor, and they respond well to direct mail. Once they start a relationship with the vendor, they tend to continue it; they aren't swayed by competing offers from other vendors, since the vendor's offering is usually unique or at least highly differentiated. Once found, these customers are relatively cheap to sell to -- and hard for other vendors to lure away.

Other examples with less market focus (read power) include traditional databases with search tools such as Dialog, Lexis and Dow Jones; maps and mapping software; tax software, with modules for states; flight information and travel-management and reservations software, etc. But the only information that has truly reached commodity status already is stock prices....

In this context, consider Apple's Newton. Industry scuttlebutt has it that Apple is cutting out worthy third-party vendors who would like to provide applications for the Newton (shades of Microsoft). In fact (see Release 1.0, 6-92), the Newton is more a medium for content-cum-tools (Applets) than a platform for applications. We don't know precisely what Apple's up to with Newton, but rest assured that it does not involve the usual suspects. More to come...
MathSoft began its business in 1985 with Mathcad, an electronic blackboard/scratchpad, sort of a practical engineer's version of Mathematica (or an updated TK!Solver) that can display and execute a variety of formulas and equations. Give it an equation, and it draws a graph; give it some values, and it derives the values of the dependent variables. Basically, Mathcad is a generic, one-size-fits-all tool that mostly does algebra and graphs and typical engineering formulas. It has sold over 300,000 licenses and has an estimated 700,000 users worldwide, the company says. IDC credits it with 63 percent of the market for "desktop technical calculation tools."

In 1988, MathSoft started selling $99 "Applications Packs" of templates for a variety of specific tasks such as electrical engineering, mechanical engineering, chemical engineering, civil engineering (bridge loading, etc.), statistics, advanced math and others, and an educational pack for lab experiments. These were basically sets of 20 to 30 templates containing numerous equations each that let you plug in your own values.

"We've always been a quantitative company," says MathSoft co-founder and CEO David Blohm. This was like heaven for us."

Meanwhile, one of MathSoft's largest customers, Du Pont, asked permission to put the tool on-line and use it to distribute its own executable polymer specifications within the company. In other words, Du Pont had loaded Mathcad with content -- its own polymer specifications and parameters -- and wanted to distribute that content along with a tool to make it alive. Asking around, Blohm found that Schlumberger was starting to do the same thing with some chemical engineering formulas, while Sargent & Lundy, a big engineering firm in the Midwest, was putting standard formulas on line.

With the advent of Windows, MathSoft started thinking about something more ambitious, with hypertext links, indexes and search tools, executable objects and the like. Rather than just plug in formulas, Windows could let users run simulations and iterations, and integrate its calculations with other (Windows-based) engineering tools. Already, most of MathSoft's customers were users of technical handbooks who copied their equations or formulas into Mathcad in order to use them -- why not save them the trouble? They would be living technical handbooks that could do the engineer's work instead of just providing the information and making him do it himself.

Thus the Windows version of Mathcad underlay the Electronic Handbook features. There was no magic -- just as there was absolutely no reason for an engineer to page through a handbook, find the right formulas, type them into Mathcad. MathSoft was uniquely positioned to serve the market because it had not only the engine in the Windows version of Mathcad, but also the customer base. All it needed now was the content -- from publishing companies such as McGraw-Hill and CRC Press, founded in 1913 and now a division of Times-Mirror, which are eager to enter electronic publishing and glad of a friendly hand from an insider such as MathSoft.

MathSoft launched the first three electronic handbooks last spring. They are *Hicks' Machine Design and Analysis* (with McGraw-Hill); and The CRC Ma-
materials Science and Engineering Handbook (with CRC); and its own The Mathcad Treasury of Methods and Formulas, all for $99 each. Once MathSoft had refined the idea and signed the requisite contracts, the handbooks took only five person-months to create, at a cost that the company recovered in less than a month's sales.

This month, MathSoft brought out three new handbooks: Selected Tables from the CRC Handbook of Chemistry and Physics, an electronic version of the science community's bible, now in its 72nd paper edition; Electrical and Electronics Engineering, derived from McGraw-Hill's Hicks' Standard Handbook of Engineering Calculations. It is working on a second handbook of its own, The Mathcad Treasury of Statistics: Hypothesis Testing.

So now MathSoft is building a full line of Electronic Handbooks -- the sets of equations, formulas and other executable information most used, by, say, pipe-fitters, astronomers, organic chemists, as well as financial analysts and securities traders -- a potential 5-million-plus people in all (not including the education market).

With only three handbooks under its belt for one quarter, MathSoft had sales of $12 million in fiscal 1992 (ended June 30), the last period for which it discusses figures. This year, the company should add 23 new titles to the roster. (Currently, the paper technical handbook market is about $100 million annually, and the technical publishing market is about $2 billion.)

Mining the market defined by the content

The second trick to selling content is reaching your market. MathSoft took the usual route to start, selling to retailers and advertising to "quantitative professionals" in the general pc press and Mechanical Engineering magazine, IEEE Spectrum, Civil Engineering Magazine and the like. Those ads sent some people to pc retailers and dealers who stocked Mathcad, but many of them contacted MathSoft directly. MathSoft soon realized that follow-on sales could be made much more profitably than the original sales. Now, with the handbooks and Applications Packs, it has follow-on products to sell. It maintains a database of customers with details on their professions, purchases and purchase plans, garnered through questionnaires and other means.

Now it is spending most of its marketing efforts on direct mail, which is more cost-effective than other channels in the first place, and also gives MathSoft a better handle on its customer base. For example, it's a great way to measure price elasticity. The findings have prompted MathSoft to lower its prices and garner extra sales which more than make up for the lower prices, and which bring in more customers for future sales as well.

What is "content"? Some items from the Electronic Handbooks:

- shaft torque, horsepower and driver efficiency
- speeds of gears and gear trains
- roller-bearing operating-life analysis
- economical cutting speeds and production rates
- hardness and resistivities of ceramics and polymers
- water absorption of selected polymers
- densities, melting points and crystal structures

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Another excellent example of content software is TSI International's EDI Trading Partner software -- basically, EDI in a box. EDI stands for electronic data interchange, the increasingly popular capability of offering goods for sale, ordering, and performing other transactions electronically (see page 8). From under 2000 in mid-1987, the number of companies using EDI regularly has risen to about 37,000 currently. The early adopters were large companies intent on managing their purchasing processes -- and smaller vendors eager to sell to them. Big players include, for example, Ford, Baxter, Wal-Mart, the grocery industry overall (since the number of transactions and the time-sensitivity are so great), Consolidated Freightways and Toys R Us.

As described above, it's easy enough for a large company such as Ford to set up an electronic system to send orders, but much harder for a small company that sells just screws, door handles or perhaps the grease pencils used in the shop to set up an electronic order-receipt and invoicing system.

Enter TSI, an old-line company founded in 1967 with roots in the data-entry software business. It saw EDI coming -- and recognized it not just as a threat, but as a possible opportunity. TSI realized that interactive processing and data entry are all very well, but it's even better if you can get the person out of the loop entirely.

TSI's first effort was a Windows-based software tool called Trading Partner, which lets developers build EDI applications to receive and generate invoices, purchase orders and other electronic "transaction sets" according to the X12 or EDIFACT formats. Over four years TSI sold fewer than 4000 copies at $1500 to $3000 each. (The product was acquired along with Foretell, a company that had changed hands a couple of times until TSI bought it and properly leveraged its capabilities.)

EDI for the masses

Two things have happened since. One, the EDI business is finally starting to take off. More and more buyers -- the ones with the market leverage -- are demanding that their suppliers fall into line and use EDI. (For clarity in this section, we'll call the people who buy things using EDI "buyers;" we'll call the people who use TSI's software "customers.")

Second, TSI has lowered its prices and developed "buyer-specific" software kits that its customers (suppliers to the buyers) can use to deal with their buyers. For example, a supplier to Sears can now buy the basic tool package for $495 plus a $395 add-on that automatically generates invoices and reads purchase orders in the Sears format. For Food Lion, Chrysler, Wal-Mart, Allstate or any of 35 other buyers it's another $249 to $395. TSI plans to offer another 250 buyer-specific kits by the end of 1993.

Part of TSI's edge is its understanding of the problem in the first place, and part is its expertise in providing buyer-specific output and input templates. Its kits are especially suited for small customers who don't have their own in-house applications. (Next year, TSI will launch a generic tool, Mercator, for more computer-literate suppliers. The cleverly named Mercator will let them automate the mapping from their internal applications...
to the formats of the various buyers handled by the TSI kits -- or custom-
design mappings for other buyers. The tool is being developed by Saydean
Zeldin, formerly the chief architect of Higher-Order Software, and a wizard
at the sort of complex abstractions required to generalize this task.)

For TSI, an EDI-reachable buyer with as few as 100 suppliers is a cost-
effective "content" niche. TSI's tools and its own analysts' skill at using
them allow the company to build each specific kit in only a few weeks -- a
cost it can spread over its customer base of suppliers to a particular
buyer. For each TSI customer, moreover, the cost would be far greater,
since few have the expertise in-house.

PreEDIsposed to buy?
The marketing effort is easy too: Although TSI isn't the only game in town,
it's just about the only one with buyer-specific kits that run on a pc.
Frequently, its salespeople attend buyers' vendor conferences, or its kits
may be recommended by the buyer to suppliers who want to do business with
it. Wal-Mart, for one, actually gives Trading Partner-based software away
to its favored suppliers -- under license from TSI, of course.

Obviously, this is a nice business for TSI, a private company with revenues
of about $15 million this year -- and substantial growth next year. But
it's also a nice model for other software companies looking for a place
where Microsoft and the other giants don't yet compete. Don't go after the
broad horizontal markets; search out the niches and the unmet needs.

Balance of purchasing-process power

Furthermore, Trading Partner helps to equalize the balance of power between
the small guys and the giants. It used to be that you had to be a big guy
(or willing to spend a lot, at least) to do business with the big guys.
Now, with automated tools to spread the investment in business processes, it
may be possible for the smaller guys to compete on a more equal footing.

Although companies such as Baxter Healthcare and General Mills manage their
EDI systems with mainframes processing thousands and thousands of trans-
actions per day, most of TSI's customers are smaller companies that can
handle everything quite comfortably on a single personal computer. A person
is involved, of course, but only for setting things up; the transactions
happen automatically as the information is received electronically over
phone lines (usually through a network service such as AT&T, the IBM Infor-
mation Network or General Electric's GEIS network). A typical 386 pc using
Trading Partner can handle about 3000 transactions per hour (and a 486 50-
Mhz pc can do 22,000).

Useful content such as Trading Partner's represents the real value of the
software industry to the country -- not Lotus's balance sheet or even Bill
Gates' personal fortune.

EDI SPOKEN HERE!

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FOR YOUR EDIFICATION

EDI, or Electronic Data Interchange, is compressed and automated workflow. EDI works application-to-application, whereas workflow slows things up with steps that involve people. As we asked in Release 1.0, 9-92: "The long-term question is: If we can automate everything, why bother with people?" You need people and workflow to send the work to them for tasks that require judgment, but for tasks such as data re-entry and invoice-matching, there's no need for workflow at all, except to handle the exceptions. Rather than use workflow to route the work, which requires babysitting by people, you should be able to automate the entire process with a single set of interacting applications, mostly untouched by human hands.

EDI is one module of that broad application set (internal workflow could be another). The term electronic data interchange covers computer-to-computer and company-to-company exchange of business transaction data. More formally, it applies to a set of standards for representing the data content of those exchanges.

"If you were in the room when they were writing a particular transaction set, your unique requirements were included."
-- TSI president Connie Galley

The standard goes by the exciting name of X12 (or EDIFACT for the superset international version). However, the "standard" is all-inclusive, with specified transaction sets for about 200 kinds of business documents such as invoices, delivery notifications, release schedules, POs, requests for a catalogue or shipment status (a favorite of the transport companies, which don't buy or sell the goods but must still be able to report where they are). Each transaction set may contain several hundred different data elements in a carefully specified sequence. So the "standard" leaves too much open to be much help in designing a system to communicate with, say, a particular customer with its own requirements for invoices. It's more like a protocol, which means that you can communicate, but doesn't guarantee that either side will understand the other.

EDI: You can call France, but can you speak French?

In theory, the concept of EDI extends to the automation of the full query/purchase/invoice-tracking process, and can feed into inventory, purchasing, invoicing, billing and payment applications. But there are no standards for the applications that manage the full business cycle -- let alone the applications they communicate with, such as accounting or customer support. (Nor should there be, as the real world keeps changing and the range of products and services and terms and conditions is so great.)

Thus many companies simply use EDI as a means of communicating data. There's a gap between their EDI systems and their internal applications, where the information is rekeyed by humans who are slow and error-prone. (Just consider the difficulty most companies have integrating applications internally... Now imagine trying to hook up your inventory system with a
supplier's ordering system. EDI provides standards for sending the data, but the job of hooking your system up to those standards is yours -- as they say in hardware school, it's only software!)

Why can't you just build an application system that talks to EDI directly? one might ask. Of course you could, but most internal systems are already built and not designed to interface directly to EDI. You need a "mapper" to reorganize the data rather than just reformat it. (Of course, in the future, developers will build EDI interface modules onto their apps, but for now users generally buy a separate package from their EDI vendor. Ross Systems of Redwood City is a leader in EDI-ready applications.)

The problem is that mapping data and transactions from one system to another isn't simple. EDI is fundamentally designed for a batch world, and the batch systems of EDI-using suppliers and buyers don't usually match up. Typical EDI messages are long, complex hierarchies, where the meaning of an item depends on its location in a sequence and on values around it; you can't just load the data in a simple stream into and out of a database or internal application. Cryptic product codes (see page 10) have to be converted into locally meaningful descriptions. A single EDI transaction may generate messages or input for a variety of applications.

Thus, most EDI users have implemented semi-automated EDI systems, but only the very largest firms (usually buyers who can enforce their own input standards) integrate them well into their computer operations. EDI does not hide the particular requirements of these buyers; it simply provides a standard way of representing them in all their particularity. Thus the suppliers are left with the task of conforming to a variety of buyers' requirements. They can't build a single application that will satisfy the demands of all their different customers, and so they need a mapper to transform their own output.

EDI is the esperanto of trading -- and like esperanto, it is rarely spoken in anyone's home. Many EDI software vendors offer "translation" software, which translates data into EDI format and back again and checks it for compliance with EDI standards. But the tools don't handle the basic problem of generating the right data in the first place -- mapping it from the application into the EDI structures required by a particular trading partner. (The very smallest users have no in-house systems anyway, and simply print the data out or enter it directly into a pc with EDI software.)

TSI, described above, provides mappings into the required formats of a variety of EDI-reachable customers. Its Trading Partner kits still require the software users to generate the requisite information to deal with any given buyer, but the software does ask for the right information in order to generate just the right EDI data for each buyer automatically.

For extra credit...

If your computer handles everything, how will you know if you don't receive your weekly order from K mart? The level of automation that EDI will make possible will require new (applications of) monitoring tools to let users define expected order levels and other events, and an alarm system to notice when things are out of kilter.

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PRJ&/QRS: RETAIL INFORMATION

PRJ& was founded in 1985 by Peter R. Johnson, who had sold IBM systems and software to retailers in Australia. The company is run by Johnson and president Tania Amochaev, formerly president of Natural Language Incorporated. Based in Richmond, CA, it sells a variety of retail MIS systems and its own QuickResponse Services (QRS), which started as a packaging of IBM’s EDI service for retailers over the IBM Information Network. As an IBM Business Partner, PRJ&’s QRS subsidiary has exclusive rights from IBM to provide EDI to the retail industry, and takes a small cut of each transaction over the IBM network.

This is a competitive and not very differentiated business. QRS competes with General Electric’s well-established GE Information Services, which just about invented the retail EDI business. GEIS is a leader in EDI overall, but QRS’s focus on the retail market has enabled it to double volume each year and catch up (it believes) with GEIS in the retail sector.

QRS’s chief competitive advantage is its QRS Catalog. Introduced in 1987 (and online since 1988), it’s a continually updated database of 18 million UPCs (Universal Product Codes) and other data for products from vendors ranging from traditional clothing suppliers such as Esprit, to Estee Lauder and Eveready. The database includes more than 1000 lines from about 350 manufacturers, and provides data to about 60 retailers. The overall QRS EDI customer base comprises 80 retailers and 2000 vendors, and should grow beyond its current 100-percent rate as IBM merges its network with Sears Communications Services to form Advantis. (Also, QRS uses IBM equipment, which allows interactive 3270 access rather than just messages; in the mainframe world of large-scale retailing, that’s interactive!)

Meanwhile, competitor GEIS introduced its UPC*Express II Catalog in 1988. GEIS says it has 3000 retail EDI customers overall; an Industry newspaper says its catalogue has 25 retailers and 125 vendors, with 8 million UPCs.

Who’s buying whom?

This is an intriguing business: Each customer pays QRS $135 per month per "partner." For example, Macy’s pays $135 per month to look at all the data it wants, as often as it wants, from Esprit. (That would be expensive for Juan or Alice to find out about a single blouse, but QRS’s customers typically order hundreds or thousands of items from each vendor each month.) Meanwhile, Esprit pays $135 each month for Macy’s and for each other retailer that looks at its data. Esprit and other vendors notify QRS which customers they will pay for, but a customer must ask; Esprit can’t force Macy’s to look at its data. The amount paid by any single customer is limited to $2700; after 20 partners, any additional data access or delivery is free. (But users still have to pay connection fees to IBM, with a cut to QRS.)

Only Imelda could tax this database

The issue isn’t the value of each individual item of information, but the ability to find the right data reliably and quickly. Each item offered by each of the vendors has a unique 12-digit Universal Product Code or a 13-digit European Article number (UPC plus a country code) -- the one you see on groceries, publications, clothing and, many people hope, eventually on

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software packages. But of course the reseller customers need some way to find out that unique code -- required for all EDI transactions -- when they want to order any particular product. Vendors and customers needn't deal with each other directly, but rely on QRS as the consolidator and provider of all this information. QRS saves both sides a lot of work, trouble and errors by acting as an intermediary and clearinghouse.

The QRS Catalog isn't proprietary information; in principle, the vendors would be happy to supply the codes and other data to anyone who asks. But they don't want their customer-service people tied up answering fishing-expedition questions from resellers: What are the codes for all your ladies' shoes in black patent leather? Do you still have that red dress with the feathers; I think it was called "Sultry Summer?" (Nor do Juan and Alice want to call up and take these numbers down by phone. Vendors average about 10,000 UPCs; some, especially shoe makers, have as many as a million," says QRS's sales & marketing vp John Simon.)

Nor is the information particularly complex. Its main feature is its sheer volume, and the fact that it changes all the time. It's virtually impossible for QRS's customers to be up to date without the ability to query the QRS Catalog as needed. In addition to UPCs and prices and product details, about 16 items in all, QRS is expanding it to include extra fields such as stocking information (how much warehouse space an item takes -- useful for Teddy bears and other large items), availability dates for out-of-stock or new items, special offers, and so forth.

Do your invidious comparisons for yourself!

Basically, the QRS Catalog is like any on-line database. Customers can browse it interactively (through a 3270 hook-up), send a select query to get details on, say, all the T-shirts available by December 23, or automatically send a list of items to be matched up to their UPC codes. QRS manages both the data and the query interface. But if you want to compare the prices of Bali's bras with Maidenform's you have to do one query, store the results, and then do the other. Although technically you could do cross-vendor queries on the underlying DB/2 database, for the moment the vendors have discouraged QRS for providing free-form query facilities for both security and competitive reasons.

Initially, the value of the UPC codes is that they make it easier to communicate with each vendor. Indeed, some vendors require that you use the code, and it's necessary for EDI transactions. From a supplier's point of view, it's easier to handle requests for 012345-678905 (this particular number is the "John Doe" of the UPC business) than for "ladies' red jeans, 34L" -- especially if one store asks for "women's jeans, 34 long" and another for "LD JNS, 34L." Customers can write software (or have QRS do it for them) that will merge their orders with the UPC codes and generate EDI transactions.

The longer-term advantage for the retailer is to avoid the wasted time and labor of remarking the goods in the store: It can use the vendors' electronically readable UPC tags to manage its own inventory, both when the goods are received, when they are (as frequently happens) repriced, and when they are sold. In the past, most retailers managed inventory statistically, by category; now they can manage by individual item. Moreover, the electronic tags keep store clerks from making mistakes in identifying or pricing goods -- or from repricing items they "sell" to friends.

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TRIAD SYSTEMS: PRECIOUS PRICES

When we first ran into Triad Systems it was a hot stock, with an IPO brought to market by L.F. Rothschild and Hambrecht & Quist in 1979. The play was vertical markets: The company sold proprietary soup-to-nuts turnkey systems to auto-parts jobbers, selling mostly direct but supported by alliances with trade associations and wholesale groups. Along the way Triad decided to diversify, selling similar systems to hardware stores and dentists. (The hardware move worked out, but dentistry turned out to be too distant a business.) It also moved from tony Sunnyvale to cost-effective Livermore, and from its own proprietary systems to standard hardware running UNIX and DOS. Now the company has found its footing again and is investing heavily in the information business that helps to differentiate it from its competitors.

Triad's biggest asset now is not its software, in a market where accounting packages and even inventory-management systems are commodities, but its continually updated electronic auto parts catalogue, a database of 2 million hardware and similar items. That catalogue and other databases generated about $18 million -- and the highest profit margins -- of Triad's $152 million revenues in the year ended September 30.

Of course, it's hard to separate Triad's data business from its more mundane activities selling systems to its customers, but the data both leverages that basic business and provides it an edge in winning the basic business. More than 3000 of its 11,300 customers subscribe to one or more of the databases. They include three significant new customers signed in the last four months: K mart, Goodyear and Sears (for their car-service operations).

In addition, some of Triad's auto-parts jobber customers resell the information (with fees to Triad) to their retailer customers in turn. Overall, Triad delivers its data through 23,000 "counter positions," or POS terminals. In addition, a couple of auto-parts and hardware vendors buy the data for competitive analysis, and an increasing number of third parties such as insurance adjusters are showing interest.

A content market takes form

Triad's main customers are jobbers, who comprise an intermediate level in the distribution chain: They buy from vendors or wholesalers, and resell to individuals, retailers, repair shops, service outlets and professional users of parts and hardware. It has more than 50 percent of the auto-parts market. It is continuing to expand through a complicated distribution web that includes industry associations and cooperatives that frequently influence members' purchases, large warehouses that can use its new MicroChannel/370 product, auto dealers and repair shops, retail chains and the like.

But Triad also serves the manufacturers, who pay a one-time fee for inclusion in Triad's database (to cover data preparation costs) and who must be satisfied to continue the relationship.

With this vendor-supplied information, Triad's basic information service is Telepricing, or automatic price updating, which costs about 2900 customers an initial license fee (usually built into the system purchase) plus $53 to $275 per month. The users find out about price changes when they happen, so that they can immediately reprice their inventory (usually upwards), avoiding mispricing or delays. And they can take advantage of specials.

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The Telepricing service is linked to Triad's CD ROM Electronic Catalog, which includes Triad's own value-added in the form of approximately 9.6 million "parts applications" -- i.e., repair or tune-up tasks. The applications can determine which parts to use for any given repair job or other activity for a particular make and year of car; thus, a customer can assemble the required parts for, say, a tune-up of a 1992 Miata, price them properly and manage inventories accordingly. Additional modules suggest add-ons for the jobber to suggest to the customer. This database also goes for an initial fee plus $200 per month, with periodic updates (but the realtime access of Telepricing is extra).

Triad has also just launched ServiceCat, which combines parts and prices with estimated time and type of labor required for repairs. (The user plugs in his own wage scale.) This is useful not only to the jobbers and a new to Triad market of about 250,000 repair shops, but also to car insurance adjusters, fleet-owners and others. Triad buys this information from Mitchell International, a San Diego publishing firm owned by Thomson International that produces labor catalogues on paper. As it happens, Mitchell likes Triad's electronic product so much that it is now reselling the electronic version to its own customers.
What happens when the largest US long-distance carrier joins forces with the largest cellular carrier? They form the first major vertically and geographically integrated entity in the US telecommunications industry since Divestiture in 1984. Together, AT&T and McCaw will provide services and products from soup to nuts (assuming the $3.73-million deal goes through):

- long distance, including advanced network services such as Enhanced Fax and the EasyReach 700 number we use;
- wireless local service through cellular and emerging personal communications services (PCS), to compete directly with wireline services;
- equipment from switches and PBXes to modern hand-held devices (EO's personal communicators);
- microcircuits (AT&T Microelectronics, which owns the Hobbit RISC chip, flash memories, DSPs and other vital internals);
- a mature messaging system (EasyLink, which runs AT&T Mail and has good third-party e-mail support from Microsoft et al.); and
- forthcoming data-over-wireless services (the CDPD initiative, described in Release 1.0, 10-92).

The diagram across illustrates the key initiatives of AT&T and McCaw, and provides an idea of what might happen as they combine forces. Each regional Bell operating company (RBOC) can't collaborate with its own unregulated sides as much as AT&T and McCaw will now be able to, and the RBOCs' incentives to collaborate among themselves are limited, too. Yet vertical integration and geographic coverage are critical requirements for delivering a rationalized, transparent communications web.

Vertical Integration

An example illustrates the challenge. Take voice mail: It can be provided anywhere across the spectrum of devices and services — on the network cloud as a service for a monthly fee, in customer premises equipment (the company voice mail system), in the hall-closet server, on the desktop (answering machines, voice-annotated documents and E-mail) or in a handheld unit (you dictate, it forwards the message). By controlling the whole product line, AT&T/McCaw can ensure that the various components work compatibly, and that the billing and marketing converge into an affordable, coherent package. AT&T and McCaw might agree on a voice mail architecture that emphasizes store-and-forward messaging from handheld personal devices, plus network-based message control. The user interfaces for both would be identical, and a user would never know where the function is actually being performed. (We will explore this further in Release 1.0 next month.)

Ultimately (and hypothetically), cellular phones and personal communicators manufactured by AT&T using AT&T chip-level components might be sold through AT&T Phone Centers and other outlets bundled with CellularOne accounts that feature data-over-cellular service (using CDPD) and advanced network ser-
vices like automated call forwarding. The whole bundle would appear on your AT&T Universal card, which would keep track of your discount calling plans (and your frequent-flyer miles?).

**AT&T + McCaw: A Sampling of Offerings and Alliances**

- **AT&T**
- **McCaw**
- **CellularOne**
- **Rogers Cantel**
- **Southwestern Bell Mobile**
- **Other cellular carriers**
- **IBM**
- **Oracle Data Publishing**
- **Data Freight**
- **On-demand cable venture**
- **US West**
- **Call Interactive**
- **AmEx**
- **GTE**
- **AGCS**
- **NCR**
- **EO**
- **Safari Systems**
- **Marubeni**
- **Panasonic**
- **Matsushita**
- **GO (PenPoint)**
- **Hughes**
- **MTel**
- **American Mobile Satellite Corp. (AMSC)**
- **PacTel**

* Don't forget:
- Bell Labs
- Consumer Products
- Network Services
- Long Distance
- Microelectronics
- EasyLink (AT&T Mail)
- Universal Card
- AT&T Phone Centers

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Geographic coverage

The RBOCs have moved abroad with a vengeance and are now helping to (re-) build the world’s communications infrastructure, frequently with faster-to-install cellular services servicing the upscale portions of downscale countries. By contrast, McCaw has stayed close to home -- but a fairly large home! Through acquisitions (including Lin Broadcasting) and collaboration with Southwestern Bell Mobile, PacTel and Rogers Cantel of Canada, McCaw is well on its way to developing a seamless US network under the name Cellular-One, which will now be marketed under the AT&T brand name.

AT&T has been working hard to sell overseas, but still has a way to go; its NCR subsidiary understands international operations better than AT&T itself does. As we mentioned, McCaw has kept a domestic focus. This new move may lead AT&T/McCaw into cellular ventures abroad.

To provide services that work as smoothly as the ones we have hypothesized, the RBOCs, the Independents, and MCI and US Sprint will have to build alliances that go far beyond agreements to serve peripatetic users without making them register or imposing roaming charges.

An egoless communications company?

It appears that AT&T and McCaw are prepared for the challenge of reinventing the business of communications -- from network services down to handheld devices, from the living room to the office, from Prague to Peoria (though it may be a while before Prague gets the same services as Peoria). The only way that a putatively unified company will be able to execute such a vision is if each business unit refrains from trying to get all the visibility or provide all the functionality. If each unit focuses on what it does best, with strong coordination across all units, the alliance could be unbeatable. The key to success will be getting the unit managers (and senior people) to keep their egos out of the fray. McCaw vp technology development Rob Mechaley, for one (and all), is already thinking of how to make this happen.

The egolessness is likely to take place inside the alliance, and only selectively outside: By allying with McCaw, AT&T will alienate other cellular carriers (to whom it sells equipment) and the regional Bell companies. Since Divestiture, AT&T has simply steered clear of them, but it must now compete with them. However, the opportunities opened by the McCaw deal are far greater than the prospects in the highly competitive and often unprofitable businesses it may give up, such as switching gear and PBXes. But AT&T and McCaw must remain open to collaborating with other companies, too. No one company, however huge, can do it all.

In Craig McCaw, AT&T gets one of the leading visionaries of a future teeming with untethered, low-cost communication and service platforms, ranging from pocket phones to personal electronic gadgets. Combined with Bell Labs (which invented cellular) and AT&T’s financial resources (which help neutralize the almost $5 billion of debt McCaw generated to fund its expansion), McCaw may be able to bring his vision to market far sooner than he could have otherwise. Alone, McCaw faced constant trade-offs: Should he invest in more capacity in metropolitan areas, in broader geographic coverage (including overseas), in new digital technology or in wireless data? Each represents a lucrative market. Now he can go after them all.

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Joe Liemandt, Trilogy Development, (512) 794-3822 x110; fax, (512) 794-8900

COMING SOON

- Simulation for education.
- Pen stuff.
- Performance support.
- Synchronization and reconciliation.
- Constraint-based reasoning.
- Unified messaging (in two parts).
- And much more... (If you know of any good examples of the categories listed above, please let us know.)

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**HAPPY HOLIDAYS!**

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<td>January 12-14</td>
<td>NetWorld 93 Boston - Boston. Sponsored by Bruno Blenheim. Call Annie Scully, (201) 346-1400 or (800) 829-3976; fax, (201) 346-1532.</td>
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<td>February 1-4</td>
<td>Object World - Boston. Sponsored by Boston University's Corporate Education Center. Call Susan Granata, (508) 879-6700 or (800) 225-4698; fax, (508) 872-8237.</td>
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<td>February 3-5</td>
<td>Infobase 1993 - Salt Lake City. All the world's an Infobase. For Folio users. Call Mike Judson, (801) 375-3700.</td>
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<td>February 21-24</td>
<td>**EDventure Holdings PC (Platforms for Computing) Forum - Phoenix (not Tucson). &quot;Content is key.&quot; Sponsored by us: You read the newsletter; now come meet the players and check out some of the services described in this issue. The usual suspects, plus speakers Dick Brass, Tom Ray, Jeff Hawkins, Vern Raburn... Call Daphne Kis, (212) 758-3434; fax, (212) 832-1720; MCI 511-3763.</td>
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<td>Inside the yellow pages '93 - Boston. Sponsored by Communications Trends/SIMBA. Call Elaine Rosa, (203) 358-9900.</td>
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<td>March 24-31</td>
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*Please let us know about events we should include.*  — Denise DuBois
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