

## Business-to-Business Connectivity on the Internet: EDI, Intermediaries, and Interorganizational Dimensions

"At the intersection of the 1990s business forces and the 1990s information technology opportunities lie the need and the ability to provide increased and more flexible connectivity" (Madnick, 1991, p. 32).

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The relationship between firms and their business partners is changing. Partnership has become a major theme of business, and increasingly, firms are aligning themselves with suppliers in order to stay ahead of the competition. Businesses and their suppliers are not only exchanging transactional information, but they are also beginning to engage in project collaboration and to share research and development information. We will examine this growth in intercompany exchange of information, new forms of business-to-business connections. We will explore the future of electronic data interchange, look at prospects for the future of intermediaries and the interorganizational dimensions. The model in Figure 1 identifies the set of interlinking relationships between organizations, their suppliers and their customers.

### Intercompany Communications

Intercompany communications involves more than the conventional form of EDI. Innovative firms with good partner relationships are beginning to share sales data, customer buying patterns, and future plans with their suppliers. These intercom-

pany communications are facilitated through the use of the Internet as the physical connection between the firms. One example of a company doing this is McDonnell Douglas ([home.netscape.com.\\_profiles/mcdonnell.html](http://home.netscape.com/_profiles/mcdonnell.html)). Their commercial aircraft manufacturing division used Netscape and the World Wide Web to build a system to distribute aircraft service bulletins to their customers around the world. Users with unique passwords access a secured Web site from the McDonnell Douglas Web page. Fruit of the Loom is another company using the Internet for intercompany communications. Fruit of the Loom has its wholesalers connected through a web site where they have set up a virtual inventory system (Verity, 1996).

### Benefits

There are several benefits to having an information connection with your partners, evidenced in the McDonnell Douglas and Fruit of the Loom examples. McDonnell Douglas's commercial aircraft manufacturing division, Douglas Aircraft, needed a way to distribute aircraft service bulletins to its customers, 65 percent of which are international. The old way of

distribution was putting together the bulletins on paper, which were around 25 pages long, and mailing them to customers. The whole process took anywhere from a few days to two or three weeks for international customers. Fruit of the Loom has around 50 wholesalers nationwide to ship its goods in bulk to thousands of silk-screen printers, embroidery shops, and similar outfits. Fruit of the Loom in the past was not sophisticated in information technology, but now, they are offering to put their wholesalers on the Web, at virtually no cost. Their goal, according to CIO Charles M. Kirk, is to make their inventory system a virtual inventory for their wholesalers in order to avoid losing customers because the wholesaler is out of stock (Verity, 1996).

As the McDonnell Douglas and Fruit of the Loom examples suggest, partners get the information when they need it, and not after the fact. Secondly, this format saves money. Digital distribution of documents costs half as much as paper distribution does ([home.netscape.com.\\_profiles/mcdonnell.html](http://home.netscape.com/_profiles/mcdonnell.html)). In addition, digital storage of information is less expensive than what it would cost to store paper documents that build up over time. Lastly, there is the idea of "customer-pull" information. With digital storage of documents, partners and customers can access the information they need and manipulate it to work for them on their end. Information collaboration also fosters the ability to examine market trends, co-develop products, and to align businesses with their partners.

### Implementation

One way is to utilize e-mail to communicate with partners and customers. Encryption allows you to send secure messages over e-mail. However, this format does not allow for very rich information flow. A second method is to allow access through a Web page, as in the McDonnell Douglas and Fruit of the Loom examples. Lastly, companies are opening up their internal corporate intranets to allow partners to access specific information parti-

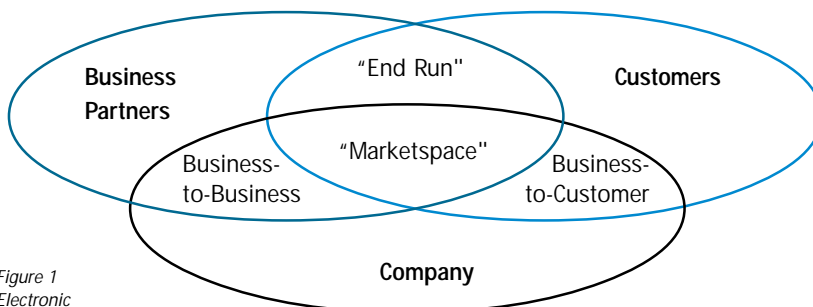


Figure 1  
Electronic  
Commerce Model

ment to individual partners. In the future, firms will conduct meetings via videoconferences. There will be global directory services, access to information servers, interactive groupware sessions involving users from different organizations, and increasing information collaboration between firms and their partners (Kalakota and Whinston, 1996).

**Interorganizational Dimensions**  
 Intercompany communications is a way that partners can cooperate and win in a world of increasing competition. The Internet is like any other information technology, it is an enabler, not a total solution. The ability to collaborate through the Internet will reflect the level of trust established between partners. In order to have the most effective information collaboration, both the firm and its partners need a high degree of information technology sophistication. What are the incentives for your partners to cooperate? If we look at the McDonnell Douglas and Fruit of the Loom examples, the incentives are clear. Their partners got the information they needed when they needed it. Intercompany communications will be beneficial when incentives for all partners are aligned.

**Electronic Data Interchange**

There are around 100,000 firms conducting EDI, yet these firms only represent a small fraction of the 6 million businesses in existence today (Baer, 1996). In the future, EDI will move to an Internet-like format, not necessarily the public Internet as we know it. A recent survey by Forrester Research, Inc. in Cambridge, Mass. revealed that 20 out of 30 heavy EDI users are looking seriously at the Internet (Baer, 1996). If EDI is going to become widespread, the implementation has to be practical for small and medium sized firms. That is where the Internet comes in. Internet technology is such that even companies with low information technology sophistication are able to conduct electronic commerce. Solutions are being adopted in which firms only need PCs with TCP/IP capability, Internet access, and a web browser to do EDI. The infrastructure

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is advantageous in that companies can exchange information with suppliers anywhere, and for a much lower cost than traditional EDI transactions through a Value Added Network.

**Benefits to Internet-EDI**  
 Not only can Internet EDI be more cost-effective, transactions can occur closer to real-time. Traditional EDI takes 12 to 24 hours for delivery versus minutes over the Internet (Baer, 1996). Lawrence Livermore Labs and Bank of America Corporation initiated a pilot program for Internet EDI. The average transaction was completed in 6 minutes, with much of that time spent negotiating with Bank of America's security checks (Baer, 1996). The pilot program demonstrates that fast and secure Internet EDI transactions are possible. Increasingly, firms are requiring faster delivery times for materials. They operate on a just-in-time inventory system, and they need suppliers who can help them survive in a time-critical environment. The Internet seems to be a logical medium for electronic commerce because of its open format, as well as its near-ubiquitous presence. The tremendous potential for cost and time savings over paper and traditional EDI are illustrated in Figure 2.

**Critical Issues**

There are two issues that will be resolved to make EDI happen over the Internet. The first issue is security. There is a standard

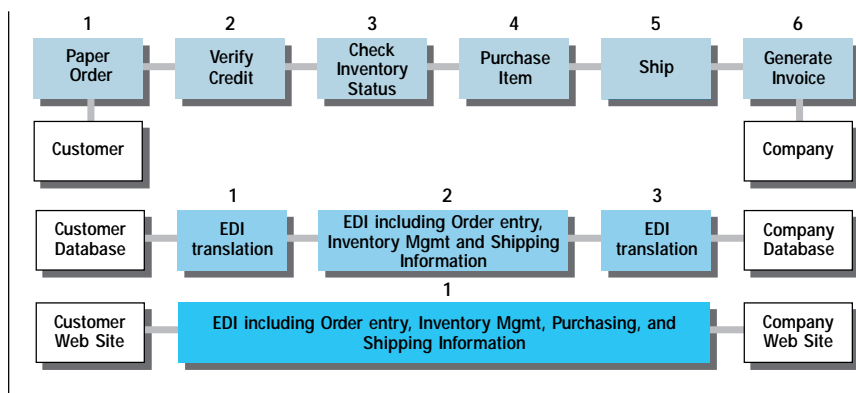


Figure 2  
 Paper Order Processing  
 Translational EDI  
 Internet EDI

coming soon for public key encryption to reduce security concerns and pave the way for Internet commerce. There will be a standard due to the fact that various electronic mail systems have public key encryption capability now (Kalakota and Whinston, 1996). The second issue is a software standard. We will witness a software package emerge as a standard, accepted by the business market. This will lead to open EDI on the Web. Traditional EDI is cost-prohibitive for non-Fortune 1000 companies due to the immense cost of translators needed for communication between firms using their own software. With open EDI, interaction between companies will be easier and less expensive because the need for special translators to convert messages will be eliminated.

#### Interorganizational Dimensions

The components for an Internet-EDI solution are innovativeness, level of information technology sophistication, existing strength of interorganizational relationship, and incentives (See Figure 3). First of all, the innovative firms are the ones who are doing Internet-EDI pilots now and are working out the problem areas. Secondly, the level of information technology sophistication should be moderate to high if you want to make effective use of EDI. In terms of interorganizational relationships, a contractual relationship will support EDI information flow. However, the more trust in the relationship, the more information will be available to you. Lastly, there has to be incentives for your partners to cooperate. If they do not derive benefits from participating, chances are they will not. If we have learned anything from traditional EDI, it is that partners with no incentives are usually not the partners that help to breed success.

#### The Role of Intermediaries

An integral role in the future of electronic commerce is the one played by intermediaries. They can provide a secure way for firms to interact with many suppliers on one medium. There are several implementations which would make this possible. One method is to use an old VAN in a new

way, such as General Electric Information Systems. There are two implementation options with GE: (1)an Internet based implementation designed for smaller firms or (2)use the Internet to access the GEIS network. A second method involves individual industries establishing their own network for electronic commerce.

#### GE Implementation Options

GE, which has been a traditional Value Added Network carrier, has repositioned itself and adapted to the change in the market. More firms are making the move to Internet-based EDI, and GE wants to be a part of it. GE TradeWeb (<http://www.getradeweb.com>) gives firms the option of exchanging EDI forms over the Internet or over GEIS' value added network (Perez, 1996). The Web site has mailboxes where the forms are received. The forms are also available on the Web site, where you fill them out. TradeWeb utilizes the Secure Sockets Layer encryption technology for its security. This solution is aimed to help small and medium sized companies to connect with their larger partners. These smaller firms can send a maximum of 25 forms a month and receive an unlimited number of forms. The cost of this service will be around \$1000 per year (Perez, 1996).

Figure 3 Business Applications with Interorganizational Dimensions

	IT Sophistication	Existing Strength of the Interorganizational Relationship	Incentives to Cooperate
Transaction-oriented (EDI)	<i>Low:</i> Difficult to achieve economies of scale <i>Moderate:</i> Can begin initial uses of EDI <i>High:</i> Most effective potential for use; Easier with symmetry between firm and partners	Can be supported in contractual, industry practice and trust situations. Additional information available with increasing levels of trust	Most often based on economic rationale. Can be result of pressure to participate. With enhanced information flow can serve to enable sharing of core competencies and information
Project Collaboration	<i>Low:</i> Infrastructure not sufficient for collaboration <i>Moderate:</i> Limited ability to collaborate with partners <i>High:</i> Most effective for project collaboration, at least within affected units	Cannot be supported by contractual or industry practice; Some level of trust must already be established	Economic rationale and pressure to participate will not give incentives to cooperate; Complementary core competencies and information provide incentives
Research and Development	<i>Low:</i> Infrastructure not present for R&D applications <i>Moderate:</i> Limited ability to do R&D applications between firm and partner <i>High:</i> Most effective for R&D applications, at least within affected units	Cannot be supported by contractual or industry practice; Strong level of trust between partners must be present	Economic rationale and pressure to participate will not give incentives to cooperate; Incentives derive from complimentary core competencies and information

#### Industry Example

The Agriculture and Chemical industries have created an alternative solution by setting up a proprietary network for electronic commerce. Rapid Inc., the intermediary which will administer the network, is paying Electronic Data Systems to set it up. The network will be TCP/IP-based and will offer a platform for conducting EDI, as well as providing full Internet access for subscribers. Users will be able to access a secure Web site called PowerAg that offers bulletin board services and databases on regulatory and industry issues. These industries like Web technology, as do others, because it makes it possible to have one readily accessible and inexpensive site to connect entire industries with many suppliers. The cost for Rapid Inc. to develop PowerAg is only \$5 million. Subscribers pay 19 cents for each 1,000 characters sent, plus \$175 connection fee and a \$45 monthly fee (Caldwell, 1996). This is much less than the charges for a traditional Value Added Network.

#### The Marketplace

The electronic marketplace, or virtual marketplace, is an idea that is becoming reality. There are a couple examples of services on the Internet now which will become the basis

for a future electronic marketplace. One service is Industry.Net, which was formed by former Lotus chief Jim Manzi. Secondly, there is an electronic bulletin board service called IBEX, or International Business Exchange. Lastly, there are specialty markets appearing on the Internet.

#### Industry.Net

Manzi and Industry.Net are focusing on the Internet becoming a place for business-to-business communication. Industry.Net will be a central marketplace where businesses can find authoritative information and conduct transactions with suppliers. Imagine a site where demand for goods and services is published, as well as a list of firms who can supply that demand and for how much. Jim Manzi feels this central marketplace idea will foster electronic commerce in a similar manner to how the development of cities centuries ago made them centers of commerce. How does Industry.Net work? Visit the Industry.Net site and do a search for a certain product. The site comes up with a list of manufacturers and their products, and you choose the one you need. This marketplace is not free for the companies that advertise products. For the Web presence, Industry.Net charges companies anywhere from \$3,000 to \$200,000 (PCMagazine, 1996). In the future, Industry.Net will take a cut from every transaction, just like credit card companies do now for credit card purchases. In order for a service like this to exist, it will have to make money. It is obvious that companies are going to have to make money on the Internet if they are going to stay on the Internet.

#### IBEX

The International Business Exchange was formed by a group that includes AT&T, Dun&Bradstreet, Digital Equipment Corporation, and SHL Systemhouse. IBEX is basically an electronic bulletin board on the Internet. IBEX allows firms in any country to post goods they want to buy or sell. This service allows firms to negotiate anonymously and, if a deal progresses, it will help them initiate credit checks, arrange financing, and get legal and customs paperwork completed by local companies (Verity, 1996).

### Conclusion

The mode for electronic commerce of the future will be a comparable medium to the Internet (See Figure 4). Businesses are beginning to broaden their relationships with their customers, suppliers, and partners beyond transaction-oriented processes. Electronic commerce is developing toward increased intercompany communications involving information sharing and collaboration. The present IT (information technology) sophistication symmetry between firms is also critical. The more symmetric the IT, the richer the information flow. Current EDI implementation and relationships are also

factors in determining what the future implementation will be. EDI is moving toward being Internet based, offering a common platform for transactions, speed, and cost effectiveness. In addition, Internet EDI will offer a secure and reliable solution. Even though electronic commerce is moving toward the Internet, there will still be a need and a place for intermediaries in a Net commerce world. The electronic marketplace will build from the foundations being laid today, from pioneers such as Industry.Net and IBEX.

#### Future Research

The business-to-business linkages will increasingly involve the flow of more than transactional information typical of EDI. Future research efforts will examine the growth of corporate intranets and the moves by many organizations to link this internal information with key partner organizations. In addition, the role of intermediaries and market makers will be explored as the "marketplace" takes a clearer form and grows in size and product content.

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	Likelihood of Advances	Costs	Benefits
Information Richness	As video and audio become more prevalent, the consumer will get more information content on products and services	Customer expectations will increase, requiring larger investments in describing products, providing customer service and presenting information on products and services	Increased granularity of product and service information. Ability to share greater amounts of relevant information with key business partners and customers
Degree of Interactivity	As video and audio become more widespread, as well as there being faster access times, interactivity will increase	Higher interactivity requires increased spending on infrastructure	Higher interactivity means increased information richness and higher customer satisfaction
Security	Within the next 3 months	High costs and very complex for this implementation	Enables more transactions to happen more rapidly
Cycle Time for Project Completion	3-6 months as more companies begin to use the Internet to streamline information	Connection costs with partners if you are not connected already	Cycle time significantly reduced at virtually low cost
Expansion of Markets	Within the next 2 months as intelligent agents improve and evolve; watch for new Excite following their acquisition of Magellan	Low cost in getting your business on the Internet if you are not on already; cost of maintaining and updating site to attract customers	Potential to reach customers and do business with other firms that would have been impossible to do before or very costly with traditional means
Support of Virtual Organization Model	Mobile connections to the Internet, multiple interorganizational connections, collaborative technologies	Cost associated with being connected to other organizations; lost use of employees involved in firm projects in favor of joint project	Ability to draw on core competencies from several organizations to complete special projects that benefit all organizations involved
Customer Information	Interactive collection of customer demographics	Connection costs with partners; open systems up to partners to access making them vulnerable	Analyze buying patterns and conform production schedules to past buying behavior
Customer Service	Audio and video will bring interactive Web sites; improvement in information flow	Lower costs to maintain over the Internet than with traditional means (800#s)	Information available to customers anytime at a low cost; customer pull
Electronic Marketplace	Substantial growth in intermediaries; Intelligent search agents	Flat fee to intermediary or percentage off of every transaction (similar to credit card transactions); product has to be competitively priced	Information Ability to increase sales and expand market base; customers will buy your products that have not heard of you before

Figure 4 The Future of Business-to-Business Use of the Internet