

The Big Picture: An Overview of Electronic Commerce

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The emergence of the Internet has given rise to four major application families: cyber communities, digital households, digital workplaces, and electronic commerce. Of these applications, electronic commerce has grown fastest. It is now poised to have an immediate and transformative impact on how companies execute their core business processes, how consumers shop and purchase, how value is created and distributed within industries, and ultimately how the global economy is structured.

Electronic commerce is often defined solely within the domain of purchase transactions, in which a buyer commits to the purchase of goods or services from a seller at an agreed-upon price. In fact, e-commerce is much broader in its scope and can be better defined as the electronic execution of all transactions supporting commerce among buyers, sellers, and other third-party intermediaries, such as financial institutions. The vast preponderance of these transactions are in fact information transactions that precede and follow the order and payment transactions that constitute a purchase.

Electronic commerce is not new; it existed long before the Internet. Early pioneering implementations of e-commerce (EC), many of which Arthur D. Little helped develop, include the initial airline customer reservation system, Sabre, electronic data interchange (EDI), electronic funds transfer, and proprietary online services. What's different today, however, is that the Internet as an open, ubiquitous, low-cost platform for distributed application development has radically accelerated the pace and extended the reach of electronic commerce. As Bob Metcalf (Ethernet inventor, founder of 3Com, Vice President of Technology, IDG) has eloquently summarized, the value of a network increases exponentially with the number of parties connected to that network. This was true of the telephone and later of proprietary local and wide-area networks; today, it is dramatically true of the Internet.

For example, although EDI has been around since the late 1970s, its adoption has been impeded by the cost and limited scalability associated with its proprietary protocols, private networks, and processing requirements. Moreover, traditional EDI focused exclusively on highly repeatable business-to-business procurement transactions in a few industries with concentrated buyers, such as the aerospace and automotive industries. Consequently, in 1996, while 95 percent of the Fortune 100 were using traditional EDI, only 2 percent of the remaining 6 million companies in the United States were using it.

By contrast, e-commerce over the Internet has enjoyed several advantages: the ubiquity of the Internet, open standards for document transmission and presentation, progressive improvements in underlying processing price/performance, and dramatic declines in the cost of communications bandwidth. The end result: the number of firms adopting EDI between 1996 and 2000 will exceed all those that had adopted it in the prior 26 years.

While supply-side drivers have lowered the cost of implementing e-commerce solutions, demand-side drivers have driven adoption. As a tool for fundamental process transformation, EC is providing benefits across the value chain. Adopters have been able to sharply increase the effectiveness of their customer-facing and back-end processes while simultaneously improving transactional efficiency (see „How Electronic Commerce Is Transforming Business Processes“ in this issue of *Prism*). Consumers have also benefited by gaining increased access to information, both to support their purchase decisions and to increase the usefulness of goods and services already purchased.

Business-to-consumer e-commerce has offered consumers a lot of „sizzle.“ It has stimulated their imaginations by letting them use interactive, virtual-reality based, personalized home-shopping technology to get the goods and services they want at the lowest available prices. The experience of Amazon.com, CDNow, Estée Lauder, J. Crew, Travelocity, and many others – including both new EC businesses and EC-based extensions of existing businesses – has proven that there will be a mass consumer-driven market for this application.

However, it has been business-to-business electronic commerce that has provided the „steak“ in this arena, as companies have created real value by transforming their core business processes, pioneering new business models, and even redefining the structures of their industries. Companies as diverse as Boeing, Dell, eBay, Federal Express, Fruit of the Loom, Intercontinental Hotels, Sabre, and Visa have all achieved breakthroughs both in revenue realization and cost management.

For example, Hewlett Packard is saving over \$100 million a year by extending its production planning intranet to its suppliers. Dell has gone beyond improving process efficiency to optimize its entire supply chain, while simultaneously spurring top-line revenue growth. Through EC, Dell has further secured its competitive advantage; Compaq, Hewlett Packard, and IBM are desperately trying to catch up by adopting Dell's business model.

The revenue Sabre is realizing from Travelocity has important strategic significance for Sabre as a hedge against a future restructuring of the travel distribution industry, in which global distribution systems will play a greatly diminished role (see „How Electronic Commerce Is Reshaping Industry Structures“ in this issue of *Prism*).

Such value creation stories are now luring late-adopting businesses (e.g., Alcoa, Exxon, Milacron, and Pharmacia and Upjohn), and multiple generations of consumers to realize the benefits of doing business electronically. Consequently, electronic commerce has grown far faster than even its most rabid boosters predicted. Only four years ago, top-end hyperbolic estimates suggested an EC market of \$50 billion in purchases in the year 2000. Today, estimates for the year 2000 reach \$100 billion, of which the business-to-consumer segment will represent 15 to 20 percent.

Impressive though these Web sales totals are, they are not necessarily the most significant performance measure because they don't capture the value electronic commerce creates through increased process efficiency. For example, both Cisco and Federal Express have reduced their customer care expenses by 65 to 70 percent. And while Dell is selling \$3 million per day directly over the Web, in addition, Dell's Web-assisted sales captured in a traditional call center are 30 percent more profitable than similar sales that are not Web-assisted. In another example, by moving 1,400 suppliers – from which GE purchased \$1 billion in goods in 1997 – to its Total Procurement Network, GE reduced cycle times up to 50 percent, procurement costs by 30 percent, and material costs by 20 percent. It also gained hard-to-quantify collateral benefits in improved relationships with its suppliers.

Often, the real driver for electronic commerce is strategic value, which generates long-term economic benefits. For commercial banks, the access the Web provides to inherently more profitable customers is a critical benefit in banking's deregulated and increasingly competitive market. The most profitable customers are more likely to be on the Web and to be attracted to online banking. Yet commercial banks historically have had a very low share of these customer assets. For leading electronic commerce-oriented banks, the ability to create and strengthen relationships in these segments has made the Web not just a complementary channel, but the most important channel.

Consequently, across high-tech and low-tech industries, manufacturers and service providers, and preexisting businesses and new Web entrants alike, the benefits of electronic commerce are being realized at the top line, at the bottom line, and in terms of less tangible, but often more significant, strategic benefits.

Organizational Obstacles

Given this positive experience to date – and a sanguine outlook – what could constrain the continued adoption of electronic commerce? Among consumers, the most often-cited barriers are typically security concerns related to credit account theft, „privacy,“ and access. For businesses, critical issues are network security, resource and competence availability, and legacy integration. For both consumers and businesses, these are temporary obstacles that will be overcome in the next three years. Far more enduring and significant are the substantial organizational, behavioral, and cultural issues that will prevent companies from fully realizing the benefits of electronic commerce.

Perceived security risks for consumers using credit cards in electronic commerce have not been borne out in actual experience, and the perception of risk is diminishing as American Express, MasterCard, and Visa and increase their ad spending, both to promote the online medium and to convince consumers of the safety of using their cards for online purchases.

Privacy, though a significant issue for a vocal minority, has not been a major inhibitor in the United States, where consumers are already accustomed to providing basic personal information that is often shared with other firms, hi Europe, however, privacy considerations could pose a significant issue, particularly in adoption of pioneering methods for lifetime customer management. If anything, the threshold of concern for privacy in the online arena is lower than in other media because of the higher potential for abuse. Two factors will mitigate a potential privacy backlash: first, self-policing by online businesses, much as mailorder firms do, as well as policing by firms such as TRUSTe, which will validate the privacy policies and practices of online businesses; and second, the fact that online consumers, recognizing the utility of targeted and directed marketing messages, have proven reasonably cooperative in allowing online businesses to collect the kinds of information essential for one-to-one marketing.

The question of whether Web access devices would find their way into enough homes to support widespread consumer electronic commerce was a significant concern when home PC prices were \$1,500-\$2,000 and home penetration was languishing in the 40 percent range. This is far less of an issue today, with low-end internet appliances and PCs costing as little as \$200 to \$600. In 1999, more than 50 percent of homes will have PCs, and nearly 60 percent of those will have Internet access. However, within the next 4 years the number of households accessing the Internet through non-PCs will increase from 3 to 20 percent, given the increased use of both Web appliances and mobile devices.

On the business side, the issues are more substantive and further from resolution. Concerns about security and privacy are critical enterprise-management issues. Eighty percent of Fortune 500 IS managers cited security as a critical issue in moving toward a fully networked environment, while 20 percent of businesses with Internet connections reportedly had a break-in within the last year. Pressure to solve this problem is intense: the IS manager of one global oil company was told that he would be fired if the company's online-related security was compromised.

The good news is that there is a burgeoning market for products and services that can manage security to acceptable levels. Differential, for example, is securing data access and providing risk management, primarily in the financial services industry, by offering a dual firewall product. Security is also typical of the new breed of security service providers, offering consulting services devoted solely to industrial-strength network security.

More troubling, at least in the short term, are issues of resource availability, particularly for small and mid-size firms. Many are eager to capitalize on EC but lack both staff and access to currently scarce electronic commerce skill sets, such as Java, CGI scripting, Web-enabled application tuning, load balancing, and security/risk management. Key internal staff are still engaged in Y2K conversions, with many electing to solve the problem by implementing Enterprise Resource Planning (ERP) systems. Thus they are also signing up for the disruptions caused by these systems and the attendant absorption of resources. Consequently, those moving forward toward e-commerce are often forced to do so without the benefit of integrating their Web front-ends with their back-end legacy systems. Even such leaders in EC implementation as Cisco and Dell until recently used a surprising amount of Web-to-fax and re-keyed data from their Web sites.

These issues will come to the forefront as businesses strive to realize the full potential of e-commerce by connecting across three sets of boundaries: information boundaries, which EC largely eradicates in a near-frictionless information environment; business system boundaries, which can be straddled by electronic payment systems, supply chain services, procurement catalogs, and one-to-one marketing applications; and interpersonal boundaries. In our view, this third set of boundaries, which are related to people's need for ownership and control, will prove the hardest to bridge. Lou Gerstner, Chairman of IBM, supports this view. IBM has been promoting the concepts and tools of e-commerce under the rubric of 'e-business'. On the basis of IBM's own experience and that of its clients, Mr. Gerstner says that, „It (e-commerce) requires a whole change in the way people think. It's a huge cultural issue. Are you willing to open the boundaries of your enterprise and bring in your extended team in a truly collaborative way?“

Thomas W. Malone, at the Massachusetts Institute of Technology Sloan School of Management, echoes Gerstner's concern. 'A very important determinant of where decisions are actually made is the pattern of interpersonal trust, motivations, prior distributions of power within the organization, and individual personalities. In any given situation at any given point in time, combinations of these other factors can be much more important than (IT systems and costs) in determining where decisions are made.'

The „people“ boundaries may be the hardest to cross for two reasons. First, because they relate to primal motivations of people for security, control, and power; and second, because people's mental models of how to „organize“ enterprises are based on the contexts in which organizations have historically functioned and the techniques that managers have traditionally used. These models and techniques are now coming up against a new organizational architecture.

The Architecture of an Extended Enterprise

In any human organization, there is fundamental tension between separation and connection. On one hand, we all want to protect our own interests and preserve our own identities. On the other hand, we must collaborate with others who also want to protect their own interests and identities, so that together we can produce something we could not produce by ourselves. Managing this tension is the challenge in creating effective collaboration within and increasingly among organizations.

These tensions often become most evident at boundaries, whether between the firm and its suppliers and customers or between its own organizational units. One widely shared issue pertains to the management of channel conflict, as firms increasingly draw customers to the Web, even at the risk of disrupting longstanding and valued channel relationships. Companies seeking to build multivendor catalogs of suppliers face the daunting task of securing the cooperation of their suppliers, even in situations in which the negotiating power does not favor the buyer. Companies interacting with their customers online must convince them to participate, not because it will save the selling companies sales and marketing costs, but because they bring compelling value propositions to customers. Companies participating in a shared online product development and manufacturing process must operate seamlessly and synchronously. What all these examples demonstrate is the increased interdependency and need for coordination among companies engaged in electronic commerce – all of which retain, at the same time, their individual strategic interests and objectives, which can undermine collaboration and prove mutually destructive.

The key to alleviating this conflict and achieving the maximum benefit from EC lies in a new organizational architecture and in new skills managers need to get things done in enterprises in which they do not own, nor have hierarchical power over, the resources they require.

Organizing Principles

Not surprisingly, principles of organization derived from a more stable world, in which boundaries between industries and companies were clearly defined and relatively predictable, are being stretched beyond their realm of efficacy in the digitally woven world of electronic commerce. We have defined four fundamental principles that must drive the design and operation of an effective networked enterprise, which we call a „fluid-network organization.“ Each of these principles applies to one of the four primary components of a business enterprise:

- *Strategy* – Aligned aspiration and choice of the partners must be the driving force for strategy formation, rather than centralized, top-down, and deterministic strategy formulation.
- *Organization* – Permeable boundaries must characterize the structure of the organization, both internally and externally.
- *Processes and Governance* – Minimal critical rules must be used to govern the enterprise and to manage boundary-spanning business processes.
- *Resources* – Flexibility must be developed in the capabilities of the resources used: over-specialization and elimination of redundancies makes enterprises too rigid and less adaptable to change.

All organizations need some means of coordinating their activities, to ensure the requisite performance by the parts and to enforce a modicum of discipline in the way things are done. Traditionally, power derived from singular ownership provided the organization with the means to implement the discipline, to reward performance and to bring the parts in line. However, in an extended enterprise, the „glue,“ by definition, cannot emerge from singular ownership control. Therefore these enterprises must learn how to coordinate activities by aligning goals and building trust. They need some minimal critical rules, consistent with their values, to manage the processes that cut across their organizational boundaries.

When Estée Lauder Companies, the world’s leading skin care and cosmetics company, decided to create the Clinique Web site, it faced the challenging issue of how to make the site a viable business through online sales without alienating its existing channels of distribution. Retaining channel loyalty was particularly critical given the tradition of trust and handshake deals that has governed Estée Lauder’s relations with its channel partners. Faced with the choice between removing sales from its site or disenfranchising its longstanding channel partners, the company chose a third way: it created a win-win solution by allowing its channel partners to fulfill online sales and also by using its site to drive foot traffic to the channel’s retail sites.

Two key characteristics of this solution are value sharing as a means to secure ongoing collaboration and a willingness to challenge existing paradigms and collaboratively define new sets of rules. The skills to align goals with partners and to develop the rules by which the business partners will govern themselves become essential for leaders and managers in fluid-network enterprises. These leaders will need skills to influence others over whom they do not have hierarchical power, but whose cooperation they need to achieve their goals. Besides, in networked enterprises, leadership will be widely dispersed; it cannot be concentrated at an apex because the fluid-network organization is not a monolithic pyramid!

Only through these new mental models and skills can the many partners in the extended enterprise share decision-rights effectively when necessary and create new shared rules as they learn together. Further, their „balanced score-cards“ must contain measures of the capability and performance of the networked enterprise, and not merely the performance of their own part. The organizing principles we have described can benefit all firms, not just those on the leading edge of electronic commerce. No organization, however, can ignore the waves of opportunity and risk that the Internet, globalization, and e-commerce are stirring up. Every business organization, at least in the more developed business world, will either tune into this new world or wither in isolation. The truly successful firms at leveraging the full potential of electronic commerce will rewire themselves to the voltage of the emerging electronic commerce world. And as we have explained here, the rewiring must take into account not only electronic commerce technology but also the organizing principles, mental models, and leadership skills of fluid-network organizations.

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