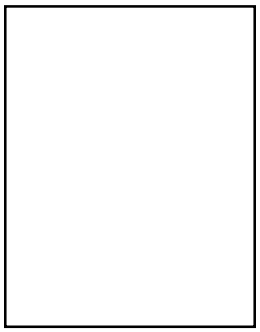
The Remaking of the Internet

Scott Evans



Mr. Scott Evans is vice president of marketing at Interaxx Television Network, an interactive programming and set-top box developer in Miami, Florida. A 25-year veteran of the telecommunications industry, Mr. Evans has been involved with the development, marketing, and deployment of digital transmission systems, ISDN, video teleconferencing, and dynamic bandwidth-based services for business and telco applications. He is also a principal of Vector Partnerships, a consultancy based on creating and managing equity-based joint ventures.

Over the long hot summer of 1993, the winds of change blew hard across the Internet. The U.S. government had gone sour over the NREN project, a broadband initiative that was supposed to prototype the "future" of the Internet and other packet-based "connectionless" communications. Sometime business partners IBM and MCI had lost their patience with a small joint venture company headquartered in sleepy Elmsford, New York, originally funded to be the backbone provider for the Internet. The startup had established a carrier network of T-3 high-speed pipes and bought seven prototype fast packet switches to hub the pipes, but through those pipes flowed only a trickle of traffic. Desperate to recoup their investment, IBM and MCI management scoured the networking landscape for a marketing director to attract customers and get the operation into the black. It was a bleak time for the Internet community, threatened with the withdrawal of federal funding that had supported government, education, institutions, and research for almost 20 years going back to the original ARPANET, and the users didn't seem willing or able to pay the freight.

Hope was not really lost, for a sea change was beginning that would alter the face of the Internet forever. One marketing guru told the IBM/MCI joint venture that the way to fill their T-3 pipes was with commercial traffic siphoned off from the Fortune 500's private networks (his idea was rejected because "the Internet isn't for business"). At the same time, a young man in Switzerland was creating a new Internet Protocol call the Hypertext Transfer Protocol by adapting a text-based programming language used in the printing industry to bring automatic linking of network sites, graphics, and a "point-and-click" capability to the command structure used to navigate the UNIX-driven Internet. And while the "true" users of the Internet disavowed business and commerce, the Internet Society had reluctantly approved the ".com" domain for commercial use, thinking it would be used mostly for electronic mail and interconnecting the "big three" (AT&T Mail, MCI Mail, and Sprint's Telenet-based Sprint Mail) which existed as separate proprietary services.

Fast forward a year to a group of students who decided to write a program that would use the new Hypertext Transfer Protocol to create a new kind of application called a "browser." This browser would allow sites on the Internet to be viewed through a "GUI" (graphical user interface), which existed for Macintosh, the PC (Microsoft Windows), and UNIX (X.11). They hurriedly hacked out 9,000 lines of code, tested it to make sure it didn't crash, and then posted it on the Internet for others to download and try for free—long a favorite Internet pastime.

The ".com" domain took hold as businesses began to take advantage of the resources available on the Internet—and, oh yes, they did start using e-mail. The young man in Switzerland succeeded in creating a new protocol (http://) and what is now known as the World Wide Web. The browser became known as *Mosaic*. The college kids went on to create *Mozilla*, the *Mosaic* killer. The rest, as they say, is history.

You may have heard this story before, but it's worth telling again because it illustrates how serendipity often results in a major convergence. The sea change mentioned earlier? Well, today, three years later, more than 300,000 World Wide Web sites exist,

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and the generate 70% of the traffic on the Internet (which has expanded tenfold, and more than filled up those T-3 pipes and the many more since added). Those college kids are now Netscape millionaires, and the Internet is driven by business, creating a whole new category of commerce.

Remaking of the Internet

What's next?, you may ask. What forces are remaking the Internet from a sleepy community into a firestorm of voracious consumption. Three serious trends have emerged in 1996, trends that hold as much potential for shifting the Internet paradigm as far off its axis as everything mentioned so far. Those three trends are:

(1) Intranets, using the Internet tools internally within the business environment.
(2) Digital cash payment based on secure electronic transactions.
(3) Multimedia content delivery via the Internet.

Each of these represents a major area, so we'll take an overview approach, while providing some pointers for further discussion. More important, the power of each of these will be expanded exponentially by the next wave of telecomputing devices quickly becoming known as "Internet Appliances" or the "$500 PC." This new category of computing equipment will likely be the turbocharger, and the reach of the Internet will dovetail into every segment of life.

The power of the Internet, as it has evolved up to this point, is to transparently connect any computer with any other computer. The browser has emerged as the "killer" application by making the Internet useful beyond the computer community. Putting a graphical face on the Internet's ability to carry digital information has transformed the medium entirely. It is now changing the role of computers from "client/server" to information "manager/user." And the content showing up on the World Wide Web is so compelling that the Internet has become both a business power tool and a source of entertainment that threatens every other medium for consumer loyalty.

The result: Everyone is searching for a way to cash in on the bonanza, with new business models appearing faster than they can be analyzed. The pace has accelerated to the point where every month on the Internet is like a year in real life. Cutting-edge technologies are grasped immediately in an effort to gain even the smallest advantage, in direct contrast to the conservative "test, wait, and see" approach that has driven business activities in the past. Under the new dynamics, to "try" is unacceptable. In the words of the Jedi master Yoda, "Try? There is no try. Do, or do not!" As evidenced in a recent *Doonesbury* sequence, going to lunch can cause the competition to eat your lunch because entire industries can change radically while you're looking the other way.

In the software industry, it has changed the business model completely. Under the Internet model, software is made available free to potential users to try out and evaluate. Download distribution and electronic access to both the developer and the user community has shortened product cycles to the point that the official release of the product is often coincident with the availability of the beta of the next-generation product (another Netscape innovation).

The flood of feedback from users is resulting in a new generation of truly "market driven" product development. The business model defined over a decade ago in *Future Perfect*, where the product is defined by the consumer at the time of purchase and the point of sale becomes the point of manufacture (eliminating the distribution channel altogether), has all but become reality. "Give the customer what they want" has been taken to the extreme.

On the Internet, ask the customer what they want and then stand back because they are definitely going to tell you. In the process, a new cost model has evolved. Traditional expenses such as manufacturing, packaging, distribution, warehousing, returns, and support infrastructures have all but disappeared. Under the new model, those costs have been displaced by servers, on-line storage, high-speed digital access lines, and technical support on-line versus telephone. Distribution, product return, and shrinkage are nil, since the product is downloaded at the customer's convenience and thrown away if unsatisfactory. The customer is empowered, and the competition may be one release away from stripping the market leaders' share. Scary stuff for traditional marketers.

Internet Madness Breeds Intranet Madness

It doesn't end there. Business is struggling to keep pace, trying to figure out the next move just before being forced to make it. Under the old system, where information is power and time is money,

distribution of and access to information often make the difference between success and failure. The lesson of the software model on the Internet is "publish, service, and improve or perish." In business, the impact can be just as dramatic. The tools that make the Internet so powerful and accessible are being adopted by business to facilitate an environment where change becomes part of the process rather than the enemy of it. The Enterprise Network, where large corporations create a communications infrastructure as both an enabler and a tactical weapon, is being leveraged to optimize workflow processes. Internet tools are being used to create a new work environment where seamless gateways exist between company and customer, making information available internally and externally at—or close to—the same instant. The service model has been extended to increase customer loyalty, shorten business cycles, and gain an edge over competition.

A major difference is that the Internet levels the playing field. The massive resources required to create an Enterprise Network environment are affordable to all via the Internet. While large businesses look to the Internet as a means of cutting costs and increasing productivity, small businesses are leveraging the same environment to compete aggressively. This is changing the model as radically as the Internet itself, since small entrepreneurial companies can act more quickly than large ones while carving out profitable niches.

Creating an Intranet and implementing a gateway to the world at large through the Internet is defeating the traditional wisdom. The philosophy of "think globally, act locally" becomes "think locally, act globally" and is facilitated by the Internet. The implementation of this is evidenced by the migration of Lotus *Notes*, a "groupware" package designed to make complex work processes more achievable across Enterprise Networks. *Notes* is now Internet "enabled," allowing the internal processes to be made available to the world at large, across both the Enterprise and the Internet. Not to be outdone, Microsoft has delivered its most powerful database engine yet in SQL Server 6.5, which includes the ability to interface with both internal and external users via Internet Protocols and to deliver data to the user in Hypertext Markup Language (HTML), making it immediately available to anyone with a browser.

Security processes embedded in both products and bolstered by Internet "firewall" technology allow business managers to control access to the information. Automatic routing via Internet Protocols moves the information along the workflow process until work is completed and the final output is published as the last stop along the route. Timers and triggers alert managers that the workflow process has slowed or stopped, allowing the logjam to be broken and the process expedited once again. Nothing is allowed to impede the workflow process other than death, hardware failure, or the network crashing. Good management mitigates the first, while careful planning and implementation of the Intranet/Internet eliminates the latter. No more excuses for not getting the job done. The ultimate power tool has been unleashed and made available to David and Goliath simultaneously. Nervous yet? If any of this is news, you ought to be.

Paying The Piper With Digital Dollars

If you don't believe that digital dollars exist, you've never used an automatic teller or a credit card. Electronic payment is already a mature business. The difference between what you do today on the street and what you do on the Internet is the security mechanisms in place. Automatic tellers are connected to private lines, with messages routed between member banks by clearinghouses. Credit cards are handled the same way, including dialing into a clearinghouse on an "as needed" basis. Replace those connections with the Internet, wrap the information in an electronic security blanket, and you've got the same thing on a global scale.

If your bank doesn't provide electronic banking—change banks! The only thing standing in the way of digital commerce is the banking establishment seeking to maintain their control over your money. This is not something you would normally tolerate in a supplier/customer relationship, so why tolerate it with a bank? It's your money. The banks will give you reasons why they can't provide this service to you because of "regulations" and "security." Bull! With all due respect to the banking community, they do business this way already. Do you direct deposit your paycheck? Your bank didn't refuse to let you put the money *in* electronically. They already have the infrastructure in place to allow you to conduct your business and personal transactions electronically. The government requires them to do so. The truth is they haven't figured out how to charge you for electronic transactions yet, but once they do they will be glad to let you do your banking this way because it also saves them money (that's their benefit from the workflow process).

In fact, MasterCard and VISA (who never agree on anything) have agreed on the Secure Electronic Transaction protocol to facilitate electronic commerce. This, by the way, is to assuage your personal fears about the hackers hanging out on the Internet trying to steal your credit card number. The reality is that sending your credit card information across the Internet is significantly safer than handing your card to the person serving you in a restaurant or store. Why? No "paper trail" of receipts and carbons left behind. Once the transaction information (what you bought and how much it cost) becomes electronic data (swipe the card through the POS terminal, punch the number into the cash register), it's as secure as technology can make it. The problems arise when you get careless (ever lose your credit card?), or the merchant fails to be vigilant.

Transactions processed over the Internet can actually be more secure than those done via automatic teller or point of sale:

(1) They are highly randomized, with the information passing between customer and seller traveling various paths crisscrossing the Internet, which is far more interconnected than the telecom infrastructure used by banks and businesses.
(2) Multiple levels of encryption can be utilized, including the Secure Sockets Layer protocol (which establishes an encrypted link between you and the other party), and/or using an encryption scheme based on a public/private key. Businesses that want your electronic transactions will make a "public" key available to you. You should have a public key for your own communications. The public key is used to encrypt the data. The private key is required to decode the message. This is the mechanism used in PGP (Pretty Good Protection), which is good enough that the U.S. government hassled the creator because it was on a par with their encryption methods. PGP is one of those utilities available for free on the Internet (most people use it to secure e-mail messages), but similar commercial packages are being sold to banks and businesses which want to conduct transactions electronically.

For those who prefer to pay cash, several forms of digital cash exist as debit mechanisms. Buy those digital dollars, put them in your digital wallet, and spend them where you like. Several versions exist today, and a standard will be forthcoming once the dollar volume reaches a threshold that can no longer be ignored. As usual, *caveat emptor*.

What seems to be missing is the "warm and fuzzy" most of us require. That's why most transactions over the Internet can be conducted via human intervention by making an 800 call or fax transmission. People are comfortable with fax, but check to find out if the fax electronically transfers the transaction data into the system before you send your digital dollars. You wouldn't want a piece of paper from a fax machine lying around with your information on it any more than you would leave your receipts behind in a restaurant. Let the buyer continue to beware.

Multimedia Madness: Surfing the 'Net for Fun and Profit

The World Wide Web became popular because graphical content is compelling. Multimedia content is mesmerizing. That's why war has broken out over who will control the multimedia delivery standard on the Internet. Sun is touting *Java*, telling you that anything you want to do can be done with their high-level programming language. Not so fast, says Microsoft. *Visual Basic* can (and will) do the same thing. Yes, that Master of the (PC) Universe and father of bloatware (countless features users don't need or can't figure out), Bill Gates, is touting *Visual Basic* as the standard for multimedia.

Not to be outdone, Macromedia (the dominant maker of multimedia creation tools) has delivered *Afterburner* and *Shockwave* to compress their multimedia formats for delivery over the Internet and allow you to play it back in your browser. These and more can create and deliver multimedia content to you at home or work. The key is integration into the browser (Netscape and *Java*, Microsoft *Internet Explorer* and *Visual Basic*) or "plug-ins," small programs that the browser uses to decode specific formats for playback. *Shockwave* is available for most browsers, as are plug-ins for the various audio and video formats.

Multimedia islands abound on the Internet. Download the plug-ins for free and go check them out. Stop at any magazine stand and pick up an issue that tells you how to plug-in and where to look for interesting and entertaining things to do. Look for business and fun. But note the time you start surfing the 'Net, because when you stop you may be surprised at how long you were at it. Time flies when you're having fun, and nowhere does time fly faster than on the Internet. As a result, entire new segments are

evolving for business and entertainment content. If you can't find your favorite TV show or movie on the Internet, check your local listings because it may not be on anymore. Need news, business information, or a special utility to perform a business task? It's probably out there, you just need to know how to find it.

The impact of multimedia is so strong that it once again changes the traditional way of doing business. The cost of developing multimedia content for the Internet is such a small increment of the total cost of developing and delivering the final product that it no longer makes good business sense not to. In the content game, distribution is as important as execution of the concept. Multimedia tools now accept almost all formats as input and deliver digital data as output. Place the data on-line, promote it, and watch what happens. In the case of movies, previews, characters, the story line, and any other aspect (toys, etc.) are made available in tantalizing ways to build demand and hype the box office. Television shows are on the Internet to provide a contact point for fans and incorporate everything from bulletin boards to chat rooms to previews. One new show, *Nash Bridges* starring Don Johnson, has a separate story line on the 'Net that ends in a cliffhanger to be resolved on the next broadcast episode.

Assimilation of the Internet

Attachment to the Internet is already universally available and cheap. Internet service providers now charge $20 per month for unlimited usage. Soon to join the fray are local cable and telephone companies offering service by year-end at or below that price. Factor in the low-cost Internet Appliances (see following story) hitting the market for the 1996 Christmas selling season, bundled with browser software that eases the pain for those not up to speed with computers, and the Internet has the potential to assimilate into all aspects of daily life as a universal information and entertainment medium. As the availability of Internet Appliances increases, driven by increasing functionality and portability and lower cost, the Internet will become the communications medium of choice. Fostering the human aspects, voice and video are already being delivered by the Internet at low fractions of the cost of other services. Software for talking across the Internet is available today, allowing people in distant lands to communicate verbally. And if you ever have a video telephone, it will probably use the Internet to connect you with family, friends, and business associates.

The transition will probably take five years or longer, but improvements in software and hardware will make this a ubiquitous service while easing the main area of discontent—slow download of information. Compression technologies, coupled with "streaming" download techniques that allow the multimedia software to begin playback while the rest of the program is delivered, will keep start times in the sub-10 second range required to keep the user interested and involved.

The flood of content will continue with increasing volume and quality. The Internet will continue to compete as both a business environment and power tool, rapidly evolving into a core resource for business of all types. The educational and entertainment value of the Internet will likewise explode, making it the single largest source of information of all types. The dominant players in today's market will have to evolve and expand their products and services at an ever-quickening pace in order to maintain position and market share, while new companies will spring up nurtured by the Internet itself and the low barrier to entry into this expanding marketplace. In the process, the Internet will remake itself, taking us along for the ride. ntq

Convergence Clash: PC Versus TV as the Ultimate Browser

The PC versus TV controversy has received incredible exposure. There are valid business reasons for this having to do with control of the distribution channel. The arguments fly over which is better to access the Internet—a PC or the TV. While most couch potatoes side with TV as the ultimate browser and PC makers respond that the Internet was created by and for computers, the real answer has to do with control of the consumer.

The people who bring you entertainment, including the broadcast and cable companies and supported by the consumer electronics industry, are telling you that the television will be your window to the world at large, including the Internet. But many television viewers don't have (or want) personal computers. If the "programs" are available via the TV, that's fine with them. They will watch whatever is on. The Internet represents a new kind of VCR, except they don't have to rent the tape and take it back. In this way, the Internet is similar to interactive television.

This is one of the reasons cable companies are hot on new modems that deliver information over the cable wire already coming into your home. They assume that you will pay a monthly charge to use the high-speed modem plus additional charges for the content (information and programs) delivered through it. Cable modems run fast enough in trial tests to deliver full-motion video and other programming delivered today on tape. They don't care if you watch it on your TV or your PC—they just care that you watch it so they can charge you.

The PC makers see the multimedia PC as the ultimate vehicle for delivery of content. The PC gives you almost unlimited control over what you view, including the ability to store the program for later reference. They are correct, up to a point.

The first personal computers that act like televisions have arrived, but they are expensive ($3,000+). The NetTV and Gateway Dimension products are high-powered multimedia computers that use special big screen (30") monitors and display TV channels as well as computer applications. Infrared devices (a keyboard for NetTV and a remote control for Dimension) allow you to sit on the couch and do things, but they are complex computers at heart. The first televisions capable of "surfing the 'Net" will be available from Mitsubishi this fall, but they are also expensive, with the Internet components adding about $300 to the price, and driving the cost to consumers over the $1,000 price point. Not bad for the big screen market, but certainly not for the rest of us. As with any other new product, acceptance will result in lower price points and/or more features. No sales, and they get discontinued and become footnotes along with the Beta VCR.

More likely to succeed is the Internet Appliance, or the $500 Networking PC as it is sometimes called. The reason it will succeed is the low price point (under $300 is a reality), and the fact that it can be used with something you already have—a television. The circuitry is optimized for display on a television, and the software tries to correct for the differences between a TV and a computer screen. Units will also be available to plug in to video games, and SEGA has already announced an attachment for its SATURN machine. Others are close behind.

The "networking computer" version of this being touted by Oracle and Sun use the Internet (or Intranet) for storing programs and information. This is already a common practice in business, where computers are networked together. Two benefits evolve from this approach. Studies (by the proponents) show that the "cost per user" is much lower, given the lower cost per unit ($500 without monitor) and the simplicity of the system which save downtime and training costs.

The second benefit has to do with portability and ubiquity. The Internet Appliance is a telecommuting device that attaches to a network,

sometimes through wires (local area network), sometimes through a modem, and sometimes via wireless (cellular phone or personal communications service). The circuitry is compact, and can be portable. Cards to connect to the network are already available and reasonably inexpensive because they are used in laptop computers. Eliminate the disk drives and display, and most laptops can be reduced in both cost and size to become Internet Appliances. Build in the programs necessary to connect to the network, and the browser becomes the user interface. If you need storage, a cheap high-density unit can be added at minimal cost. The key is that most storage is consumed by applications, not data. Download the applications (the death knell of bloatware), and the problem is solved. Can't download because you're traveling? The basic applications you need can be stored on a card that plugs into the same slot the network interface occupies, at about the same cost.

Now you have a mass market device. Simple and cheap enough to have at home (about the price of a VCR), with a remote control that includes a small keyboard (it's amazing how little typing you do surfing the 'Net). If it plugs into your video game, the price should be around $200, including a place to attach a printer. For $300, you can get a stand-alone unit that hooks up to the TV or VCR (and uses the VCR as a storage device) and can be upgraded to include local storage. Consider that the kids can research their homework, explore far-off places, participate in multiplayer events (video games, challenges, and skill contests, etc.), you can do your shopping and banking (you have changed banks, haven't you?), get involved with hobbies and on-line learning...whatever appeals to you, including turning it off and watching TV. The programs you use and watch will be available on the Internet, both for free (supported by advertising, just like the TV shows) or at a small cost compared with today's software prices. Even if you already have a PC at home, you'll want this because it will offer some interesting services over time such as controlling other appliances and maintaining home security.

The business version is a little more expensive ($500 tops) because it supports more attachments and is rugged for portability. For everyone but the power users and developers, it has enough horsepower to handle all your computing needs. The low cost and portability outweigh the need to have a laptop or full-blown computer on your desk.

The fact that these units will support high-quality audio and video as part of the basic package will be very appealing to consumers at large. They will have an audio jack that accepts headphones (for privacy) or attaches to self-powered speakers or a high-fidelity sound system. The video output sends the monitor signal to a TV modulated as a standard signal, and the business version will drive a standard monitor. The consumer products will be based on cheap chips (computer and memory), while the business versions will use highly-integrated architectures such as Motorola's 821 PowerPC and upgradeable memory modules. Today's units will have four Megabytes of memory (plenty for applications that don't consume Megabytes and efficient operating systems to run them). Memory chips as dense as 16 Gigabytes are on the horizon, and 64 Megabyte chips are becoming available. These high-density chips can be segmented to provide full storage (the 64 Megabyte chip yields 16 Megabytes of addressable memory on a single chip). ntq