ELECTRONIC COMMERCE
by Jerry Michalski

Ordering flowers for a convalescing aunt is clearly different from ordering spare parts for an F-14 fighter or a weekly supply of soap from a grocery wholesaler. These transactions are in turn different from negotiating a contract for professional services -- or paying a few cents for the right to read a report online. These transactions range widely in complexity and value; they involve different kinds of relationships, understandings and expectations.

Many high-volume transaction relationships between businesses are now automated through Electronic Data Interchange (EDI; see Release 1.0, 11-92), principally between companies and their suppliers. Yet EDI has had trouble moving beyond industries with dominant buyers who could force compliance (e.g., automobiles, apparel retailers and the military) and relatively low-margin industries where cooperation among vendors has significantly increased efficiencies without eliminating the basis for competition (e.g., groceries and transportation).

On the consumer side, faxes, call centers and voice-response systems have enabled companies to create automated (sometimes only semi-automated) transaction services. Vendors such as Edify offer tools for such services (despite the "Edi," Edify isn't an EDI vendor; see Release 1.0, 2-92 and 1-93). Millions of people fax credit-card information or read it to others over the phone, which they consider a secure system.

What's going on now is not merely an attempt to make existing transactions somewhat easier to execute, but rather a movement toward major improvements in business efficiency, potentially large new markets and permanent changes in the relationships between buyers and sellers.

Disjointed systems

Although companies have automated many types of transactions, their solutions are mostly point solutions to specific markets or opportunities. Some schemes are awkward and require purchasers to use several media (to go "out of band," in telecom parlance). For example, to order a pay-per-view movie or the Ronco pasta machine that we see on TV (1), we pick up the phone (2). If we order a physical good, it may arrive via UPS (3). Some time later, we get -->

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and pay our credit-card or cable TV bill in the mail (4). That's three or four communication systems and multiple interactions for one transaction.

The same goes for the Internet, where it's not advisable to send sensitive credit-card information in the clear and where there's no standard form of encryption to make that activity safer. Most commerce on the Internet today is done the way Home Shopping Network does business: Buyers call an 800 number displayed on the Web page and place orders over the phone. Some shopping services have buyers register ahead of time -- again, through another medium. They can then make purchases with a password, with items sent to a pre-arranged address.

Increased integration is clearly desirable. One goal of forthcoming interactive-TV systems is to make the purchase process as easy as pressing the "select" button on a remote control, a service available to few cable households today.

Requisite variety

This issue of Release 1.0 describes various aspects of electronic commerce and lists many of the more promising efforts. Then, it explores in more depth the dynamics of EDI and electronic commerce, and one vendor: First Virtual Holdings, a startup that is taking advantage of the strange physics of information. Our goal is to draw useful distinctions between various schemes, to highlight their special contributions and to explore how they relate to each other.

The many efforts underway to grease the rails of electronic commerce range from simple to ambitious (and occasionally from trivial to absurd). Because there is a lot at stake, there is plenty of jockeying for position going on and a larger-than-average amount of hype. Although many of the contenders claim to have a universal solution, it is hard to envision one that could encompass the entire range of potential interactions. Just as there are many kinds of financial instruments in use today that vary in liquidity, risk and usage, there is room for several digital money systems optimized for transactions in different market domains.

But there isn't room for many. Critical mass is vital for broadly used payment systems, but several systems that serve relatively different market niches will likely survive competition and become viable. Think of it as an ecology of systems that support commerce, with its own food chains. Systems may nest within or complement each other. One may be used to purchase units of another or pass data along to a third party. A person might use digital currency A to pay for microtransactions accumulated with metering system B, or buy anonymous currency C with currency A, which is linked to her credit card. Interoperability of this kind will probably help guarantee any one system's longevity. It supports fungibility.

Commerce, not just transactions

Commerce involves much more than merely paying for things; this issue of Release 1.0 focuses on the transactions in the context of a larger process. Buyers must find sellers, then they must present, configure and negotiate. Order capture, entry and transmittal may be the easiest parts of the process. The sale must be consummated and often there's after-sale service and
support. Some interactions require more emphasis on early parts of this value chain, such as negotiation and configuration (planning the itinerary for a trip); others involve little up-front effort and require speedy and accurate fulfillment (the inventory system indicates we're low on soap; it orders soap). We explore the value-chain perspective in more detail on page 12, where we refer to it as the scope of operations.

The three market tiers (Athos, Porthos and Aramis?)

To illustrate the role of automation and standards in electronic commerce, picture three tiers of commerce. The top and bottom tiers have resisted automation. Commercial interactions in the topmost tier are complex, typically high-value -- and tough to automate. They often involve specific, one-time services or events, and custom contracts or honor-bound handshakes (e.g., potential acquisitions of Apple or Borland, set designs for a Broadway musical and engineers shopping for ASICs). They are hard to represent in catalogs and standard order-entry forms, although Trilogy is working on it (see Release 1.0, 10-91, 2-92).

In the bottom tier, transactions are simple but so low in value that they are uneconomical to account and bill for with traditional payment systems. At fractions of a penny per page, song or frame, these are often called microtransactions, and they are a lucrative potential market if enough people will participate.

The middle tier

Between the top and bottom are the vast majority of automated (and currently automatable) transactions. These include various systems mentioned above, such as voice-response, call centers and paper order processing. They include retail, business-to-business relationships and the fuzzy zone in between, which we'll call quasi-retail (e.g., when the blanket purchasing agreement with Office Club replaces the purchasing department and stockroom, and departments place their own phone orders from catalogs). The increased availability of compelling, low-cost front-ends drives the automation in this tier. Sybase's Bob Epstein described this concept as the Extended Enterprise at the 1994 PC Forum (see Release 1.0, 3-94). Digital cash systems will accelerate the process.

The EDI world has codified some of the transactions in the middle tier, forming a discrete segment focused on pre-arranged, business-to-business transactions in certain industries. Usually EDI involves secure computer-to-computer links that tie one corporation's inventory system to another's order-entry system, or the transportation department to the consignee's loading dock. With the patience and commitment of Talmudic scholars, the EDI community has done great work getting companies to agree on many specifics, such as terms of sale and currency exchange. As EDI working groups map more territory by defining more standards, they absorb transactions into the larger middle tier.

The middle tier applies constant upward and downward pressure, shifting the boundaries over time. As the EDI community adds flexibility and complexity to its standards, it nibbles at the top tier. EDI's inherent costs are high enough that it is not likely to encroach on the microtransactions tier (more on EDI in a moment). Other electronic-commerce systems also tackle the top-
most, custom transactions. For example, engineers can test-drive DEC's Alpha machines on the Internet. Soon they may be able to evaluate ASICs and submit their requirements as design files.

The bottom tier

Similarly, as innovators drive costs out of the infrastructure and find novel ways of accounting for resource consumption, they force the bottom-tier threshold lower. For example, if all retailers had full-time, low-cost net connections and many people used digital cash, it would reduce some costs from the credit-card validation process and shift others to the merchants, who would pay for the net connections. If many PCs had software meters onboard (see Wave Systems, page 7) and easy net connections, it would be possible to pay for fonts or clip art on a per-design basis.

The microtransactions at the bottom of this structure are separated from the tier above by transaction overhead, which until now exceeds the value of the items to purchase. At the lowest level are per-page or per-minute accrual bins that should enable us to collect small amounts from large numbers of people for certain items, such as charging readers by the page or viewers by the frame (please deposit 25 cents for the next two pages).

The closest thing to a microtransaction system in broad use today is the phone billing system, which is optimized to process high volumes of specific, small transactions. However, much of the code in those systems is hard-wired to process call records from switches and is difficult to customize. Another option is Wave Systems' technology, which requires a chip be present to meter resource usage.

The goal is not to automate all transactions, but to use automation strategically and appropriately. The success of call centers and 800 numbers has shown that it's pretty easy (and getting easier) to bring a person into the transaction. Labor costs are typically higher than automated voice-response systems, but if you factor in the life-cycle costs of some commercial relationships, people may in fact be more effective. For example, people can ensure that buyers get what they need and remain loyal. L.L. Bean hasn't moved its order-entry system to voice-response because it believes the personal touch is an essential part of the experience they offer. Companies that want to keep people in the loop focus on performance support systems (see Release 1.0, 2-93) and on processing efficiencies.

What's so special about the Internet?

Despite its immaturity for moving money, the Internet is the most important locus of activity in electronic commerce. The Internet has already changed the distribution and marketing of information and some services; now it is about to change commerce. The transaction systems that succeed on the Internet will have pervasive, long-term effects on commerce, and ultimately on tax systems and national economies.

The Internet has won -- at least for the time being. Most of the major online services will soon use the Internet for connectivity, including the Microsoft Network, which just struck a deal with access supplier UUNet. America Online's Macintosh client software already works over the Internet; Prodigy has a new Web browser and a prototype service on the Web called
Astranet. By this spring, there should also be several kinds of Internet money in use, including CyberCash, First Virtual Holdings and Netscape.

The Internet's non-commercial charter (as ARPANET) caused its designers to look for efficient ways to move bits around, not for ways to account and bill -- for every bit that changes hands, as happened in the explicitly commercial EDI and X.400 messaging worlds. On the Internet, most information exchanges have an I'll-carry-yours-if-you'll-carry-mine nature: Two servers connect, exchange messages or news files, and assume that their traffic will net out. Many just retransmit messages as part of a virtual, international bucket brigade, or become access providers to others downstream. Each site is responsible for its own equipment and for connecting itself to its access provider. In addition, the goal of nuclear survivability led to a radically decentralized system architecture. No single vendor or site has control over the Internet (see Release 1.0, 1-94 and 2-94 for more on the Internet).

The resulting system shows many surprising traits. It offers easy, flat-rate, wide-area connectivity with relatively low cost structures. It doesn't cost any more to link to Austin than to the server in the next city. It is organic and self-organizing -- but not easy to see. Although it is less reliable than other data networks, the Internet has a wider variety of useful protocols to build applications on than the phone, value-added network and cable-TV systems combined. The Internet is the first real distributed applications platform.

Now, with the advent of widely available cryptography to secure transactions, the Internet is preparing for commerce. Although cryptography is not essential to exchange value for products electronically as long as you can go out to the banking system (see First Virtual Holdings, page 23), it is essential for a unified electronic-commerce system. Easy and low-cost communications on the net, enhanced with secure systems, will change the economics and dynamics of business.
THE QUICK TOUR: A SUMMARY OF APPROACHES

Electronic-commerce efforts range from simple to complex, low transaction value to high, transaction services to complete commercial environments. A few target interesting niches; many aim to suit almost everyone. Here is a summary of the initiatives we know (for pointers to these companies' online presences, see Resources, page 27). Interestingly, several of them are designed to manage payment for the kind of intellectual property that we stated last month might be offered free as an inducement for other service- or performance-related payments. Many high-value items will, of course, still be metered (see Release 1.0, 12-94).

Welcome to net/digi/e/cyber/cash/bill/check/bank/site

NetBank has offered e-mail-based pocket change for the Internet since May, 1994. Founded over a year ago by Bob Houston, president of Maryland-based Software Agents, NetBank offers people and companies a low-cost way to buy and sell low-priced items. NetBank collects fees only when money enters and exits the system. As long as people keep NetBank's NetCash circulating, it's like cash. If Zoe pays Phil in NetCash, Phil can use it to pay Alice, without incurring a fee.

To get real money out of the system, open a merchant account and deposit NetCash coupons in it; merchants may specify how often or at what threshold value they wish to be paid. NetBank charges a two percent fee when it converts NetCash to US dollars, subject to minimum charges of $1 for check cashing (people buying NetCash) and $4 for merchant payments. NetBank does not yet support foreign currencies, but plans to.

A NetCash coupon looks like a line of text in an e-mail message. For example, the line "NetCash US$ 10.00 E123456789012W" represents ten US dollars of NetCash. When NetCash changes hands, the recipient sends an "accept" transaction to NetBank's server, which returns the coupon with a new ID number. The old one is then void, which prevents its being spent again. An e-mail merchant catalog is available to anyone who requests it. To pay for items with NetCash, buyers must send exact change to the seller (the NetBank server makes change). The NetBank system is simple enough that a merchant can create a virtual vending machine with a few pages of Perl script.

NetCash holders are responsible for securing the IDs. Whoever submits a particular ID first gets its value. NetBank does support PGP encryption to secure transactions. There is no maximum denomination for NetCash, but NetBank does specify that items for sale not exceed $100. NetCash initially had only denominations that match US currency, but that proved cumbersome. Since October, 1994, the system supports arbitrary amounts. NetBank is also working with MIME to improve the e-mail interface.

First Virtual Holdings has already launched a system that makes clever use of information physics. When an information merchant fulfills an order, it doesn't deplete its inventory, so First Virtual has them deliver the information immediately. Buyers get instant gratification; later, they must confirm their purchases and may decline to pay. First Virtual monitors purchase patterns and closes abusers' accounts. The system is easy to enroll in, easy to use, doesn't require encryption and attaches to the credit-card system, through the First USA bank. First Virtual's system is explicitly
not intended for the sale of hard goods. It offers small merchants a way to make money, even if they don't qualify for a Visa merchant account (more details, page 23).

CyberCash, a friend of the banking system, has two efforts underway: an authorized merchant service and a peer-to-peer service (the latter is portable electronic cash you can pass to a friend). The first system uses special client and server software developed by CyberCash to put a "pay" button on the screen of an online service or Web browser. A prospective buyer needs to download that software and establish an account prior to the initial purchase with CyberCash.

When a buyer presses the button, it calls up a purchase form, into which the buyer enters her CyberCash account information. The merchant passes that information, encrypted along with purchase details, to CyberCash, which presents the information to the buyer right away for approval with a digital signature. When the transaction is complete, CyberCash sends it to a bank as if it were a traditional credit transaction. It charges the consumer a transaction fee roughly equal to the cost of a postage stamp. CyberCash expects to have a pilot version of the merchant system running by April and eventually plans to support debit cards. Its first partner is Wells Fargo Bank, but CyberCash plans to offer its services to many banks.

The peer-to-peer system uses blind signature technology licensed from DigiCash to allow any CyberCash account holder to pass "cash" to another account holder unilaterally and without intervention from a server. The digital cash is first certified as authentic by a bank. Bill Melton, founder of VeriFone, and Dan Lynch of Interop fame co-founded CyberCash in 1994. The Merchant system seeks to do for the Internet what VeriFone did for credit-card transactions over point-of-sale terminal devices.

Hardware-aided systems

With chipmaker VLSI, Wave Systems is developing secure ASICs to act as consumption meters in PCs and PC peripherals, turning them into software vending machines. For sellers, it's a way to protect intellectual property. It also allows buyers to store large amounts of information locally, fonts on a CD-ROM, for example, yet pay only for what they consume. The system isn't limited to CD-ROMs and can deal with broadcast and network-distributed information as well. It could become a great way to protect and sell distributed network software objects.

Wave's system competes with software unlocking schemes, which require buyers to call for codes that unlock the software they wish to get from a demo CD-ROM. These systems require people to enter many numbers, which makes them cumbersome, especially for relatively small purchases. To load a Wave system with some purchasing power, a user must dial into Wave's server with a modem and an account to charge. The first such even requires two minutes of account setup; after that, the transaction is similar to an ATM withdrawal. (In principle, one could load anonymous digital cash onto the meter.)

The first major hurdle Wave must clear is getting the meters out. As an enticement to build the chips directly into PCs before they ship, Wave offers PC vendors a royalty stream from subsequent transactions. Peter Sprague founded the company as Cryptologics in 1988; he described the compa-
ny at the 1994 PC Forum (see Release 1.0, 3-94). Wave's recent IPO netted roughly $13 million.

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Merchants will go out of their way to collect funds, if there's enough money to collect. The number of steps it takes is less important than how much it costs to perform. For end-users, however, minimal effort is essential. The likelihood that a buyer will use a system decreases exponentially with each added mouse click or key tap.

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AT&T recently unveiled a Wave-like technology suite of chips and software called the Information Vending Encryption Systems (IVES). The suite of tools is designed to secure video-on-demand, home shopping and banking, and software distribution.

Mondex, a joint venture between National Westminster Bank and Midland Bank, expects to pilot a smart-card-based system in the UK this year. UK consultancy Hyperion developed the system, in collaboration with partner British Telecom and many suppliers. The system allows value to pass from one card to another account. It eliminates the need to verify every transaction with a central credit-approval system. Small readers and electronic wallets will tell people how much value their cards have at any given time.

DigiCash is the only initiative in this newsletter that has proposed a system with untraceable digital cash. Founder David Chaum, a longtime innovator in public-key cryptography (and major patent holder), feels strongly that there should be a way for people to protect themselves from inappropriate use of their personal information. His answer is "ecash," a system that uses blind digital signatures to certify that the digital payment units have value, without betraying their owner.

To oversimplify: An account holder submits a digitally signed withdrawal note to her bank with the note information scrambled. The bank verifies that its customer signed it, removes that signature and applies its own, which certifies that the resulting message now has transferable value. But the bank can't trace the note and does not know where it is spent because of the blind factors. DigiCash's technology operates on a minimal-need-to-know basis, with trusted virtual intermediaries that monitor and confirm steps along the way. In this way, value gets transferred and people get paid (verifiably), but nobody knows who did what to whom.

The ecash system can be implemented in software. In fact, one million dollars of ecash are in circulation now as part of DigiCash's first operational pilot project. That money is cleared by DigiCash's First Digital Bank. DigiCash is working on a large-scale system that relies on smart-card technology, which in turn requires an infrastructure of readers and portable electronic wallets, so people can know how much money they have on hand. Chaum holds several important cryptography patents.
Serving and services

Netscape Communications, formerly Mosaic Communications, recently struck a deal with MasterCard, which gives it a link to a major transaction system, expected to be operational by mid-year. Netscape is already working with First Data Corp., Bank of America and First Interstate. Netscape's browser has been licensed by many large companies, most notably MCI, which will use it as part of its internetMCI offering. Netscape has also made its client software easily available for free to non-commercial users, who can also pay $29 to register, which entitles them to support and upgrades. The company is trying to seed broad use of its protocols in order to grow the server market -- and set de facto standards.

Netscape's developers embedded encryption and validation in the Netsite Commerce Server software. Users who log in with Netscape's client software, or other clients that use the Secure Sockets Layer (SSL) protocol Netscape developed, can access the server's transaction functionality. Netscape licenses the technology openly, and has proposed it to the World Wide Web Organization as a standard. If users try to do transactions with non-compliant browsers, the system warns them that their transactions may not be secure. Netscape developed the SSL protocol using RSA encryption; the protocol authenticates the server as well as encrypting transmissions. Enterprise Integration Technologies (EIT) has developed a secure Web protocol that uses RSA encryption called S-HTTP (Secure HyperText Transfer Protocol), which several major developers support. The two protocols are not compatible, though they could be used together.

Open Market's goal is to help companies set up and manage "storefronts" on the World Wide Web as automatically as possible -- on Open Market's electronic mall or in environments of their own. Open Market's StoreBuilder kit, currently available only on the Internet, leads merchants elegantly through the steps of creating an electronic storefront on the Internet. It includes layouts for catalogs of items for sale, advertising pages and indices. StoreBuilder is a bit like paint-by-numbers, but it is effective in its completeness and allows companies to create custom experiences more quickly. StoreBuilder will eventually be available as a shrinkwrapped package for companies that have no Internet access at all.

Companies that want to create their own electronic commerce infrastructures will be able to use Open Market's servers in various configurations, ranging from a core server (with basic management and reporting tools, as well as optional security and remote-payment capabilities); a more complex merchant server that incorporates the StoreBuilder for companies that want to deploy multiple storefronts; and, eventually, a payment switch to do online settlement and account management.

Open Market will support different payment models, including pay-per-page and subscriptions. It will also offer digital fingerprinting to cut down the unauthorized reproduction of copyrighted material. DEC and Tandem will

1 In 1994, EIT and RSA Data Security formed Terisa Systems, which has developed SecureWeb, a software toolkit that implements the Secure HTTP protocol.
resell Open Market's system. Open Market's customers include Ipswitch (a TCP/IP solutions provider) and Mead Data Central. Increasingly, Open Market is getting involved in reengineering projects to help companies take advantage of electronic distribution. One such project involves electronic banking services; another involved customized textbooks.

Shikhar Ghosh founded Open Market in 1994 with MIT professor David Gifford, who developed wide-area, agent-based search technology that Open Market has exclusive rights to now. Ghosh was a consultant at the Boston Consulting Group, then became CEO of Appex, which does inter-company payments that account for roaming cellular subscribers and is now part of EDS. The company is funded by private investors and Greylock Management.

NetMarket is developing business-to-business and retail catalog offerings over the Internet. Its very young staff is now linked to one of the largest, savviest marketing organizations: It was bought in November 1994 by CUC International (formerly Comp-U-Card International). CUC already has experience on almost all the major online services as Shopper's Advantage. NetMarket was the first company to run secure transactions on the Internet, which it did using ViaCrypt's PGP encryption technology. NetMarket plans to offer many back-end services, including state-of-the-art digital production facilities, redundant Internet connections, distributed server hardware and secure facilities, all leveraging CUC's assets of vendor relationships and price guarantees.

Companies that create malls or markets online with servers such as Netscape's are sprouting everywhere. Here's a sample of cyber mall- and market-builders: Branch Information Services, Downtown Anywhere, Internet Business Center, Internet Distribution Services, Internet Shopping Network, Interse and On Ramp. To help their client companies establish presences, these companies consult on Web publishing; help companies collect, reformat and upload their product information; design their link structures and plan strategies for building links across the World Wide Web. Most of them organize their clients into markets within their own service.

Not many of these market builders have committed yet to support the digital cash systems listed here, although their interest is high and some are participating in pilot projects. Some of the ones using Netscape server software may follow that company's strategy; others may switch later on. EDI has attracted far less attention from the market builders than the prospect of digital cash. This is probably due in part to the cost and complexity associated with EDI, and to the nascent stage the industry is at. As transactions begin to occur with more regularity and volume, some of the benefits of integrated EDI systems will become more apparent. However, many aspects of the EDI business will need to change to accommodate the new dynamics of electronic commerce, which we describe in more detail below on page 20.

To wrap up the server survey, there are at least two university electronic-commerce projects of note. The NetBill project at Carnegie-Mellon University's Information Networking Institute is a transaction and authentication server that will work with NetBill-aware client software. The Information Sciences Institute of the University of Southern California is developing NetCheque, yet another electronic payment system for the Internet.
Commercial environments and infrastructures

CommerceNet is a non-profit consortium of mostly commercial organizations banded together to create an Internet-based infrastructure for electronic commerce. It began in Northern California as part of the Smart Valley initiative and has grown quickly. Funded by interested corporations with matching funds from the US government's Technology Reinvestment Project, CommerceNet is broadly scoped: It includes pilot programs in transaction security, payment services, electronic catalogs, Internet EDI, engineering data transfer and design-to-manufacturing integration. One of the primary sponsors and developers is Enterprise Integration Technologies (EIT); others include BBN BARRNet, Stanford University's Center for Information Technology and many businesses.

BroadVision, which made its debut at the 1994 PC Forum (see Release 1.0, 3-94), has fleshed out its plans: It is developing CORBA-compliant back-end support for consumer-oriented electronic commerce. Just as Metaphor workstations were designed around brand managers' analytic needs, BroadVision's system is tailored to marketers who want to apply to various electronic media the full range of tools they use in real life. Its offerings are designed to work with many kinds of narrow- and broadband networks, including cable TV, online services and the Internet.

BroadVision assumes that merchants and service providers that use its system will create their own front-end software. BroadVision offers those interactive applications an API that ties them to its sophisticated back-end system (which it calls its interactive commerce management system) and a Windows-based "dashboard," from which marketers can view and control what's going on. A brand manager might use BroadVision's dashboard software to monitor sales by category in response to a promotion, then change business rules in the system accordingly.

Merchants can try to engage prospective buyers with BroadVision's tools, which include ways for merchants to offer coupons, points banks or special currencies (e.g., frequent-flyer clubs), narrowcast advertising and quantity-purchase cards. BroadVision's system deals with information the way a marketer would. It keeps many descriptive variables on households and individual members. It tracks exposures and helps schedule ads. It also enforces access control in the household and helps family members store electronic receipts and coupons. In addition, it can offer individuals privacy from advertisers and offers a way for customers to trade their attention and behavioral details for some benefits.

Other tools BroadVision is developing include order management, a pricing engine and a variety of payment handlers. Like those of Open Market and other enterprises described here, BroadVision's system supports many different billing models and digital payment systems. The company is building a link to a major credit and debit clearing system. BroadVision's founder is Pehong Chen, who sold his previous startup, Gain Technology, to Sybase for over $100 million. Gain creates networked, multimedia authoring tools.

For four years, Electronic Publishing Resources (EPR), a low-key startup, has been working on a large-scale commerce platform it calls the Virtual Distribution Environment (VDE). The VDE is designed to work on PCs, set-top boxes and other devices, all of which would run EPR's Transaction Oper-
ating System, plus specific applications. Aside from an object-oriented, distributed architecture, EPR's principal draw is digital rights protection. The VDE is designed to protect cable TV operators from video piracy, content providers from rogue copying and game authors from cloners.

Victor Sheer, co-founder of Personal Library Software, founded EPR in 1990 and is its president. Erwin Lenowitz, formerly vp of business development at Sun Microsystems, is the vice-chairman and cfo. Their bet is that organizations with private networks and high-value content will need a powerful infrastructure to protect their intellectual property (IP). Even if much IP on the Internet is available for free, they feel that there will be many thriving for-pay IP markets, especially business-to-business market. Of course, EPR's technology applies to low-value content over public networks.

EPR has applied for several significant patents, including electronic content vending from a database, a secure (hardware) processing unit and a more fundamental process patent covering electronic commerce. EPR believes the latter patent is particularly significant; it expects to make some announcements about it in March.

EPR is developing a full set of tools, including content packaging, administration, distribution, control and financial management. The company expects to bring the system to market late this year and is in negotiation with major potential licensees.

Agorics is developing an infrastructure for highly distributed, market-oriented computer resource management, such as allocation of printer time or bandwidth, which could be used as a platform for electronic commerce. We first described the company in Release 1.0, 8-94, as a platform for multi-user virtual environments. Agorics' technology may fit well under some of the other initiatives described here. Among other things, Agorics' Joule language includes algorithms that allow for quick resolution of resource contention, as occurs when video, e-mail and voice data streams compete for limited router bandwidth.

Finally, Microsoft will likely be a player on many fronts, although it isn't being public with its efforts, beyond a recent agreement with Visa. One can easily imagine an NT-based transaction server, a payment system specific to The Microsoft Network, payment code built into Windows 95 and Bob, and software "wallets" for PDAs and future wearable gear. Some of those potential offerings may be among the initiatives described here.

SORTING THINGS OUT

The efforts described above take many different approaches to electronic commerce. Here are four dimensions to help distinguish such initiatives from each other. The question of risk -- who assumes what kind of risk at what time -- cuts broadly.

- The nature of the transaction the system is designed for. The obvious first cut is to identify the parties, the average amounts and the purchase patterns. Some systems target specific transactions, some seek breadth.

- The scope of its efforts. Within any market segment, a company can tackle a thin slice of the process or create an entire environment.
• What means of payment it uses -- and how it works. Most systems rely on existing transaction systems such as credit cards. Some use tokens or other proxies for value, effectively creating currencies of dubious liquidity and with interesting tax, risk and float implications.

• The system's approach to security/anonymity/identity/authentication/trust. Different pieces of the system may be open or closed to potentially prying eyes -- or even to the participants themselves. Encryption can help with authentication, non-repudiability and asset management.

1. The nature of the transaction

The answer to the question, "Who is selling what to whom?" describes both the relationships between buyers and sellers and the nature of the things purchased. It also leads naturally to the other items below, such as how the system might be implemented, what transaction system it will use and the role of privacy and authentication.

Repetitive, high-volume, business-to-business transactions are great candidates for EDI. Consumer relationships require different systems altogether, with an emphasis on ease of use and visual appeal. The middle ground is going through dramatic changes that we began to describe above. In essence, many transactions that used to be handled by purchasing departments are taking on retail characteristics.

As corporate offices downsize, decentralize and virtualize, inventories move. In the past, the purchasing department bought stocks of lined paper pads and ballpoint pens; now departments buy things when they need them. With corporate volume-discount deals, the local Staples, Office Club or Office Depot becomes the stockroom. FedEx saw this trend early and has set itself up to play the warehouse role. Many companies now store goods and parts in Memphis near the main FedEx hub and fulfill orders as late as 2 am.

Internet and private-network connectivity is accelerating this trend. IBM and Egghead Software are working to automate quasi-retail transactions. IBM's Electronic Market Services (EMS) group has piloted an electronic procurement service for office supplies and equipment. Called the Electronic Purchasing Service, it front-ends EDI systems with browsable, graphical interfaces that can go directly on authorized individuals' desktops, rather than stopping at the procurement department computer. The Electronic Purchasing Service transmits the orders to suppliers, handles shipment notifications and other messages. Suppliers provide the content for the multimedia catalogs; they can also use APIs to integrate their financial, accounting and logistics systems with EPS. The service will be available through VANs, including IBM's Global Network. The EMS group is headed by Carolyn Chin, who joined IBM a year ago after working at Citibank, Macy's and AT&T; she reports to Fernand Sarrat.

Egghead has taken heed of the corporate world's fondness for Lotus Notes, and has used Notes to create an online catalog and ordering system.

Information and services are different from hard goods, though they are often treated similarly. Software can be superdistributed, then metered or

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simply used. It can be available across the net for use on demand. It can be measured out and paid for in small amounts. First Virtual Holdings takes advantage of the differences and focuses specifically on information.

Services will be easier to run profitably when companies link a payment system to the subscription process common to Internet mailing lists. That’s what AT&T Interchange has done as part of its interface design, although it is intended for publications, not other kinds of services. To subscribe to an Interchange information provider’s publication, drag its icon to your inbox (you have to subscribe to the information provider first).

2. The scope of operations

The companies launching electronic-commerce initiatives take very different approaches to participating in the value chain. Some ventures choose to do well at narrow functions, such as CyberCash; others plan more expansively and create new platforms, currencies or environments, such as the DigiCash and CommerceNet initiatives.

There are many ways to participate. On the front end, companies can define complete retail interfaces: front-ends for commerce with virtual shopping baskets, aisles and product-test and -comparison tools. Some of the tools created for CD-ROM shopping are likely to be available for online services soon. Or companies can leave the interface design to others and supply some code that enables any interface to incorporate secure transactions (e.g., a "buy it" button and a password-entry dialog that goes with it that sends information to a particular transaction server or service).

Electronic storefronts and malls are sterile places. On the whole, except for cases in which someone knows what he wants and is looking for a good deal (in which case a comparison table seems to make more sense than a virtual display), commercial behavior on the Net is a by-product of successful social behavior. These malls and so on need to be a part of social spaces.

On the back-end, companies might run a server, run a service, build a mall or develop an entire environment for commerce. Servers can provide a gateway or switch to existing clearinghouses, banks or transaction systems. They can be standalone transaction systems or issue their own tokens or certificates. Servers can present, validate, authenticate or notarize. They can offer protection schemes for intellectual property such as metering and unique, traceable digital signatures. Metering systems monitor usage, accumulate charges and submit them when they cross a threshold.

Companies can also consult and do facilities management. Helping organizations create a presence on the Internet is a fast-growing business. Many of those entities would like to make money from that presence. The most ambitious initiatives are out to create parallel economic structures with radically different rules. We will revisit this question in a future issue of this newsletter.

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3. What's the currency, Kenneth?

We pay for things in many ways: with cash, credit cards, debit cards, food stamps, traveler's checks, electronic bill payments (prearranged and spontaneous), airline miles, money orders, cashier's checks, IOUs, letters and lines of credit and wire transfers, to name a few. Each conventional payment option presents tradeoffs between transaction speed, risk and cost.

Cash (the old paper kind) is immediate and almost risk-free (counterfeiting is rampant), but its transport and storage are expensive. Debit cards withdraw money directly from customers' accounts, but the direct account access increases risk, so their use is more constrained than credit cards. For example, card holders generally have to be present when they use their debit cards, as happens at gas stations or checkout counters. Wire transfers are more immediate than checks, but they cost more.

Checkfree, the market leader in consumer electronic bill payment, has links to demand-deposit accounts, credit cards, savings accounts and debit cards. The company has just received a US patent on the design of its system to pay bills electronically. It is unclear at this point whether and how the patent may affect the companies described in this issue.

These payment schemes have significantly different infrastructures. Some schemes give rise to support systems to mitigate risk, such as supermarket check-verification cards. Over time, electronic commerce offerings will likely mirror much of this variety and complexity. They will also create some complexity of their own.

Most electronic-commerce efforts use the credit card system. None yet make use of "near money" and trusted systems such as frequent-flyer miles, preferred customer schemes, barter arrangements and countertrade, but a few attempt to create their own local currencies in the form of tokens or vouchers for specific uses. Think of them as electronic Disney Dollars.

Creating a currency is much more complex than passing transactions through to a conventional clearing system. It raises nasty tax and float implications and questions of what happens if the system is compromised or if its guarantor fails. Instruments such as frequent-flyer miles have emerged as near-currencies, but they are not liquid (also, changes in terms have brought on lawsuits). Currencies and payment systems have a lot of inertia. New ones need to have many people agree to use them at once, or they are not useful.

An entirely new currency or payment system needs to offer real value. Anonymity might be one such benefit. Sometimes a system's technical merit or sophistication blind its developers to the fact that there is no market need for what it delivers, but until companies experiment with various systems it's hard to tell which are definite casualties. One thing is pretty certain: Credit cards will be the default players for the near term.

Trust and risk

Transferring value requires many kinds of trust. Almost every system requires that participants pre-register, usually through other media, such as over the phone. The person's credit-card account is proof of creditworthi-
ness. Encryption technology addresses many other trust issues, such as whether the transmission medium is trustworthy. Today, the issues of authorization and payment -- clearing and settlement -- are mixed together. Over time, innovators are likely to make the distinction clearer.

There are other risks. The currency might suddenly be worthless; you might be in a situation where you want to use the currency but nobody will accept it. If the system stores value in a smart card or special account, users may be exposed to risk as they hold static assets. If the system has lag times between product delivery and payments to merchants, as First Virtual Holdings' does, it exposes merchants to the risk that buyers don't pay -- or vice-versa that the vendor doesn't deliver. A proxy currency might be subject to discounting or arbitrage.

A useful approach to assessing risks (and looking for opportunities) is to examine transactions in slow motion and postulate failure at every possible juncture. Who is exposed to risk at each point? Does a particular transaction have to unfold the way it currently does, or can parts of it be skipped? Sometimes there are opportunities to redesign the process.

How payments happen

Intermediaries play a necessary role in most electronic-commerce systems; the number of parties and the sequence of events vary. Transactions may have to pass through a centralized server for validation, then through a gateway to the credit-card system for approval. It may take many steps to complete a single transaction. If the transaction has to happen while someone is waiting to buy something, the digital cash system is only useful when the buyer is somehow net-connected. This isn't always convenient. Sometimes people want to transfer value in other ways. For example, one aspect of the system CyberCash is developing will allow two people to transfer electronic funds offline, without the need for a server intermediary when they transact. They will still need one at settlement time.

Most electronic-commerce initiatives require special software; some require special hardware. The simplest systems require that participants use a specific client application or encryption scheme. Because it can be hard to detect when passwords are compromised, software authentication tends to be less reliable than systems based on smart cards or other hardware. Hardware cards are also the best way to assure that the person is actually present -- as long as people report stolen cards and don't give them to others. Nevertheless, hardware-based systems are harder to establish due to the magnitude of the effort to get broad access. ATMs, set-top boxes and other devices could well be upgraded to act as ubiquitous terminals where people could "charge up" their cards, but that diffusion will take considerable time.

4. Encryption, authentication, anonymity and more

Encryption technology, itself a massive topic, makes most of the efforts described here possible. It enables people to send sensitive information securely over otherwise unsecure networks. Encryption can be applied selectively: It can keep prying eyes from peeking at transaction messages (e.g., privacy-enhanced mail), communication sessions (secure server protocols) or people's identities (anonymity). It also has a multitude of
other uses. For example, encryption can ascertain that entities are who they claim to be (authentication) and prove that they sent a message or executed a transaction (digital signatures and non-repudiation). Finally, encryption can uniquely identify information assets so that they are traceable, including software-based cash (digital signatures again).

Most of these issues are relatively straightforward applications of encryption. The divisive and controversial issue is privacy, which arises mostly from some people's doubts about how organizations that collect information on individuals, such as the government, banks, credit-reporting and credit-card companies, might use or redistribute that information. Most electronic commerce schemes are linked to the major credit-card processing systems. When you use a credit card for purchases, you leave behind an amazingly complete record of your behavior.

Some people advocate disconnecting from the traditional system and creating anonymous economies; others advocate that people own information about themselves, which they may sell (the use of) to marketers as they see fit (see Release 1.0, 6-91).

Sometimes you need it, sometimes you don't

There is considerable debate about how many people really want total privacy and anonymity, and therefore about the potential demand for DigiCash-type systems. Certainly few people want to broadcast their purchases to the world, but there are many kinds of transactions in which anonymity isn't desirable. There are things you can't do or buy unless you identify yourself. Often, voluntary identification is useful. You want to have proof that you bought a vacuum cleaner so you can get warranted repairs made. Privacy and anonymity matter most in the retail market. Businesses generally disclose their identities to each other (except, of course, the Mafia and other clandestine businesses).

Of the systems that we describe here, neither NetBank nor First Virtual Holdings (see page 23) uses encryption as part of the user transaction. CyberCash uses encryption, but is linked directly to the credit-card system. Only DigiCash offers completely anonymous encrypted transactions.

Long run, these systems -- or systems similar in function -- can coexist. They overlap, but they address different product and feature markets. They also have interesting export and tax implications. Some encryption technologies can't be exported for now, which may limit international penetration of systems that depend on them. With anonymous systems, who will pay the tax on taxable items?

Types and degrees of anonymity

Counter-party anonymity means the parties to a transaction can't identify each other; issuer anonymity means the payment system can't identify where the payment goes. Each is useful in different settings. A blind intermediate step changes things, too. One can increase a system's anonymity by using it to buy blocks of a more anonymous system's currency. That's how these forthcoming systems might interlock in useful ways. Anonymity can hide one's identity, but an anonymous system can still have persistent identities. They just can't be connected with the individuals behind them.
Anonymity is easily compromised. You're not anonymous if your user ID can be captured as you visit a site, regardless what kind of digital cash you use. Web servers make a major selling point of their ability to track people. Commercial online services can also track people's behavior in detail. Who wouldn't like to know which pages in their product literature someone turned to, and how long they spent on each page? Customers aren't the only people who will browse those documents: Competitors will, too. With luck, several systems will emerge that allow people to define where on the spectrum of anonymity they care to live. People may choose different levels of anonymity for different activities.

STRUGGLES -- TECHNOLOGICAL AND POLITICAL

The recent surge in electronic commerce activity and interest highlights a series of important struggles. There's the natural competition between companies that want to charge a fee for providing some form of electronic commerce. There are fans of encryption and some people who like encryption too, but believe that it is not necessary, and that waiting for it forces an unnecessary delay. These factions generally misunderstand each other. Of course, those who use encryption debate over which kind, whether it should be in hardware or software, and which part of the interaction it should secure.

The competitive battles are intertwined with a more curious political struggle between cypherpunks, conservatives, libertarians and the Clinton administration. Unlike the good old days, when there was a polarization of political opinions around clear questions, now it's different to say exactly who stands where. The old two-dimensional landscape more closely resembles a Mobius strip, or maybe an n-dimensional space. These issues have created unexpected alliances -- or at least alignments.

True conservatives, libertarians and cryptoanarchists would all like to see minimal government involvement and thorough deregulation. Conservatives support encryption, but also the banking infrastructure. The cypherpunks and libertarians emphasize complete transactional privacy, so no corporation can trace individuals' purchases or activities. When that is possible, many of them plan to slip out of the conventional economy. The banks and the US government aren't crazy about that idea. The Government's Clipper key-escrow initiative is as much a defense against tax evasion as it is about wiretaps to sniff out terrorists. Meanwhile, banks and other financial institutions have jumped in aggressively to prevent the new kinds of transactions from migrating to other institutions, and to stop new currencies that they don't control from emerging at all.

Points of view and history

The technology struggles are exacerbated by the fact that most groups see the world through their field's lenses. EDI folks feel everything is an EDI transaction and it's already been done. Crypto people can come off as

2 Web tracking is subvertible, too. An early visitor to HotWired, Wired Magazine's home on the Web, created an account with both name and password of "cypherpunk." It's now the system's number one username.
believing that encryption is the answer to all things. Internet server-based transaction providers think they can cover most transactions. Smart-card fans believe everyone will have smart cards and card readers will proliferate everywhere, including ATMs and public phones (who will be the first vendor of a combined CD-ROM, floppy, PCMCIA and smart-card drive?). As always, some people are blinded by their solution's technical elegance and forget about practical benefits to people and businesses.

Finally, there's the tension between Internet commerce entrepreneurs and the EDI establishment. This struggle is not just about standards, but about the standards process itself, though this larger issue isn't the focus of much debate yet. We're witnessing the collision of the traditional way of creating standards through ANSI, ISO and other international bureaucracies, and a new way that is exemplified by the process that exists on the Internet.

The old way is: design, meet, define, redesign, debate, compromise, build, test, then deploy. Although many important standards have emerged this way, it takes a long time and the resulting definitions are usually left fuzzy so that competitors have room to differentiate their products. Many of the products and services they do develop don't interoperate, even though they meet the written specs. X.400 and ISDN are both victims of this process; the X API Association (XAPIA; see Release 1.0, 9-93) and Ver-sit (the recent Apple, IBM, AT&T, Siemens/Rolm alliance) are both positive responses to it.

The new way is: prototype, distribute, improve, distribute, propose, agree and improve. Along the way, companies begin to commercialize products that obey the standard and sometimes try their own twists. It leads to early results and early deaths for ideas that don't work. By the time a standard is actually proposed to a common body such as the Internet Engineering Task Force (IETF), it is already in wide use. One explanation for this dynamic may be the fact that IETF members participate of their own volition, not as company representatives.

Needless to say, these two cultures sometimes have trouble getting along.

There are strong parallels to this dynamic in the tension between SGML and HTML (see Release 1.0, 10-94) and others. It goes something like this: An upstart technology challenges a mature discipline from which it descends. The mature technology's proponents see all the work they've done over many years, feel that they already invented the stuff and that the newcomer will have to reinvent it all. The newcomer, which often represents some important insight, sees the older party as fossilized and immobile and ignores the often rich assets the other has created. Each has something to offer the other, but sometimes that exchange of information doesn't happen for a decade. The same thing happened between mainframe and micro-based computing. It took a decade before client/server systems hit the big time and people (re)discovered mirrored systems, fault tolerance, system management and disaster recovery.

The key to getting past these tensions is to find people who are comfortable and competent in both worlds and open to collaborating. Luckily, many such people are out there.
EDI, PREMENOS AND THE INTERNET

The swift rise of electronic commerce on the Internet has brought the EDI world to an important juncture. Internet-based commerce seems certain to grow, though probably not as explosively as some would like. The question is whether its growth will come at EDI’s expense, or whether it will help EDI grow, as well. One determinant is how critical EDI’s assets are to electronic commerce in general; others are cost, flexibility and attitude. The traditional EDI business will stagnate unless its players make some changes quickly.

Over the past decade, EDI has had considerable international success. Along the way, by hammering out standards, the EDI community developed assets such as uniform definitions for transaction elements across broad domains. These definitions delve into the complexities of real-world problems: They define terms of sale, trading partner agreements, currency and payment issues, and other things that arise when transactions stray from the simple floral purchase. Third-party vendors have built businesses around mapping EDI to specific companies’ forms and applications (see TSI, Release 1.0, 11-92). There is also a growing body of law around EDI. All of these things are important underpinnings for commerce.

In the consumer realm, sellers usually dictate terms of sale and they constantly deal with buyers they’ve never met before. EDI’s structure doesn’t make it very useful for consumer transactions. In fact, EDI doesn’t address promotion, selection, configuration and order-taking at all. However, the trend toward quasi-retail transactions described above opens an opportunity to stretch EDI out of the purchasing department and onto other workers’ screens. Besides being a way to automate purchase cycles for non-critical goods, IBM’s Electronic Purchasing Service (page 13) is an attempt to give EDI a user interface, although still with pre-qualified organizations and over private networks.

What is happening instead is that companies are bypassing EDI, which is daunting to many. EDI standards are complex and even the documentation is expensive. Many companies don’t want to bother to convert their transactions into EDI formats or semantics. Why should merchants adopt EDI when many of the initiatives described in this newsletter should allow them to present their own information to buyers, configure products, negotiate transactions, take orders, run payments through the well-known credit-card system and deposit the resulting money without it?

EDI isn’t appropriate for all transactions. Today it is for predefined business-to-business transactions, sent in batches from one computer to another. Parties know each other in advance; they sign contracts that make their future electronic transactions valid. EDI is also batch-oriented and therefore unforgiving: Transactions must be semantically perfect or they won’t go through (some translation software permits fudging, although it violates the standards by doing so). Buyers and sellers lose the flexibility of human participation at either end. Precision clearly matters, but in the EDI world, it comes at the cost of flexibility. Perhaps it is time for someone to formulate an Interactive EDI standard.

Nevertheless, the EDI community has charted much of the territory of electronic commerce. It could help solve problems that other initiatives will discover soon, because it has faced many of them already.

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Getting past the barriers

There are still many barriers to that kind of cooperation between EDI and other electronic-commerce efforts. People are working to correct issues of cost, complexity and use, but there's still a need for an attitudinal change: Newcomers need to pay attention to what EDI can offer, and the EDI world needs to stop thinking that it invented the only proper method.

Less expensive EDI software is available, and transport costs are falling. Value-added networks (VANs) now face competition from the Internet, which a few companies have begun to use as an EDI message transport. To reduce the cost of getting EDI standards documents, people are starting to publish them on the Internet for everyone's access and benefit. To allow for more random interactions, the ISO and the IEC (the International Electrical Committee, which predates ISO) recently formed a joint technical committee called Open-edi to create EDI specifications that allow for trade with unknown participants. The Open-edi group has other goals, as well.

Finally, to overcome the fact that EDI standards don't allow for bundling of messages into a complete transaction, the Internet Engineering Task Force's EDI working group is using MIME (the Multipurpose Internet Messaging Extensions; see Release 1.0, 2-94), to allow multiple messages, with attachments, to travel together as a unit.

Premenos gets it

Premenos is one EDI company that sees the value of the Internet and is moving quickly to blend it with the best attributes of EDI. Last year Premenos licensed RSA Data Security's encryption technology as a way to secure EDI transactions over the Internet. Templar, the resulting system, is in use at Cisco Systems, Avex Electronics and National Semiconductor.

Concord, CA-based Premenos sells AS/400- and Unix-based EDI systems. Its key customers include Coca-Cola, Microsoft, Costco, Blockbuster Video, Ciba-Geigy and Cartier. Before 1989, Premenos was the EDI business of Apparel Computer Systems (ACS), which Lew Jenkins, Premenos' founder, chairman and chief visionary, founded in 1978. Premenos has annual revenues of nearly $20 million. Daniel Federman is its president and CEO.

Defining transactions: the Basic Semantic Repository

Premenos participates extensively in the international EDI standards process. One of its priorities is to help the EDI community make effective use of a key asset: well-defined transaction semantics. Precise language does matter in transactions, especially as amounts rise. Payment terms, shipment times and acceptance criteria are all seeds for misunderstanding, unless they are sown properly.

It seems logical that an order for a part or circuit should include the CAD file or other documents that specify the item in question. EDI's message-as-paper-form system doesn't allow for this: Recipients have to collect and coordinate all the messages, files and transactions.
In an attempt to unify and leverage these definitions, ISO and UN/ECE started a project called the Basic Semantic Repository (BSR). It began in 1991, when the ISO's Data Reference Group decided to examine all the data element directories that its efforts had spawned, as well as those of similar organizations. Banking initiatives had their definitions, libraries had theirs, EDI some more, and so on.

After a feasibility study, ISO sponsored a project to create a generic repository that deals at the abstract semantic levels across industries and languages -- the BSR. A Basic Semantic Unit is not quite a data element, but close. It does not define the data representation for each element (i.e., how many bytes of what kind the element must be), but rather focuses on definitions of terms.

**Pushing the envelope?**

The BSR management committee held its first official meeting as this newsletter went to press. The project's charter illustrates some of the weaknesses of the standards process. Because the BSR project is scoped loosely, the group is not working to develop a standard, but rather to discuss and iron out many of the issues that lead to confusion. Then participating companies can clean up their own data element directories, moving closer to commercial products. As the companies do this exploration, they will likely find that they have placed some data elements in the wrong place, which will be expensive for them to fix and hard to cost-justify.

At its best, this project could collaboratively design an object-oriented class hierarchy of data concepts for use in many fields. But the BSR project is not discussing implementation details, including the use of objects, which seem like a natural fit to the problem. At this point, there is also little involvement in the group from the Internet community. These are all delicate issues, but long run, the BSR project's gentle approach may prove to take too long, and companies paving the way for electronic commerce will build what they need themselves.
First Virtual Holdings began with a chance encounter in December 1993. Attorney and entrepreneur Lee Stein bumped into Einar Stefferud in the LAX Red Carpet lounge. Stein, among other things, is a financial adviser to Peter Gabriel, Rod Stewart and Kenny Loggins. Stefferud is a well-known Internet guru with especially deep roots in e-mail. When they met, Stefferud was using a RadioMail unit, and Stein, an inveterate techno-enthusiast, got curious. The two hit it off, and ended up on the same flight, talking about the Internet and other phenomena. When they arrived in New York, Stefferud sent wireless e-mail to his friend Nathaniel Borenstein (the author of MIME), who joined Stein the next day.

One project idea the three found particularly compelling was a low-cost, high-volume information service such as a joke-of-the-day. At a price as low as a penny per person per day, which they figured many people would be willing to pay, the service could be a big money-maker on a network with the Internet's reach. But no existing transaction system could support such a service, which led them to bring in some other Internet-wizard friends, including Marshall Rose. Together, the four founded First Virtual Holdings in March, 1994. The company is privately held and financed.

By October, they had a working system that was performing buy/sell transactions with major partners who provide secure servers (EDS) and a link to the banking system (First USA Merchant Services in Dallas, a subsidiary of First USA). First Virtual's first settlement is due to merchants who use the system this month.

Most of First Virtual's services are available over e-mail, FTP and the Web. Because browsing is so much easier over the Web, Web access is preferable. Since Prodigy and Pipeline now feature Web browsers, this doesn't imply setting up a SLIP account and all its associated complexity.

A bit-buying bazaar with instant gratification

The founders wanted their system to be deployable quickly with no special software or equipment. These turned out to be creative constraints that led to a startling insight: By focusing only on the sale of information, First Virtual could take advantage of the strange physics of the Internet. Instead of waiting for real-time connections to remote servers for purchase confirmations, buyers get the information they want the instant they solicit it. Since the thing purchased is not a hard good, there's no question of returning it, nor is anyone's inventory depleted by its delivery. Risk is specifically shifted to the merchant, who must await payment, but

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4 Not to be confused with Ralph Ungermann's networking company, First Virtual Corp., which made its debut at nearly the same time as FV. This issue refers only to First Virtual Holdings, but as "First Virtual" or "FV" for the sake of brevity.

5 Living the virtual life, no two of First Virtual's principals live in the same area code. Stein lives in San Diego; Stefferud in Huntington Beach, CA; Rose in Mountain View, CA; and Borenstein in Morristown, NJ.

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the losses involve much lower direct costs than they would otherwise. Some merchants may require payments to clear before they deliver information; this option is left open to them.

For now, most of the information for sale is in First Virtual's Infohaus. Sellers will be able to run servers of their own that use the First Virtual technology. An item offered for sale will have a button that indicates the purchase amount. That button and the transaction that it invokes are in software that is available from First Virtual to add to any Web server. After a purchase, buyers receive a confirmation request via e-mail.

Are you sure you want that report?

E-mail confirmations play an essential role in the First Virtual system, a role similar to the two-phased commit in the database world. All FV transactions generate a confirming e-mail to the buyer, who can respond with one of three answers: "yes," "no" or "fraud."

"Yes" means the buyer actually ordered the item and is willing to pay for it. "No" means the buyer ordered the item but either wasn't satisfied with or won't use it and declines to pay for it. First Virtual will cancel accounts that say "no" too often. FV staff and statistical software watch purchase patterns and take action when buyers or sellers abuse the system. (FV doesn't explain what constitutes abuse to make it more difficult to game the system.)

"Fraud" means the person didn't order the item, and FV will cancel the account immediately and launch investigations as necessary. Failure to respond is treated as a "no," but FV will try a few times before giving up. All FV transactions have this two-stage, closed-loop nature. A merchant or First Virtual may accumulate transactions, so that several show up on one confirmation message, but there is always a delay between purchase and payment.

Making the software interface easy is important to First Virtual's success. Z-Code, an Internet software vendor, has announced that it will support FV protocols to enhance its e-mail client software, which should make the purchase confirmation process easier for buyers. A Web browser vendor will also announce support for FV protocols shortly.

First Virtual's system is particularly appealing to potential vendors too small to get a Visa or MasterCard merchant account. It also allows companies to experiment with pricing and packaging, and innovate on accrual of charges or transmittal of goods. Some merchants, such as startup Novelty Space, are using the system in ways that First Virtual didn't originally think of, including the sale of low-price, high-margin physical goods.

Signups are a breeze

It's relatively easy to sign up for FV's service, and it doesn't take any special software or hardware beyond that needed for Internet access. The signup process circumvents the problems of moving sensitive information...
such as credit-card account numbers across the Internet by using other, more customary and trusted means of transporting it.

To open an account, a prospective FV participant uses telnet to log into a secure server at EDS's facility. That server requests standard account information, but not the credit card number, then confirms the transaction by sending the applicant an e-mail message. The applicant also chooses a First Virtual account ID of up to 24 alpha-numeric characters.

The application confirmation e-mail has further instructions, plus a one-time transaction ID. The applicant calls an 800 number, where another automated system requests the transaction ID, matches it with the original application, then requests the sensitive credit-card information. That system charges the applicant $2 and sends another confirmation e-mail, this time with a word to add to the account ID that the applicant chose early on. Now the applicant is ready to buy stuff.

I wanna sell, too

To become a merchant, which is optional, the applicant must mail a check for $10 to First Virtual. The company cashes the check to cover its costs and reads the magnetic ink code on the check to use as an account address for direct deposits of the proceeds of sales made through the First Virtual system. This process is simple and nonexclusive. An individual can sign up as a merchant easily, which means that the system becomes an appealing way for anyone to sell stuff over the Internet, rather than merely a way to spend money with larger, more traditional merchants.

For each transaction, sellers pay First Virtual 29 cents plus two percent of the transaction price. The minimum transaction amount is 31 cents, which yields one cent for the seller; FV charges 30 cents. Clearly, few merchants will want to charge such low prices. Merchants can accumulate charges on their own, then submit them when they cross a threshold. Sellers also pay a $1 processing fee when they receive payments from First Virtual. Transactions are processed at EDS's Bank Card Processing Center.

Merchants must wait 91 days to collect any money they have been paid through the First Virtual system. The lag time is required because Federal regulations allow buyers to "charge back" credit-card transactions within 90 days, leaving the merchant to collect or obtain return of the purchased goods. This 91-day holding period can be a big deal to some people, who believe that companies won't be able to plan adequately on information that is uncertain for 90 days, and will have trouble financing cash flows until they collect payments. First Virtual plans to make terms better for trusted sellers, to improve cash flow while waiting for final settlement.

6 A description of the signup process is available to anyone who sends a message (any message) to info@fv.com. Signup is also feasible through e-mail and on the Web; send any message to apply@card.com to get an e-mail application form.
Pseudonyms and crypto

The interaction between buyers and sellers is as anonymous as those parties wish to make them, but they are traceable. Since the FV system creates persistent accounts that are traceable to the account holder with a subpoena, it is only pseudonymous.

First Virtual is definitely not against cryptography; it is just very aware that any system that must wait for many people to get and use the same encryption scheme is limited in how quickly it can grow. Encryption also costs something to implement and isn’t standardized.

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COMING SOON

- Links and link management.
- Software for education.
- Navigation & the semiotics of cyberspace.
- Advanced user interfaces.
- Web authoring tools.
- The analog world.
- And much more... (If you know of any good examples of the categories listed above, please let us know.)

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Marty Tenenbaum, Allan Schiffman, Enterprise Integration Technologies (EIT & CommerceNet), (415) 617-8000; fax, (415) 617-8019; e-mail, marty@eit.com, ams@eit.com; http://www.commerce.com

David Bernstein, Electronic Publishing Resources (EPR), (408) 774-6100; fax, (408) 774-6144; e-mail, drb@epr.com

Nathaniel Borenstein, First Virtual Holdings, (201) 829-4270; fax, (201) 829-4372; e-mail, nsb@nsb.fv.com; http://www.fv.com

Einar Stefferud, First Virtual Holdings, (714) 842-3711; fax, (714) 848-2091; e-mail, stef@mva.com

Lee Stein, First Virtual Holdings, (619) 759-9300; fax, (619) 759-0501; e-mail, leestein@scripps.edu

Dan Kohn, NetMarket, (617) 441-5050; fax, (617) 441-5099; e-mail, dan@netmarket.com; http://www.netmarket.com

Marc Andreessen, Netscape Communications, (415) 254-1900; fax, (415) 528-4122; e-mail, marca@mcom.com; http://home.mcom.com

Shikhar Ghosh, Open Market, (617) 621-9500; fax, (617) 621-1703; e-mail, ghosh@openmarket.com; http://www.openmarket.com

Lew Jenkins, Premenos, (510) 602-2000; fax, (510) 602-2133; e-mail, lew@premenos.com

Bob Houston, Software Agents, (301) 601-4362; fax, (301) 540-3958; e-mail, rkh@agents.com

Peter Sprague, Wave Systems, (212) 755-3282; fax, (212) 755-3436

More pointers:

NetBill is at http://www.ini.cmu.edu/netbill/

NetCheque is at http://nii-server.isi.edu/NetCheque/

For information on NetBank (and NetCash), send any message to netbank-info@agents.com

Premenos has a list of EDI organizations, standards efforts and more at http://www.premenos.com

Thomas I. M. Ho of the National University of Singapore maintains a treasure trove of pointers relevant to electronic commerce and other stuff at http://biomed.nus.sg/people/commmenu.html

For general discussions on marketing online, browse the archived messages of the inet-marketing mailing list on the Web (using Hypermail, a Lisp program that turns e-mail messages into threaded Web pages) at http://galaxy.einet.net/hypermail/inet-marketing/

For nitty-gritty details of electronic commerce systems as they are debated, browse the archived messages of the www-buyinfo mailing list at http://www.research.att.com/www-buyinfo/archive/

(Resources continued on next page.)
**Release 1.0 Calendar**

**Jan 24 - Mar 14**  

**January 26-27**  

**Jan 29 - Feb 1**  

**Jan 30 - Feb 1**  
WebWorld - Orlando. Sponsored by DCI. Call Melissa Stewart, (508) 470-3880; fax, (508) 470-0526.

**February 5-8**  
*Demo 95* - Palm Springs. Stewart and David's picks. Sponsored by InfoWorld Editorial Products. Call Therese Solimeno, (415) 312-0545; fax, (415) 312-0547.

**February 6-9**  
Frontiers '95 - McLean, VA. Organized by UMIACS. Contact Joel Saltz, (301) 405-2669; e-mail, frontiers95@umiacs.umd.edu.

**February 7-9**  

**February 7-9**  
Call Center '95 - Dallas. Sponsors: AT&T, Northern Telecom, TCS. Call Lori Monty, (714) 513-8655 or (800) 854-3112 x655. To register, call (800) 331-5706; fax, (218) 723-9122.

**February 8-11**  
*Two BBSCON* - Dusseldorf. Sponsored by Two BBSCON. Learn about bulletin-boards and online services in Europe. With Esther Dyson. Call Philipp Ziegler or Corinne Jost, 41 (75) 373-2832; fax, 41 (75) 373-3062.

**February 9-10**  

**February 14-16**  

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For further reading:

http://www.cnri.reston.va.us:3000/XIWT/documents/dig_cash_doc/ToC.html


February 14-16 Networks Expo - Boston. Sponsored by Bruno Blenheim. Call Annie Scully, (800) 829-3976 or (201) 346-1400; fax, (201) 346-1532.


February 14-17 Client/Server Conference and Exposition - San Jose. Sponsored by CMP Publications and Software Productivity Group. Call Eleanor Dixson-Hobbes, (800) 972-5244 x6743 or (516) 733-6743; fax, (516) 733-6730.


February 18 @MacFair Seminar - New York. Sponsored by NYMUG. Call Andrew Listfield, (212) 473-1600; fax, (212) 473-1745; e-mail, david@escape.com.


Feb 28 - March 1 @Consumer Online Services II - New York City. Produced by Jupiter Communications Company. Where the online world meets F2F. Call Harry Larson, (800) 488-4345 or (212) 941-9252; fax, (212) 941-7376.

March 3 Cryptography: Technology, Law and Economics - New York City. Sponsored by Columbia University Institute for Tele-Information. Call John Kasdan, (212) 854-4222; fax, (212) 932-7816; e-mail, citi@research.gsb.columbia.edu.

March 5-8 **PC (Platforms for Communication) Forum - Phoenix. "Local --> Global: Creative Tension." Sponsored by us: You read the newsletter; now meet the players. Call Daphne Kis, (212) 924-8800; fax, (212) 924-0240; e-mail, daphne@edventure.com.

March 7-9 Computer Telephony Conference and Exhibition - Dallas. Sponsored by Computer Telephony. Harry and the CTI community show their stuff. Call Helen Shilkin, (212) 691-8215 x215; fax, (212) 691-1191.

March 7-9 Documation '95 - Long Beach, CA. Co-sponsored by PTM, GCA, The Gilbane Report and GCARI. Call Frank Gilbane, (617) 576-5700; fax, (617) 576-5708, or Marion Elledge, (703) 519-8160; fax, (703) 548-2867.

* Events Esther plans to attend.
@ Events Jerry plans to attend.

Lack of a symbol is no indication of lack of merit.
Please let us know about other events we should include. -- Christina Koukkos

Release 1.0 24 January 1995
We invite you to attend the Eighteenth Annual PC Forum in Phoenix, Arizona, from March 5 to 8. Each Release 1.0 subscription (plus the fee!) entitles you to two registrations for the Forum.

Each year, the Forum raises issues that play out in the year that follows. Last year, our theme was "Interactivity is two-way" -- a theme echoed through the year as the Internet caught the popular imagination and highlighted the implications of two-way communication and feedback loops on commerce and community.

This year, our new theme is "Local <-> Global: Creative tension" (pronounced "local to global") as two-way interactivity takes hold more broadly. Communications technology is erasing the physical distinctions between local and global, but business, cultural, legal and social distances persist; the once popular notion of a global community looks specious. Global is not just local writ large -- and local successes may not scale to global reach.

At the Forum, we will look at the commercial, technological and social aspects of the boundaries between local and global: How we can erase them, or alternatively how we can add value as we cross them. How can business exploit (rather than resolve) the creative tension between local and global?

Since we sent you the original invitation, we have added some notable speakers:

Brian Arthur is Morrison Professor of Economics at Stanford University, and Citibank Professor at the Santa Fe Institute. He assisted in the white paper created by Wilson, Sonsini, Goodrich & Rosati in November 1994, *Technological, Economic and Legal Perspectives Regarding Microsoft’s Business Strategy in Light of the Proposed Acquisition of Intuit, Inc.*

His lunch presentation on Tuesday will address the issue of how marketplace power favors the leader and grows faster in standards-based markets such as PC software than in traditional markets.

Gerhard Schulmeyer, CEO of Siemens Nixdorf, is a German-born global citizen who has spent much of his career in the US. Now he brings some US-style reengineering to Germany’s leading computer maker.

We’re especially excited about the Forum this year because this is the year when worlds collide -- government and industry, Democrats and Republicans, social and commercial Internet users, Americans and non-Americans.
Although the Forum always attracts a large contingent of industry insiders, we try to seed it each year with provocative new people and ideas from outside our community. Please come join us to meet with, argue with and learn from your colleagues and counterparts.

Release 1.0 editor Esther Dyson and managing editor Jerry Michalski will moderate the Forum, which operates as a series of talks, interviews, debates and panel discussions with active audience participation. In short, we’re holding a local meeting of the computer/communications/media industry’s leaders to address these global issues.

In addition, Jerry will organize Release 2.0 of last year’s popular Rumpus Room with a variety of online services and communities available for attendees to explore -- many of them still in beta.

Speakers will include:

- Brian Arthur
- Carol Bartz
- Eric Benhamou
- Gabor Bojar
- Stewart Brand
- Jim Clark
- Scott Cook
- Adam Curry
- Russell Daggatt
- Bob Frankenberg
- Wayland Hicks
- Eric Hughes
- Bob Kavner
- Alex Mandl
- Jim Manzi
- Nathan Myhrvold
- Mike Nelson
- Carol Peters
- Bert Roberts
- Mort Rosenthal
- Gerhard Schultze
- Sherry Turkle
- John Warnock
- Santa Fe Institute
- Autodesk
- 3Com
- Graphisoft (Hungary)
- Global Business Network
- Netscape Communications
- Intuit/Microsoft
- OnRamp
- Teledesic
- Novell
- Nextel
- Abraham, Hughes
- Creative Artists Agency
- AT&T
- Lotus
- Microsoft
- Executive Office of the (US) President
- daVinci Time & Space
- MCI
- Corporate Software
- Siemens Nixdorf (Germany)
- MIT
- Adobe

Company presentations and Rumpus Room participants will include America Online, Autodesk, Checkpoint, CI Labs, EIT, First Virtual Holdings, Fujitsu Cultural Technologies, Knowledge Adventure Worlds, Lotus, Open Market, ParaGraph, ProductView Interactive, Quarterdeck and Ubique.

If you are a Release 1.0 subscriber and have not yet received your registration materials, call us at (212) 924-8800, or send e-mail to daphne@edventure.com.
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Daphne Kis
Publisher