

Doing Business in the Wired World

Electronic commerce promises to radically transform business. To remain competitive, firms must understand the implications of the information-rich infrastructure the Internet provides.

Ajit Kambil

New York
University
Stern School
of Business

Electronic commerce—the application of information technology to support business processes and the exchange of goods and services—promises to radically transform business. Since 1993, use of the Internet and World Wide Web has exploded, spurred on by dramatically cheaper, higher performance hardware and software. This creates a global “infostructure” to support commerce.

Today the Internet provides an inexpensive and information-rich, shared, multimedia network interconnecting more than 50 million users and 16 million servers¹ in more than 140 countries. Today in New York, costs to publish on this infostructure are as low as \$3,000 for server hardware and software, and \$650 per month for a shared T1 connection. Individual dial-up access costs around \$15 per month and continues to fall. This and the Internet’s usefulness will capture an estimated 377 million users by 2000.²

The 1997 Nielsen-CommerceNet³ survey of Internet demographics estimated 50 million people over the age of sixteen in the US and Canada had Internet access. About 37 million had access to the Web. Both the Nielsen and Hermes⁴ project surveys found Internet users are well educated and affluent—ideal targets for marketing. Survey respondents also said they gathered purchase-related information over the Internet and that it was more useful and effective than direct mail. Interestingly, an estimated 5.6 million users have already purchased products over the Internet, and this method was especially attractive to those who valued convenience more than price. Thus the Internet is rapidly becoming the largest interactive multimedia infrastructure for marketing and is supplanting some traditional media.

APPLYING THE INTERNET TO COMMERCE

My research shows that firms use the Internet to improve enterprise information and workflows, redefine the way they communicate with customers, and leverage global resources. Companies like Cisco Systems, Amazon, Onsale, BidnAsk, and Virtual Vineyards are pioneering new business models with e-commerce.

Redesigning enterprise information systems

Internet technologies have dramatically lowered information publishing and dissemination costs within a firm. For example, Morgan Stanley, a major New York-based investment bank, uses the Web for access to routine information or to electronically route key reports. An analysis estimated that eliminating paper broadcasting processes could save the firm between \$300,000 and \$700,000 annually for each process. In the first 18 months of Web usage, the company documented over \$1 million in annual savings, and nearly all of the company’s 10,000 employees access its server on a weekly or daily basis. This example quantifies the savings provided by adopting Internet technologies within a firm.

By initially choosing an easily measurable application, Morgan Stanley’s managers justified the cost of adopting intranet technologies. As technology improves, projects with values that are difficult to measure, such as workflow control, can build on this existing infrastructure. In essence, these managers started with an easily justifiable application that created the infrastructure to extend to applications for which returns are longer term or difficult to quantify.

Redefining how companies and customers communicate

Companies such as Cisco and General Electric are

leveraging the Internet to redefine marketing channels and customer communications to provide rich information, receive orders, and gather detailed customer profiles. For example, Cisco Connection Online, Figure 1, received 13 percent of the company's product orders in January 1997 and sells products at a rate of more than \$200 million a year. By year's end, Cisco expects customers to place 15 to 20 percent of all orders online. Rather than questioning company personnel, customers seek out detailed product and technical information at the Cisco site. By moving support functions onto the Web, Cisco has saved over \$250 million in one year. Of that savings, \$130 million stemmed from reduced technical support and \$100 million from displacing paper documents.⁵

Another feature of the Cisco site is the use of software agents for ordering, configuring, and customizing products, and checking prices and order status. These software agents reduce errors in order entry from rekeying (only the customer keys in the order) and errors in product configuration. Customizing product configuration before shipment changes the customer value proposition by reducing the customer's effort to integrate a new product into a network. Cisco can also use information collected during custom configuration to cross-sell products and could later expand its offerings to include remote network management services.

In addition to providing detailed customer information on the company's specialized plastics, the GE Plastics site invites customers to "co-create" value: The Tech Tip of the Week contest asks customers to report discoveries in using the company's products, providing GE with new ideas to share with other customers. Sales representatives also use tips to illustrate new product uses to prospective clients.

Leveraging resources

Inexpensive Internet access allows small and large firms to access expertise, information, and resources worldwide at low costs. This lowers information and entry barriers across various industries, allowing smaller firms to better leverage resources and compete on a global scale.

Amazon is a canonical example of an entrepreneurial growth company leveraging the Internet's capabilities. Amazon is effectively becoming the Internet's version of a bookstore "category killer." Amazon has posted a 35 percent *monthly* sales growth and garnered a well-recognized brand name in cyberspace. What makes this company so special as a business model?

First, it offers a catalog of over two million books to buyers anytime, anywhere—a selection over 10 times what the largest bookstore can typically carry. Amazon incurs virtually no direct warehousing, sales, and rental

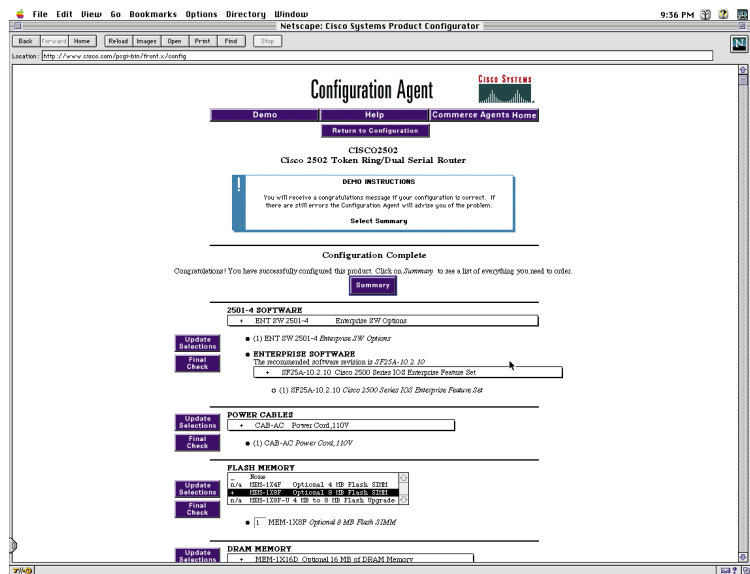


Figure 1. According to Cisco Systems, Cisco Connection Online handles more than 70 percent of customer support for a savings of \$130 million. Cisco's Configuration Agent (<http://www.cisco.com/cgi-bin/front.x/config>) lets customers configure and order products without sales assistance.

costs because it automates order processing, and wholesalers and suppliers ship most products directly from their warehouses to buyers. By not operating retail facilities or intermediate warehouses, Amazon accumulates savings to pass on to customers. Numerous electronic retailers are developing similar models.

Users can also program automatic software agents to alert them to special offers and new book arrivals—a service tailored to the specific customer (marketing to one). In addition, Amazon allows customers to co-create value by posting book reviews and recommendations to friends. The company further leverages its inventory and delivery system by allowing other Web sites to create mini bookstores, for which the proprietor receives an 8-percent commission. These strategies proliferate the Amazon brand across the Web and increase its scale.

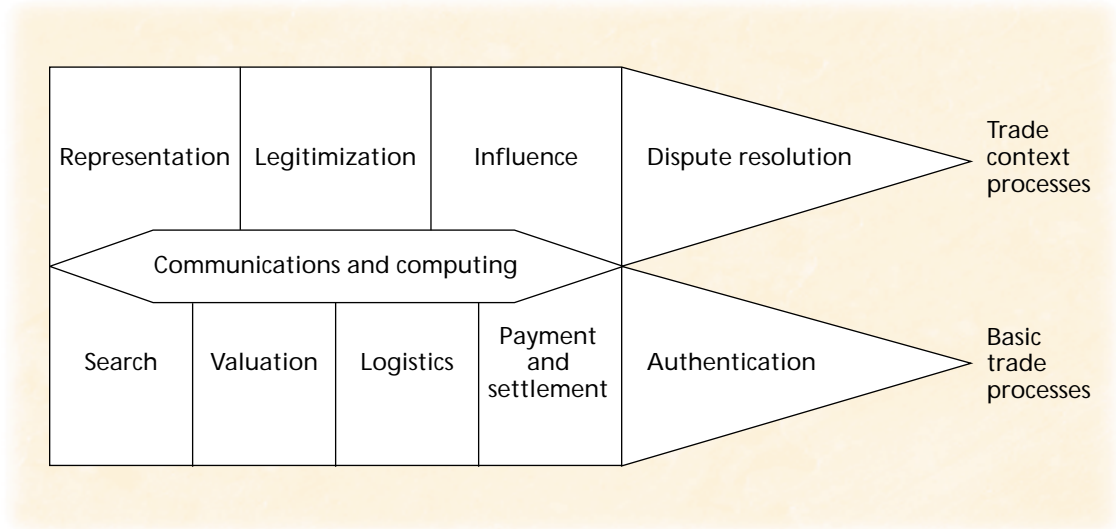
The previous examples primarily generate cost savings in a firm's internal operations or its access to customer and supplier resources. This commerce infrastructure will realize its true potential when consumers and businesses adopt it for widespread trading, inventing business models that change trading processes and the strategic positions of firms in markets. Understanding how e-commerce alters standard business transactions will be crucial to maintaining a firm's strategic position.

TRANSFORMING BUSINESS TRANSACTIONS

All business transactions require significant information processing and communication to reduce uncertainties for buyers and sellers. These include uncertainty about the quality of products traded, whether the other party will honor commitments, and how to resolve disputes.

Communicating via the Internet allows firms to radically transform trading processes and intermediary roles. This lowers the transaction costs^{6,7} incurred in exchanging goods or services. Transaction costs include those for product searches; drafting, negotiating, and safeguarding the terms of a sale; payment

Figure 2. Generalized model of exchange processes.



and settlement; and enforcing contracts or resolving contract disagreements.

Eric Van Heck and I developed a generalized process model for exchange;^{8,9} Figure 2 shows the key processes it identifies as present in all transactions. Communications and computing serve as the glue between these exchange processes. Basic trade processes rely on trade context processes to further reduce trading's uncertainties. I use this model to systematically map the emerging effects of e-commerce on trading processes.

Search

The Internet is radically transforming search, the first of five basic trade processes. In early models, firms established Web sites with information on their goods and services, which customers sought out. Companies such as Microsoft run extensive banner advertisement campaigns to pull customers to their site for more information on products. Today, three alternative models are emerging.

Sellers now use customer preference profiles for targeted marketing. They provide information on specific products to a select group or individual based on information collected from Internet users. This is especially useful for business-to-business transactions but can also support consumer transactions. For example, Amazon provides users with e-mail alerts about new books in the categories they've specified.

Another marketing strategy facilitates search by leveraging information from a community. For example, Firefly's agent software uses information on user preferences across a community of users. The agent groups user preferences based on their similarities. Companies use this information to suggest buying opportunities to specific customers based on their similarity to other customers.

A third emerging search strategy is for customers to broadcast desired product requirements, allowing different vendors to offer bids. For example, buyers subscribing to BidnAsk can post requests for computer and other equipment and receive bids from vendors.

These changes reduce the customer's search costs. The supplier's costs may vary as marketing programs become more information intensive.

Valuation

All trading requires processes for valuation. In the simplest model, the seller posts a non-negotiable offering price and reduces it until someone buys the product. The Internet makes the price of a good or service more transparent to customers.

For example, Andersen Consulting's BargainFinder program automatically searches multiple online music stores for the best price for a CD. Today, many Web music stores deny access to this program because it was too successful at finding the lowest price.

In addition to such agents, the Internet's interactive and inexpensive communication infrastructure enables different and *dynamic* price discovery mechanisms. An emerging technique is to use auction models (some work in real time). For example, Onsale developed the Yankee Auction for refurbished computer and audio equipment. Users may bid on a product's price until a specified time. The auction then closes, and the seller accepts the highest bids. Netherlands-based Wehkamp uses a Dutch auction model, in which the price starts high and drops until users bid at a specified price and clear the auction inventory of computers and other goods.

Logistics

This is the specification and coordination of delivery for physical products or information to a buyer. Web retailers typically maintain small inventories of the most popular products and coordinate directly with suppliers for more specialized products.

Delivering physical goods is a critical constraint in any commercial system. E-commerce creates new opportunities for delivery firms such as Federal Express, UPS, and Ryder to provide more complex inventory management, routing, and delivery services. This in turn allows retailers to save money by limiting inventories. Those supplying products will also

require more complex, flexible, production systems and delivery services to service such retailers.

Information and software vendors also use the Internet to deliver products and software upgrades, but so far only in a limited way. Efficient delivery of large programs and files now requires higher bandwidth.

Payment and settlement

Efficient, paperless payment and settlement processes are critical for widespread e-commerce. First Virtual, CyberCash, and DigiCash provide different models for secure payments, and each charges merchants transaction fees of 2 to 3 percent, comparable to those for credit cards.

Although protecting a customer's credit or account information is technically straightforward with public-key encryption, protecting the credit issuer's and merchant's risk is another critical ingredient. Electronic payment systems manage this risk by reconciling the participants' views of the transaction prior to payment, settlement, and completion of the trade. Postal Service Micropayment systems such as Netbill and CyberCoin promise to reduce transaction costs for some goods to a fraction of a cent. Micropayments will enable information providers to price on a pay-per-use basis, which will help expand their markets to new users. They will also enable firms to implement internal currencies and pricing systems for the efficient allocation of computing and other resources. The proliferation of electronic payment and settlement systems will drive the transaction costs paid by buyers and sellers substantially lower.

Authentication

These processes verify the quality and features of the goods traded, ensure the authenticity of the trading parties, and monitor trading parties to assure that they conform to agreements. E-commerce creates new authentication challenges. For instance, how do you verify that a Web storefront is a legitimate business? How can you assure good product quality?

Several initiatives seek to verify that a party to an electronic communication and transaction is whom they purport to be. Public-key cryptography is a well-known solution, but requires certificate authorities for implementation. Trusted third parties (certificate authorities) certify public keys, bind them to specific individuals or firms, and verify their authenticity. Various firms, industry groups, and the US Postal Service are beginning programs to establish certificate authorities.

Assuring product quality prior to purchase is more difficult. Purchasers have to rely on established reputations and brands to reduce their uncertainty about product reliability. We examine the importance of branding later.

Trade context processes

This group of processes reduces the risks of trading.

Representation. These processes determine how a company communicates product attributes and agreements to buyers. Information standards (such as the carats that characterize gold) represent product attributes and features or contractual agreements. They effectively reduce the buyer's and seller's communication costs and uncertainty. Electronic data interchange initiatives have developed some text-based templates for business-to-business message exchange in different industry sectors. However, to incorporate virtual reality and multimedia views of products, the Internet will require more specialized standards. Little progress has been made toward defining standards for such advanced transaction templates. Templates will also make it easier for software agents to search and compare products.

Legitimization. Such processes define how agreements are declared valid in the electronic space. For example, does clicking Accept using a mouse in New York to download a new Netscape browser constitute a binding contract of adhesion? If so, where is the contract considered valid—in New York where the click occurs or in California where the server is located? If a dispute arises, what state has jurisdiction? As e-commerce spreads, jurisdiction over network transactions will become a major issue. Legitimizing and recording a transaction's occurrence is critical to all trade. Steps toward *cybernotaries* and other third-party transaction certifiers are only in their infancy.

Influence. Business exchanges occur within an institutional context that generates trust or implements incentives and sanctions to reduce the transacting parties' risks. These influence mechanisms provide transacting parties incentives to fulfill commitments. Enforcing warranties and prosecuting fraud will make parties more willing to trade electronically.

Reputation is a special type of influence mechanism; when valuable, a firm will act to preserve its reputation. Entities that enforce this type of influence (like better business bureaus) are beginning to emerge on the Internet. Conversely, the Internet also poses many risks to reputation-based influence mechanisms. For instance, individuals dissatisfied with a particular product or service can, without impunity, post negative comments about their experience. This can easily diminish a prospective customer's trust in a brand's reputation.

Dispute resolution. These processes may include direct negotiation, use of the court system, or arbitration. Traditional mechanisms for dispute resolution and influence are local, so the Internet, which has no national or geographic boundaries, presents new problems.

Several initiatives seek to verify that a party to an electronic communication and transaction is whom they purport to be.

For more information

Amazon	http://www.amazon.com
Bargain Finder	http://bf.cstar.ac.com/bf/
BidnAsk	http://www.bidnask.com
Cisco	http://www.cisco.com
CyberCash	http://www.cybercash.com
DigiCash	http://www.digicash.com
First Virtual	http://www.fv.com
GE Plastics	http://www.ge.com/plastics/
Indiaserver	http://www.indiaserver.com
Onsale	http://www.onsale.com
Virtual Vineyards	http://www.virtualvin.com
Wehkamp	http://www.wehkamp.nl

Adopting new processes

Although technical solutions for basic trade processes progress rapidly, the adoption of trade context processes to the new infostructure is substantially slower. Progress toward certificate authorities, cybernotaries, e-commerce insurance, and enforceable laws to govern international and interstate transactions requires new levels of consensus. It involves institutional commitments from industry and government stakeholders.

Thus, e-commerce will likely modify existing business-to-business transactions and initially be governed by existing agreements between firms. Next, industry and trade associations like CommerceNet will provide a forum to develop transaction templates and modify trade context processes for use within or across related industries. Thus, specific industries will likely construct or adapt transaction-oriented Internet applications to their specialized needs, which will eventually help establish systems that serve other communities.

REDEFINING STRATEGIES

Falling transactions costs and bountiful information will erode the profit margins and competitive advantage of certain businesses. These include businesses that previously exploited information asymmetries between buyers and sellers (such as real estate brokerages) and those that located close to customers to reduce search and purchase costs (retailers). As electronic-publishing costs plummet, every person connected to the infostructure can become a worldwide publisher. This creates an increasingly noisy environment in which the consumer's attention is a critical and scarce resource.

To respond to the challenges of greater market efficiency, lower margins, and information overload, managers must reorganize firm-level strategies to emphasize scale; differentiated, value-added services; and brand names.

Scale and adding value are critical

E-commerce increases price wars and competition as software agents identify the lowest cost suppliers for standard products. To realize substantial profits, virtual stores must have sufficient scale to negotiate lower prices from suppliers. They must also turn over product quickly and with low margins to increase net profit.

As commerce becomes more information intensive, firms like Cisco, GE, and Amazon collect and process detailed customer preference, profile, and purchase information. Companies use their growing information assets to better match products to a customer's tastes and enhance the service relationship. These targeted marketing efforts can lower marketing costs and create a repeated service and learning relationship with customers—a strategy generally less costly than acquiring new customers. Well-designed learning relationships¹⁰ reduce the customer's incentives to switch to alternate suppliers.

Differentiated merchandise and proprietary assets also provide competitive advantage. For example, Amazon's alliances with used bookstores enable it to offer out-of-print titles and provide a value-added service. When an innovation or information is a proprietary asset, a firm can demand a higher margin. Service marks on brand and domain names, copyrights on information and artwork, and patents on security mechanisms are valuable new proprietary assets.

Integrated push/pull marketing

Low-cost electronic publishing results in an explosion of marketing information available across multiple channels such as Web sites. Capturing the consumer's attention in this fragmented and noisy environment is a critical precursor to product sales. Integrated, cross-media push/pull strategies will be essential to success in this environment.

Push strategies. These strategies make special offers (discounts, coupons, sales) to push the product out to the marketplace. They are most appropriate for lower value-added products without a strong brand identity.¹¹ New software companies have built brand awareness by providing free trial versions of software (as is the case for Netscape's browser, Shockwave, Real Audio, and Marimba's Castanet).

Pull strategies. Pull strategies use advertising to build brand identity and pull the customer to the product. Branding associates valued characteristics with a product and allows sellers to charge a higher price than that for generic products. It also establishes a reputation for the seller and a tacit promise between seller and customer—that the seller will honor the commitments associated with the brand identity. Branding also reduces information overload, an important aspect on the Internet. Building a brand through advertising over multiple channels will overcome channel fragmenta-

tion problems confronted by sellers. In one brand proliferation strategy, Microsoft requires sites to prominently display its Site Builder logo.

Brand and channel management

Building and maintaining brand identities become more challenging in the emerging infostructure. The low entry costs for Internet publishing enable individuals to post their own opinions, bypassing traditional advertising channels, promotions, and brand management efforts. For example, users identified the Intel Pentium flaw and originally discussed it in Internet newsgroups. Intel initially downplayed the error until the Internet discussions created substantial consumer pressure and adverse publicity. Despite the company's eventual replacement of flawed chips, this episode substantially undercut Intel's investment in the "Intel Inside" campaign. This illustrates how the emerging environment makes it critical to have coherent cross-media brand management.

Marketing managers must extend their advertising and brand management strategies to adapt to channel proliferation. As thousands of Web sites come online, user attention is fragmenting based on gender, ethnicity, lifestyle, special interest, age, income, profession, and other demographic categories. Conversely, such demographics were not easily and inexpensively accessible before. For example, Indiaserver is a site providing expatriates with news from India, combined with calendars of Indian community events, business news, and other information. This site helps advertisers target this affluent group of two million people in the US. Thus, the Internet creates new possibilities and requirements for product advertising along dimensions that were previously too expensive to effectively target.

Although in its infancy, e-commerce promises to dramatically alter the structure and processes of commerce. Managers will have to invent new business models that reemphasize scale, differentiation, and brands to effectively compete on a noisy infostructure with low transaction costs. They will also have to spend substantial time redesigning transaction processes and participating in industry groups to develop new e-commerce conventions. Effectively implementing these strategies and simultaneously reconciling new and existing business models will be key to a firm's success. ❖

Acknowledgments

I thank Michael Bloch, Giri Gururaja, and Tomas Isakowitz for their helpful comments on earlier versions and assistance with data collection.

References

1. "Internet Domain Survey, January 1997," <http://www.nw.com/zone/WWW/report.html>, Jan. 1997.
2. J. Quarterman, "1997 Users and Hosts of the Internet and the Matrix," Matrix Information and Directory Services, Austin, Tex., <http://www.mids.org/press/pr9701.html>, Feb. 11, 1997.
3. "Who Is on the Net and Who Is Buying. Electronic Commerce Overview, Spring 1997," in *CommerceNet/Nielsen Internet Demographics Survey*, <http://www.commerce.net>, Mar. 1997.
4. S. Gupta, "Hermes: A Research Project on the Commercial Uses of the World Wide Web," <http://www.umich.edu/~sgupta/hermes/>, July 1995.
5. C. Wilder, "Electronic Commerce—Strictly Business: Know How to Make Money on the Web? Think Business to Business," *InformationWeek*, Mar. 17, 1997, p. 42.
6. O.E. Williamson, "Transaction-Cost Economics: The Governance of Contractual Relations," *J. Law and Economics*, Vol. 22, 1979, pp. 233-261.
7. O.E. Williamson, *The Economic Institutions of Capitalism: Firms, Markets and Relational Contracting*, Free Press, New York, 1985.
8. A. Kambil, *Electronic Integration: Designing Information Technology Mediated Exchange Relations and Networks*, doctoral dissertation, Sloan School of Management, Massachusetts Inst. of Technology, Cambridge, Mass., 1992.
9. A. Kambil and E. van Heck, *Re-engineering the Dutch Flower Auctions: A Framework for Analyzing Exchange Organizations*, CRIS working paper IS-96-24, New York Univ. Stern School, New York, Nov. 1996.
10. B.J. Pine, D. Peppers, and M. Rogers, "Do You Want to Keep Your Customers Forever?" *Harvard Business Rev.*, Mar.-Apr. 1995, pp. 103-114.
11. A.A. Achenbaum and F.K. Mitchel, "Pulling Away from Push Marketing," *Harvard Business Rev.*, May-June 1987, pp. 38-40.

Ajit Kambil is an assistant professor of information systems at New York University Stern School of Business. His research focuses on e-commerce, the design of networked organizations, and the alignment of IT and business strategies. Kambil received his SB in electrical engineering, SM in technology and policy, and PhD in management science (information technologies) from the Massachusetts Institute of Technology. He is a member of the Society for Information Management, the IEEE Computer Society, and the ACM.

Contact Kambil at New York University Stern School of Business, 44 West 4th St., New York, NY 10012; akambil@stern.nyu.edu; <http://kambil.stern.nyu.edu>.

Capturing the consumer's attention in this fragmented and noisy environment is critical. Integrated, cross-media push/pull strategies will be essential to success.