THE U.S. ELECTRONIC DATA INTERCHANGE MARKET

1992 - 1997

INPUT

About INPUT

INPUT is a worldwide consulting and market research firm uniquely focused on the information technology services and software markets. Executives in many technically advanced companies in North America, Europe, and Japan rely on INPUT for data, objective analysis, and insightful opinions to support their business plans, market assessments, and technology directions. By leveraging INPUT's considerable knowledge and expertise, clients make informed decisions more quickly, and benefit by saving on the cost of internal research.

Since 1974, INPUT has compiled the most extensive research base available on the worldwide information services market and its key segments, providing detailed market forecasts, vertical industry sector analysis and forecasts and analysis of vendor strategies and products. INPUT delivers specific expertise in the fast changing areas of outsourcing, systems integration, EDI/electronic commerce, software development/CASE, and on the impact of downsizing.

Consulting services are provided by more than 50 professionals in major international business centers. Clients retain INPUT for custom consulting/ proprietary research, subscription-based continuous advisory programs, merger/acquisition analysis and detailed studies of U.S. federal government IT procurements.

Most clients have retained INPUT continuously for a number of years, providing testimony to INPUT's consistent delivery of high-value solutions to complex business problems. To find out how your company can leverage INPUT's market knowledge and experience to gain a competitive edge, call us today.

INPUT OFFICES

North America

San Francisco
1280 Villa Street
Mountain View, CA 94041-1194
Tel. (415) 961-3300 Fax (415) 961-3966

New York
Atrium at Glenpointe
400 Frank W. Burr Blvd.
Teaneck, NJ 07666
Tel. (201) 801-0050 Fax (201) 801-0441

Washington, D.C. - INPUT, INC.
1953 Gallows Road, Suite 560
Vienna, VA 22182
Tel. (703) 847-6870 Fax (703) 847-6872

International

London - INPUT LTD.
Piccadilly House
33/37 Regent Street
London SW1Y 4NF, England
Tel. (071) 493-9335 Fax (071) 629-0179

Paris - INPUT SARL
24, avenue du Recteur Poincaré
75016 Paris, France
Tel. (1) 46 47 65 65 Fax (1) 46 47 69 50

Frankfurt - INPUT LTD.
Sudetenstrasse 9
W-6306 Langgöns-Niederkleen, Germany
Tel. 0 6447-7229 Fax 0 6447-7327

Tokyo - INPUT KK
Saida Building, 4-6
Kanda Sakuma-cho, Chiyoda-ku
Tokyo 101, Japan
Tel. (03) 3864-0531 Fax (03) 3864-4114

JULY 1992

THE U.S. ELECTRONIC DATA INTERCHANGE MARKET

1992-1997

INPUT®

1280 Villa Street, Mountain View, California 94041-1194 (415) 961-3300

Published by
INPUT
1280 Villa Street
Mountain View, CA 94041-1194
U.S.A.

EDI and Electronic Commerce Program
(EDEDI)

The U.S. Electronic Data Interchange Market, 1992-1997

EDI92 • 448 • 1992

Abstract

This report defines the current state of the U.S. EDI marketplace, and provides detailed estimates of current (1992) and future (through 1997) user expenditures for EDI products and services. Specific industry trends are identified, and usage characteristics, profiles and patterns are described and analyzed.

The report notes the most significant issues now facing the EDI industry, analyzes them, and offers a series of recommendations for EDI users and vendors. A number of industries offering unusual vendor opportunities are identified.

This report contains revenue and market share estimates of vendors of EDI software and services. Comprehensive profiles of these vendors are found in the companion volume to this report, *EDI Vendor Profiles and Analysis*.

This report is 102 pages long and contains 47 exhibits. An index of companies mentioned in the report is included.

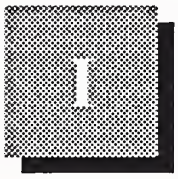
Table of Contents

Table of Contents (Continued)

Table of Contents (Continued)

Exhibits

Exhibits



Introduction

This report, produced as part of INPUT's EDI and Electronic Commerce Interchange Program, examines the EDI market in the United States.

A
Scope of the Report

INPUT defines EDI as the application-to-application exchange of intercompany business data in structured, standard data formats. Business data typically includes invoices, purchase orders, shipping documents, and other information that companies exchange with each other during the course of commercial transactions.

This report focuses on third-party EDI service and software markets in the United States and excludes consumer applications such as electronic shopping, electronic banking, automatic teller networks (ATMs), point-of-sale (POS) data/funds transfers, airline reservation systems, credit authorization systems, and other captive networks that are used for transactions between two parties. Although these systems do use structured data formats to transfer information, the applications generally use specialized terminal devices to communicate with dedicated computers, are not computer-to-computer, application-to-application implementations, and use proprietary data formats rather than public standards.

Analysis of these other technologies and their respective markets can be found in other INPUT studies of electronic commerce. See Section D, Related INPUT Reports, below.

The report is designed to assist vendors in:

- Identifying new markets and product opportunities
- Assessing product and marketing risk exposure
- Allocating research, development, and operational resources
- Gaining insights into market developments

The report also helps EDI users to:

- Become familiar with the various applications of EDI throughout industries and sectors of the economy
- Understand product trends for EDI and how other users are implementing EDI systems
- Become familiar with the vendors of the EDI market

This report reviews the state of EDI use within the economy, how it is being applied in selected industrial/commercial sectors, the concerns and practices of EDI users today, how much users are spending on EDI products and services, how much the market for these products and services will grow through 1996, who the leading vendors of these products and services are, and the features and characteristics of these products and services.

B
Data Collection

INPUT prepared this report using data gathered from surveys and interviews of EDI users, representatives of industry trade associations, and vendors of EDI products and services. In addition, a variety of published material was used, including vendor annual reports, and articles drawn from a broad spectrum of print media.

1. Interviews

a. Surveyed EDI Users

Using a structured questionnaire, INPUT surveyed a total of 134 user companies. Respondents at these companies were directly involved in the company's EDI program and were typically EDI project directors, EDI systems analysts, or functional managers (e.g., in purchasing).

A copy of the questionnaire is contained in Appendix D.

Exhibit I-1 lists the kinds of companies interviewed for this report.

EXHIBIT I-1

Company Types Interviewed

Industry Type	Number of Companies
Discrete Manufacturing	29
Process Manufacturing	36
Health Services	3
Business Services	1
Education	2
Federal Government	2
State & Local Gov't.	2
Transportation	5
Utilities	4
Communications	3
Retail Distribution	17
Wholesale Distribution	22
Banking	5
Insurance	3
Total	134

Companies interviewed ranged in size from small to Fortune 500. Exhibit I-2 lists the size of companies by the number of employees.

Of the 134 companies interviewed, INPUT could determine the revenues of only 114. The revenues of these 114 are broken out in Exhibit I-3.

EXHIBIT I-2

Size of Companies

Number of Employees	Percent of Companies
< 100	33
100-499	15
500-999	5
1,000+	47
Total	100

EXHIBIT I-3

Revenues of Companies

Revenues ($ Millions)	Percent of Companies
<19	27
20-49	12
50-99	8
100-499	12
500-999	13
1,000+	28
Total	100

b. Other EDI Users

In addition to the survey, INPUT maintains continuous contact with a broad range of EDI users, especially in conjunction with the publication of its *EDI Reporter International* newsletter. Information obtained from conversations with these users also contributed to this report.

c. Associations

INPUT has an ongoing dialogue with the major EDI industry trade associations. The information and opinions offered during a broad range of interactions have been factored into this report.

Exhibit I-4 lists the industry trade associations with which INPUT maintains ongoing relationships.

EXHIBIT I-4

Trade Associations

- Health Insurance Business Communications Council
- National Wholesale Druggists Association
- National Electrical Manufacturers Association
- Electronics Industries Data Exchange (EIDX)
- Aerospace Industries Association of America
- National Automated Clearinghouse Association (NACHA)
- Cal Western Automated Clearinghouse
- National Customs Brokers and Forwarders Association of America
- Automotive Industry Action Group (AIAG)
- Voluntary Inter-industry Communication Standard (VICS)
- American Trucking Association
- American Association of Railroads
- Construction Industry Institute
- Uniform Code Council
- Chemical Industry Data Exchange (CIDX)
- Utility Industry Group
- Printing Industries of America
- Graphic Communication Association
- American Paper Institute
- National Association of Purchasing Management
- Insurance Value Added Network Service Inc. (IVANS)

d. Vendors

INPUT is continually canvassing vendors of EDI services and products. Communications occur for many reasons—to respond to INPUT client consulting requests, to report on news in INPUT's *EDI Reporter International*, to stay current with developments in the EDI world, to update INPUT's information bank, and to gather data for this and other reports.

Vendor communications take place over the phone, in person during visits between INPUT and vendors, and in person during EDI conferences and meetings. INPUT maintains active contact with over 25 software vendors and 15 services companies that participate in the EDI market.

2. Product, Service and Industry Analysis

INPUT collected and analyzed information on EDI services and vendors planning EDI services, and reviewed secondary research sources. Additionally, INPUT monitored industry publications, attended conferences, and secured other relevant research data in the process of preparing this study.

3. Related Program and Custom Research

INPUT has been engaged in several consulting projects concerning EDI and has published a variety of other publicly available research reports on EDI. Although no proprietary information from the custom research is revealed, the general industry knowledge gained is presented in this report.

C
Report Structure

The report is structured in the manner noted and addresses the following topics:

Chapter II is an Executive Overview of the entire study.

Chapter III is a background and tutorial on EDI that reviews the rationale, product and service needs, and objectives of companies that implement EDI.

Chapter IV contains market forecasts and user expenditure estimates for services and software, and presents an overall market forecast.

Chapter V reviews the trends in vendor software, network and professional services offerings, and examines significant issues defined during dialogues with EDI vendors and users.

Chapter VI presents conclusions and recommendations for EDI users and vendors.

Appendix A refers the reader to sources of definitions used in this report.

Appendix B contains the forecast data base.

Appendix C contains the reconciliation between INPUT's 1991 forecast for the EDI market and the 1992 forecast.

Appendix D contains the survey questionnaire completed by EDI users.

D
Related INPUT Reports

This study is one of a continuing series focused on EDI. Other reports (with their respective publication years) in the series include:

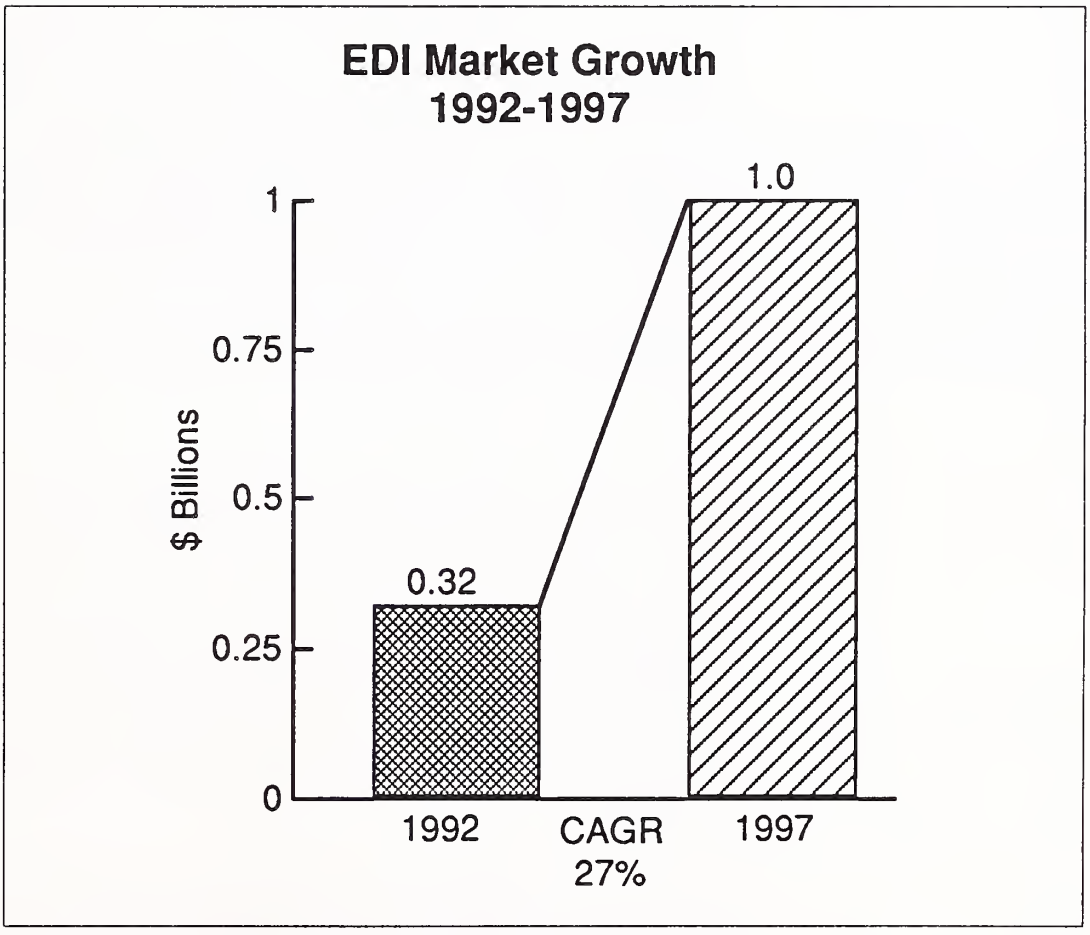
- *EDI in Japan (1992)*
- *EDI in Europe (1992)*
- *Electronic Commerce in The Media Industry (1992)*
- *Electronic Commerce in Travel and Tourism (1992)*
- *Electronic Commerce in U.S. Health Care (1991)*
- *Electronic Commerce in Trade and Transportation (1991)*
- *Electronic Commerce in Grocery Production and Distribution (1991)*
- *Electronic Commerce in Apparel Production and Distribution (1991)*
- *Electronic Commerce in the U.S. Federal Government (1991)*
- *Electronic Commerce: The New Foundation for Trade (1991)*
- *Developments in Corporate Electronic Trade Payments (1991)*
- *North American EDI Service and Software Provider Profiles (1991)*
- *The U.S. EDI Market, 1991-1996 (1991)*
- *The EDI Market, 1990-1995 (1990)*
- *EDI: Business Integration Issues (1990)*
- *The Western European EDI Market, 1991-1996 (1991)*
- *Western European Electronic Information Services—1990 (1990)*
- *Financial Network Services in Western Europe—1990 (1990)*
- *Advanced EDI Services (1989)*
- *EDI Standards Reference Guide (1989)*
- *EDI Implementation Case Studies (Volumes I and II) (1988, 1989)*
- *EDI and X.400 (1988)*

II

Executive Overview

The market for EDI software and services continues to grow at a rate of 20% to 25% per year. INPUT expects it to become a billion-dollar market by 1997 and to grow at a compound annual growth rate of 27% between now and then. Exhibit II-1 depicts this growth graphically.

EXHIBIT II-1



Just in the last year—from 1991 to 1992—there has been tremendous growth in the market for EDI translation software that runs on midrange platforms (typically, AS/400s, and the System 3X class of machines).

The growth in the midrange market, INPUT believes, corresponds to more users upgrading their EDI capacities. After a certain number of trading partners has been attained with whom EDI is used as a communication channel, the typical EDI user will replace its translation software. In this year's survey of 134 experienced EDI users, more than half (58%) reported that they had replaced their software in this manner.

Last year's introduction of UNIX-based EDI software that is distributable in a client/server fashion fits into this trend of upgrading by users. INPUT expects the UNIX-client/server architecture to be a successful market offering, bringing satisfaction to EDI users, and growing rapidly from its current relatively small market niche.

INPUT expects that consulting and systems integration professional services for EDI will be one of the most rapidly expanding segments of the EDI market over the next five years. Professional services will increasingly be required as workflow is restructured within companies as well as within trading communities. Part of the growth in the professional services segment, however, may be due to a redefinition of what constitutes "EDI consulting." Re-engineering business processes and workflow will be intermixed with EDI projects. An EDI project in 1997 will be as much a re-engineering project as an EDI project. This expansion of the scope of EDI consulting, because it is more inclusive, will cause the market for EDI consulting services to appear larger than it would if a narrow definition of EDI were used.

Despite the relatively solid growth for EDI products and services, the EDI market faces some challenges.

The first challenge is competition among vendors. Entry by software providers into the mainframe and midrange EDI software markets will further erode profit margins in those arenas. The network services market, already subject to falling prices over the past couple of years, will continue to be a price-war battleground, especially as some Regional Bell Operating Companies increase their EDI offerings. The only way network providers can compete is to move away from offering basic transport services and offer community-wide system support (such as electronic information services, trading partner implementation programs, E-mail, and others).

An even greater challenge to EDI than competition is the way EDI is marketed by vendors and understood by users. Today, EDI is a rigidly defined technology looking for a buyer. To be more widely used, EDI must be more flexible (to accommodate many kinds of business relationships and processes) and it must be sold as part of a larger solution.

Buyers of EDI typically come to EDI because it offers the possibility of streamlining their operations. EDI should be packaged in a solution that addresses this request for streamlining. Today, however, it is largely sold as a standalone technology.

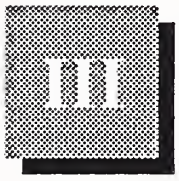
Nevertheless, some vendors are shifting the way they position their products to address this challenge. Making alliances with many other vendors, INPUT believes, is the right approach to take in selling EDI.

Lastly, a third—and perhaps the greatest—challenge facing EDI is integration. Integration is difficult on two levels: for the single EDI user to integrate its internal applications with EDI, and for the trading community of users to integrate their business workflows with each other through EDI.

The reason this is challenging is that so much has to be coordinated and no single person or group can foresee all contingencies. The rigidity of the EDI architecture prevents the user from responding to changing business conditions.

INPUT recommends that users and vendors alike take the position of being "market makers" when it comes to EDI. That is, they should position themselves with their customers and suppliers in such a way that it is in the interest of all parties to build and use an EDI infrastructure.

Effectively implementing EDI requires vendors and users to incrementally build an EDI infrastructure and share the investment costs with as many parties as possible.



EDI Background

Electronic data interchange (EDI) was conceived in the 1960s with a particular rationale: to eliminate the paper that companies send to one another in the course of conducting business.

This rationale has guided the conceptual development and proliferation of EDI since then.

This rationale, however, is in crisis. It no longer serves the further development of EDI.

A new rationale, a new architecture, and a new understanding of EDI are necessary.

This report, in bringing to light new empirical evidence regarding EDI use today, re-examines some of the "sacred" principles of traditional EDI. The purpose is to indicate new directions and possibilities open to people who build and use data interchange systems.

Before proceeding further, INPUT will first present the concept of EDI as it is traditionally understood.

A
Introduction

Today, in the United States, virtually all large and many smaller companies have installed computerized systems for routine business operations such as order processing, inventory control, accounting, and so on.

A business will use these computer applications to prepare business documents such as purchase orders, invoices, shipment bills of lading, etc. Typically, the documents are printed on paper and mailed to the company's appropriate trading partner. For example, purchase orders are sent to suppliers, invoices to customers, bills of lading to transportation vendors, and payment instructions to the company's bank.

The company's trading partners receive these paper documents and, in most cases, put the data into their respective computer systems. In other words, the data generated in one company's computer system is temporarily transferred to paper so that it can be re-entered into another company's computer. In fact, a study by General Electric found that 70% of all data entered into computers is generated by other computers.

Electronic data interchange (EDI) was invented to eliminate the need for paper data transfer methods and their associated high labor intensiveness and cost.

The rationale for EDI is to allow the direct computer application-to-computer application exchange of data representing business documents. This exchange is sometimes handled by physically shipping computer tapes or diskettes. But increasingly, data networks are being used.

B

The Role of Standards

Rarely do two businesses have computer applications that format the data of their business documents identically. Furthermore, different computer systems (with different brands of hardware, software, telecommunications protocols, etc.) prevent applications from being connected and smoothly communicating with each other.

Thus, to allow computer systems to directly tie into each other, the data formats that represent the business documents must be standardized. Each organization is then free to build its particular applications to a common standard. The data is machine processable by any other application that has been built to the standard. Exhibit III-1 gives the technical definition of EDI.

Despite the availability of public standards, however, there is much EDI activity that is conducted using proprietary data formats. Usually, a dominant company requires that its dependent suppliers accept the data formats of its system(s), with the penalty to the supplier being the potential loss of business if it doesn't comply.

EXHIBIT III-1

Definition of EDI

EDI is the application-to-application exchange of intercompany business data in structured, standard data formats

C
Benefits of Using EDI

Companies using EDI benefit from improved use of labor, inventories, capital (funds) and facilities.

Specific benefits are listed in Exhibit III-2.

D
EDI and Other Data Communications Applications

For the purposes of market definition, analysis and discussion, EDI should not be confused with other closely related data communication applications. These include:

On-line Systems

On-line systems such as computer reservation systems (CRS) and customer order-entry systems are not considered EDI. These systems adhere to a terminal-host architecture, not the host-host architecture mandatory for the application to be considered EDI.

Electronic Funds Transfer

Buying and selling relationships involve inquiring, ordering, bidding, shipping, and other similar activities. The process culminates in a monetary exchange. EDI is typically associated with the transfer of information regarding the first set of functions, while EFT is the transfer of monetary value.

EXHIBIT III-2

Benefits of EDI

- Data Keying—EDI reduces or eliminates redundant data entry.
- Errors—EDI eliminates keying errors; eliminates human interpretation/classification errors; and eliminates filing errors and lost documents.
- Filing—EDI replaces paper document filing with electronic files. It eliminates the need for human filing and file retrieval and reduces total space for computer files.
- Paper Forms—EDI reduces paper forms, especially multipart carbons going to many departments.
- Postage—EDI replaces mailed documents with data transmissions.
- Invoicing—EDI eliminates the need to invoice, since payment can be automatically triggered upon receipt of goods (evaluated receipt settlement).
- Payment—EDI replaces checks with electronic payment.
- Accounts Receivable—EDI automates the cash application function, improves control, and eliminates the billing/invoicing function via evaluated receipt settlement.
- Accounts Payable—EDI automates the entire payments process, including payment and remittance creation; it eliminates invoice validation via evaluated receipt settlement.
- Inventory—EDI reduces order lead time and order confirmation delay; it facilitates just-in-time inventory and the maintenance of lower levels of costly inventory. It reduces out-of-stock situations and allows better control overall.
- Customer Service—EDI allows for more responsiveness to customers and direct sales connections, and encourages lasting relationships with customers.

Financial institutions have developed structured, computer processable data formats by which they can transfer value amongst themselves and on behalf of their customers. Because these formats were developed within the banking industry (and under the control of the Federal Reserve), EFT is not considered an entirely EDI application.

In particular, data exchanges involved in automated teller machine, point-of-sale, and many kinds of interbank transfers (such as those for foreign exchange trades, cash considerations or direct deposit of payroll) are considered to be outside the definition of EDI. Only those funds/data transfers that are specifically linked to a corporate-to-corporate business transaction are considered within the scope of EDI. Often, industry insiders call the funds transfer side of EDI "EDI/EFT" or "financial EDI."

Electronic Mail

Electronic mail (E-mail) contains text that is freely formatted/structured and therefore not machine processable. Although allied to EDI, E-mail is not considered EDI and will not be analyzed in this report. However, it will appear as a topic in Chapter V, EDI Market Trends and Issues.

E

The Role of Value-Added Networks

Using today's standard (voice) telephone lines, the computer systems of a company can directly "dial up" another company's computers to exchange EDI messages. Indeed, many large companies maintain their own substantial internal data communications networks and frequently allow outside companies to access these resources. Today, some EDI is done in this manner, e.g., directly between companies. However, this approach is not practical for the majority of companies that are using (or could potentially use) EDI. Reasons for this limitation include:

- The computers, communications protocols to connect them, and the data formats between sending and receiving computers may be incompatible.

- Business relationships are numerous and complex, especially for large companies. Each EDI trading partner may have unique data formatting, protocol, scheduling, and other requirements. Managing the multitude of specific requirements quickly becomes a non-trivial task requiring people and computing resources when many (approximately twenty or more) EDI trading partners come on-line.

- Direct links require expensive hardware at the host company. Mandatory capabilities include multiple telecommunications ports, 24-hour operation capability, fault-tolerant architecture, network management capabilities, mailbox capabilities, the ability to handle a variety of protocols and line speeds, and security features.

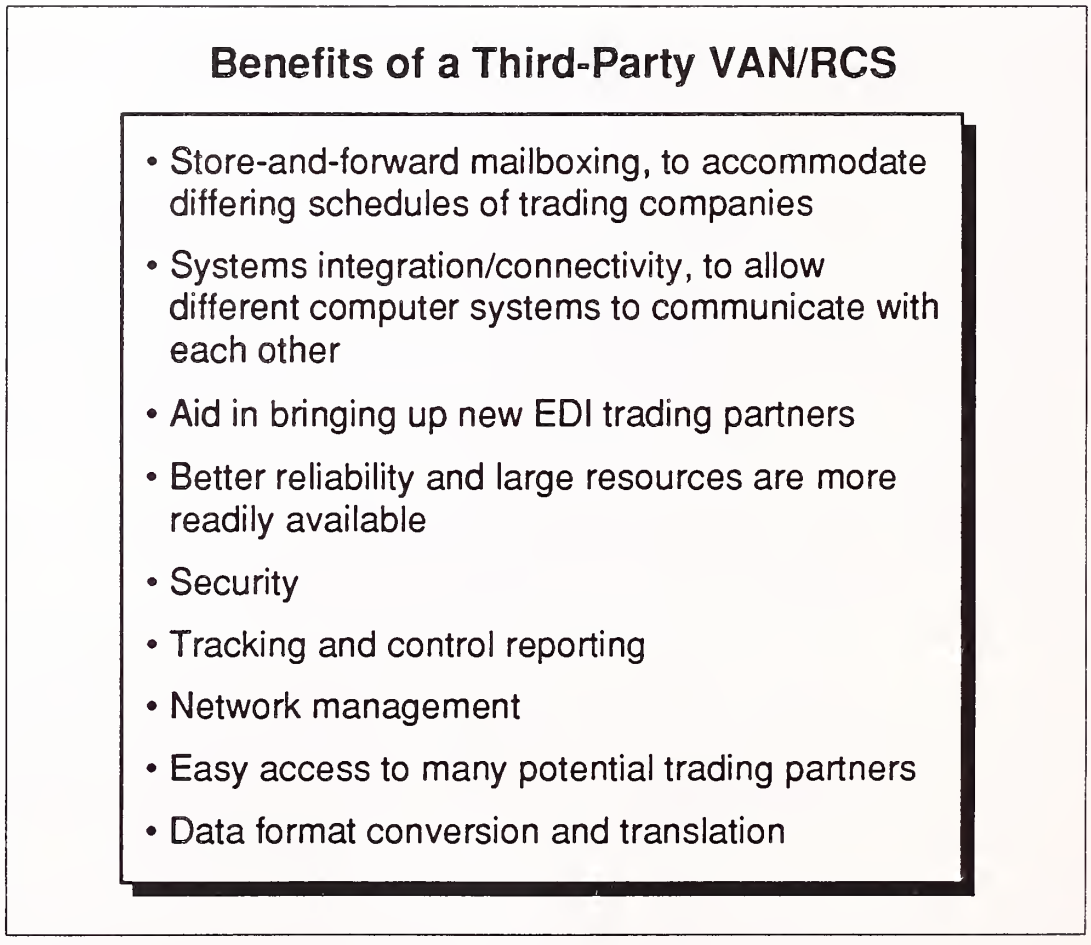
Because of these requirements, the need arises for a third party, such as a value-added network (VAN) or a remote computer service bureau (RCS) to act as an intermediary between companies that trade electronically.

In addition to resolving the noted shortcomings of direct telecommunications between companies, third-party VANs provide other services to EDI-using companies. Exhibit III-3 lists the benefits of using a third-party VAN or RCS.

Today, networking for EDI transmissions is provided in three broad categories:

- Directly between two companies using standard telephone lines
- Via a third-party VAN/RCS store-and-forward switch
- Via an industry association clearinghouse, which is similar to a VAN/RCS. Transnet (automotive parts), IVANS (insurance) and Specification 2000 (aircraft parts and services) are examples of this approach.

EXHIBIT III-3



F
The Role of Software

Essential to EDI is the translation of company data formats into standard formats or into the proprietary formats of a leading trading partner.

Users subscribing to VAN or RCS services may rely on software hosted on the vendor's processors to perform data format translations. Alternatively, users may conduct this translation function on their own premises using in-house translation software. This approach is less expensive over time and is the dominant trend.

Users can either write their own software or purchase it.

- If software is purchased, customization and interfacing to internal applications by the software vendor, a professional services vendor, a consultant, or the user's own development staff is usually required.

- EDI software should be closely linked ("mapped") to existing applications to optimize its usefulness. Otherwise, a company may have to print the received EDI transactions (to understand what has been transmitted) and rekey the data, thus losing efficiency.

G
User Trends in Adopting EDI

1. Reasons for Implementing

Typically, it is the large Fortune 1000 and Forbes 500 companies that consider EDI a strategic technology and deliberately incorporate it into long-range plans. Smaller companies do not necessarily view EDI as strategic, and frequently implement it only because their largest customers have requested that they do so. In a 1991 INPUT survey, the respondents indicated that 40% had implemented EDI because their customers had required or requested it. Thirty-eight percent stated that they had asked their suppliers for EDI. Primary reasons for implementing EDI are summarized in Exhibit III-4.

EXHIBIT III-4

Primary Reasons for Implementing EDI

Reason	Percent
Company's customers required it	40
Company asked suppliers	38
Company asked customers	5
Supplier asked customers	2
Other	15

2. The "Hub and Spoke" Phenomenon

Because most users adopt EDI at the request of a large trading partner, a "hub and spoke" pattern has emerged. A single large company—the hub—has electronic ties with several suppliers and trading partners—the spokes. EDI typically grows along the lines of these hub-and-spoke clusters.

3. Customer Premise Data Format Translation

Since the mid-1980s, users have increasingly opted to perform data format translation on their own hardware platforms with purchased or developed software, and not use the translation function of the VANs. An explosive increase in the number of third-party software vendors (there are now more than 40) since 1985 has led to a large selection of translation software. Packages are available not only for mainframes, but also for micros and midrange computers. Prices range from $600 to $20,000 for the non-mainframe packages, and from $15,000 to more than $120,000 for mainframe versions. Thus, there are multiple points of entry for the novice EDI company.

4. User Platforms

In the hub and spoke environment, the large hub company usually implements a mainframe translation software package. Its trading partner spoke companies usually implement micro or midrange packages. Sometimes, however, a large company will use a smaller platform than a mainframe—often a micro—to perform all communications with the VAN and all data translation. The smaller platform is connected to the company's mainframe(s) where the applications reside. Such a configuration (called a "front end") also provides a high level of security by preventing outside telecommunications from directly interfacing with the company's central processor(s).

5. Use of Networks

Method - INPUT's research shows that the majority (67%) of EDI users are accessing third-party networks. Very few (approximately 8%) communicate directly with trading partners using only ordinary telephone lines. However, almost 30% use both direct and third-party services, and this mixed group is expected to grow in proportion to the others.

Dual Sourcing - INPUT's research also shows that one-quarter of all users access more than one third-party network. Multiple networks are used to reach the greatest number of trading partners.

Internetworking Services - The main EDI networks today are interconnected and will transfer a customer's EDI messages to other networks for delivery. Nearly all EDI users are invoking this service.

6. Relationships with Trading Partners

EDI is often implemented along with just-in-time (manufacturing) or quick-response (retail) inventory programs. JIT and QR are inventory management concepts designed to minimize inventory levels. Only enough vendor products are ordered to meet the demands of production or customer sales.

In addition to minimizing on-hand inventories, JIT and QR programs often minimize the total number of suppliers with which a company does business. Companies seek only suppliers that meet delivery dates and quality levels. Thus, EDI is often conducted among companies that have formed very close business relationships.

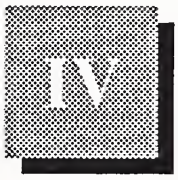
7. EDI Use Grows in Two Dimensions

Typically, a pilot EDI program starts with a single transaction set (for example, a purchase order), with a single trading partner. After the pilot—which may take anywhere from one week to three months—more trading partners are brought in using the same transaction set. Once a certain volume of trade is conducted in a single transaction set, a new transaction set is introduced and the process is repeated. First the number of trading partners increases, then the number of transaction sets.

8. Parallel Paper and Electronic Systems

No company, to date, transacts *all* of its business in the EDI environment. Even sophisticated companies use EDI only in small proportion to its potential. Typically, a company only sends EDI purchase orders to a handful of key suppliers.

Most EDI-using companies have discovered an "80-20" rule when implementing EDI. The top 20% of their trading partners are typically responsible for 80% of their business. Therefore, a company will target these key partners to start an EDI program. For the remaining 80% of their trading partners (with whom the company transacts only 20% of its business), traditional paper documents are used. Thus, all companies conducting EDI today still have two systems: EDI and paper.



The EDI Market and Forecast

A
Introduction

This chapter presents quantitative data on the market for EDI software, network services, professional services and educational conferences.

The market is estimated in terms of the number of EDI-using companies, and expenditures on EDI products, services, and events by these companies.

B
Challenges of Measuring the EDI Market

The following are some of the challenges faced in trying to estimate the EDI market:

- Not everyone uses the same definition of EDI.
- Most interviewees at a user or vendor company will be unable to answer all questions relevant to a market research study.
- Double counting occurs—one cannot add up all trading partners of every EDI user (or all the customers of every network) to find the total number of EDI users. Many of one company's EDI trading partners are also the EDI trading partners of another company.

1. Counting the EDI Marketplace

Exhibit IV-1 lists the variables used to measure the EDI market.

This report focuses on the number of companies using EDI, the number of trading relationships, the total expenditures of users, and the total revenues of vendors.

EXHIBIT IV-1

Statistical Data That Can Be Used to Size the EDI Market

- Number of companies using EDI
- Number of locations using EDI (some companies have more than one location using EDI)
- Number of EDI mailboxes on networks
- Number of invoicable EDI customers on networks (some companies' EDI network fees are paid for by a trading partner)
- Number of EDI transaction sets sent
- Number of EDI digital characters sent
- Dollar volume of trade for which EDI is responsible
- Percentage of total communication transactions (phone, mail, facsimile, E-mail, telex) for which EDI is responsible
- Number of EDI trading relationships
- Total user expenditures on EDI services and products
- Total vendor revenues from EDI services and products

2. Users versus Trading Relationships

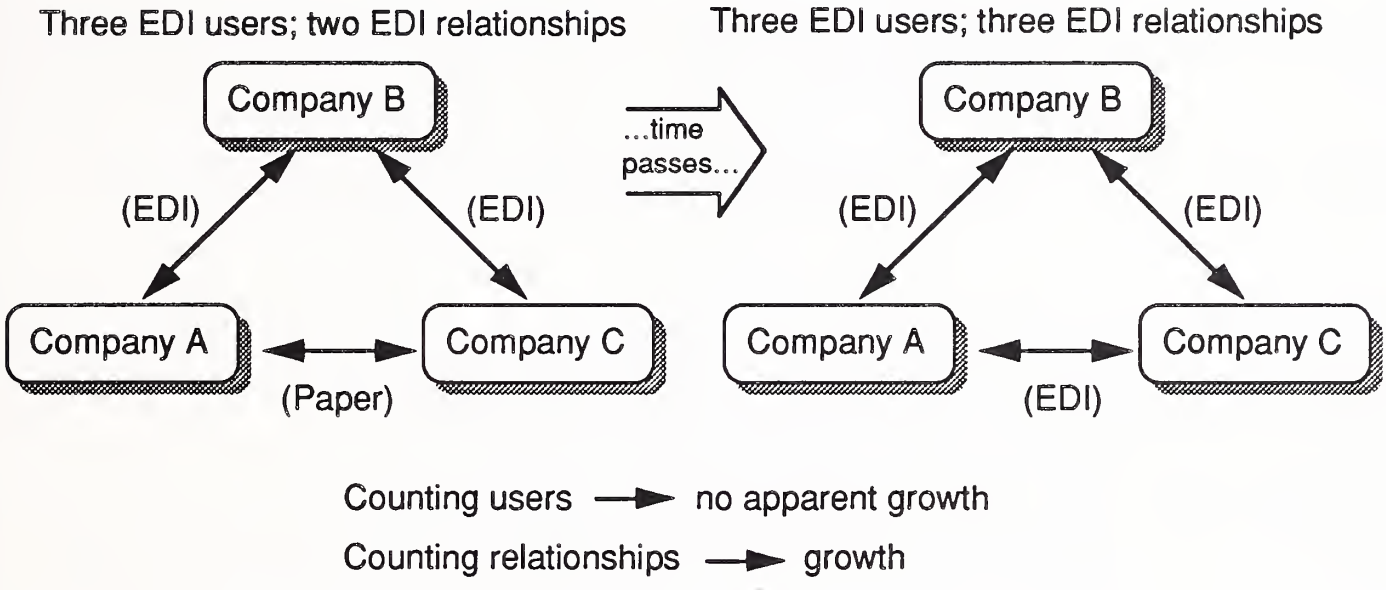
An important distinction in estimating EDI usage is the difference between total EDI users and total EDI trading relationships.

Exhibit IV-2 illustrates the difference between users and relationships.

EDI usage can grow without an increase in the number of users. Growth occurs when existing users establish new EDI trading relationships among themselves and/or existing users expand their use of EDI with existing trading partners (introducing new transaction sets, increasing the volume of use of existing transaction sets, etc.).

EXHIBIT IV-2

Difference Between EDI Users and EDI Trade Relationships



The relationship between number of users and number of trading partners is shown in Exhibit IV-3.

EXHIBIT IV-3

Relationship Between Total EDI User Population and Potential EDI Trading Relationships

$$\sum_{i=1,n-1} n - 1 = i$$

n = total number of EDI-using companies

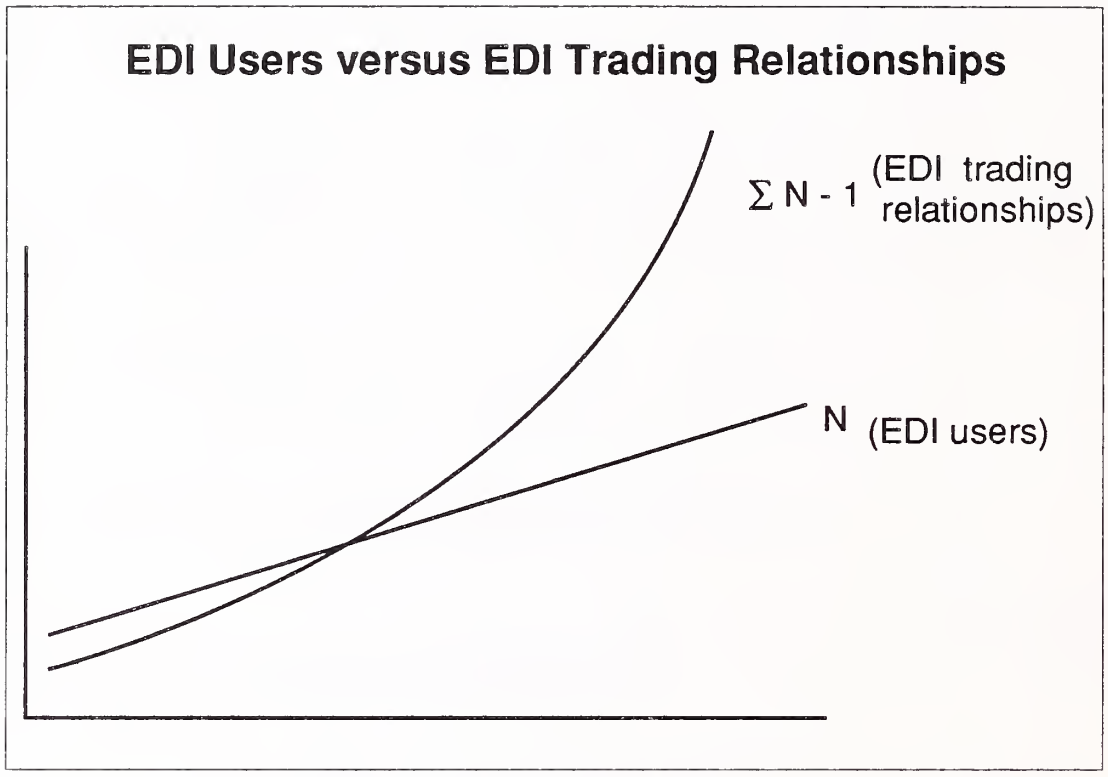
i = total number of EDI trading relationships

n	n - 1	Σn - 1
2	1	1
3	2	3
4	3	6
5	4	10
.	.	.
.	.	.
.	.	.

The formula states that each new EDI user that joins the total user population adds to the existing number of potential trading relationships by its numeric ranking minus one. In other words, if it is the 75th EDI user, it brings 74 more potential trading relationships to the existing number of relationships.

Exhibit IV-4 graphically depicts the relationship between users and EDI trading relationships.

EXHIBIT IV-4



The implications of this relationship differ for EDI software vendors and network services providers.

Even when the growth in absolute number of EDI users slows down or ceases, service vendors will still enjoy growth in their business while software vendors will experience a maturing market.

- Software vendors will be threatened when the growth of EDI adoption slows down. Their market is driven by new companies adopting EDI and by product turnover (companies changing software brands or upgrading).

- Network vendors, however, can continue expanding their markets even when the total number of EDI users stabilizes. The market for network services is driven by new companies adopting EDI, new relationships between companies being established, growth in transmission volumes, and new network services.

INPUT expects the growth in absolute number of EDI-using companies to eventually level off. When this will happen is still unclear. A macro 80-20 rule may govern EDI proliferation in the economy: only the 20% of all companies and/or trading relationships that are responsible for 80% of the GNP will employ EDI.

C

Assumptions of the Forecast Model

The U.S. EDI market has been viewed as the sum of its components as follows:

- Network services, including access point maintenance, error correction, protocol speed conversions, switching, store-and-forward services, internetworking through gateways, format compliance checking, format translations/conversions, and other processing services. These services are typically offered by third-party service providers' networks, although private networks may deliver many of these elements. This market forecast estimates only third-party network services.

- Software that resides at user premises that translates data between EDI standard formats and formats of the company's internal software applications

- Professional services for systems design, software customization, equipment selection and acquisition, systems integration, facilities management, education and training

The following are specific assumptions for each delivery mode.

1. Network Services

Revenue figures were obtained from direct interviews and reports, from network providers, and from estimates based upon the specific network's customer base. The customer base data was obtained from interviews of service providers, collateral documentation, and common-sense guessing. The customer base is defined as the number of discrete companies using the network (*not* mailboxes on the network or invoiceable accounts).

In the past, INPUT used financial models of network service providers to determine revenues from number of customers. Although INPUT will use such models (in some cases) for market estimates, the revenue estimates of key market leaders in this report were based entirely on discussions with these market leaders.

Many EDI service providers derive revenue from professional services and software. INPUT omitted these revenue components from network revenue estimates and accounts for them under the software and professional services categories.

2. Software

Software revenues of the market leaders and many of the smaller firms were confirmed through direct interviews with these companies. For many of the smaller companies, software revenue estimates are derived from installations, unless more specific data has been provided from another source. Revenues for 1992 are the product of the number of installations made in 1991 and the average price of the software/ installation plus revenues from maintenance fees on the existing customer base.

INPUT assumed an existing customer base cumulative through 1991, then assumed a number of software packages sold in 1992. INPUT multiplied 15% of the 1991 installation base by the average sales price of the package. This determined maintenance revenues for 1992.

The number of packages sold in 1992 times the average price determined total software sales for 1992. Adding this number to the maintenance number, INPUT arrived at an estimate for the total software revenue of each company.

The software component of EDI earnings includes revenues derived only from EDI translation software and, in some cases, associated communications software. Applications software that has built-in EDI capabilities is not considered in this market estimate.

3. Professional Services

This category includes the professional services provided by software vendors and network service providers as well as independent professional services firms, based on the total number of companies and consultants that offer professional services. INPUT estimates that there are approximately 35 to 40 individual consultants (including consultants belonging to the Big Six accounting firms) and another 10 companies (such as IBM, Sterling Software, GEIS, and Harbinger) that provide consulting in addition to software and/or network services.

For individual consultants, INPUT assumes that the average yearly gross on EDI professional services consulting is $500,000. For larger/multi-offering companies, INPUT assumes an average gross for professional EDI services of $1.5 million.

4. Conferences and Standards Meetings

Attending and exhibiting at EDI conferences and participating in EDI standards-setting organizations have costs associated with them. This year INPUT has chosen to examine this expense category and include it in its assessment of expenditures on EDI.

In recent years, users and vendors have voiced concern that there are too many EDI conferences and that the standards development committee process has become too time consuming and costly.

Because of these concerns and because conferences and standards activities are de facto expenses of EDI marketing, education and development, INPUT has decided to include them in the market forecast.

Conference and related expenses are not straightforward products, as are the other EDI delivery modes. Moneys paid to the various conference bodies are not vendor revenues, as are other delivery mode items. Moneys are paid by EDI users and vendors (to attend the conferences and to be members of the standards bodies) and by EDI vendors (to exhibit at conferences). Conference expenditures constitute, in part, marketing/sales expenses and product/market development (with respect to their participation in standards bodies) on the part of vendors, and education expenses and infrastructure investment on the part of users (with respect to their participating in standards bodies).

INPUT concentrated on a limited number of key conference activities that related just to North American EDI. These are the DISA X12 trimester standards meetings (averaging 1,400 attendees per meeting), the DISA X12 annual conference (with 1,200 attendees and 50 exhibitors in 1992), the annual EDIA (formerly TDCC) show (with a forecasted 1,000 attending in 1992), an estimate of U.S. EDI user and vendor expenses for overseas EDI conferences, and 20 standards working-group meetings with 500 people attending each.

INPUT multiplied these numbers by the corresponding fees for attending, exhibiting, and joining the various committees and standards bodies. To this amount, INPUT added the estimated travel and lodging expenses associated with each event (which will be charged to the person's corporate employer, and thus an expense shouldered by the corporation for EDI).

D
Data Presentation

1. Market Sizes and Forecasts

Exhibit IV-5 shows the total amount spent on EDI software and services for 1992.

EXHIBIT IV-5

1992 EDI Market

	$ Millions
Software	102
Network Services	187
Professional Services	27
Total	316

A comprehensive EDI expenditure estimate would include the three delivery modes estimated plus hardware expenses and conference/ standards committee expenses.

The comprehensive EDI market estimate is shown in Exhibit IV-6 .

EXHIBIT IV-6

Comprehensive EDI Market Estimate, 1992

	$ Millions
Software	102
Network Services	187
Professional Services	27
Equipment	250
Conferences	6
Total	572

Exhibit IV-7 shows the estimated growth rates for three delivery modes over the one-year period 1991 to 1992.

EXHIBIT IV-7

EDI Market Growth by Delivery Mode, 1991-1992

Deliverable	$ Millions		Percent
	1991	1992	
Software	75*	102	36
Network Services	148	187	26
Professional Services	24*	27	12
Total	247	316	28

* Figures are new estimates since last year's market report. See Section E, Discussion of Estimates and Forecasts, below.

Exhibit IV-8 shows the anticipated growth rates for the software and service delivery modes of the EDI market over the five-year period 1992 to 1997.

EXHIBIT IV-8

EDI Market Growth by Delivery Mode, 1992-1997

Deliverable	$ Millions		CAGR Percent
	1992	1997	
Software	102	350	28
Network Services	187	600	26
Professional Services	27	100	29
Total	316	1,050	27

Exhibit IV-9 shows the forecasted EDI market in 1997 and the associated compound annual growth rate.

EXHIBIT IV-9

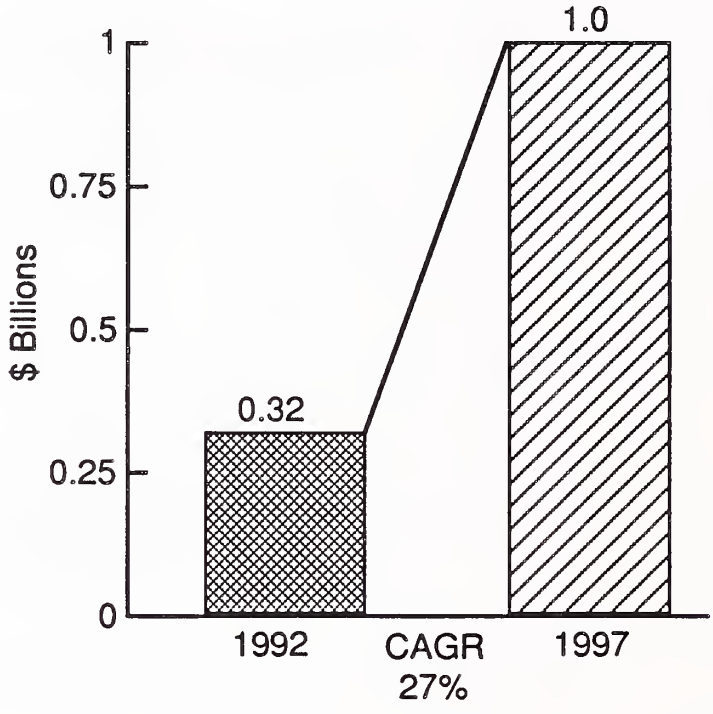


Exhibit IV-10 shows EDI expenditures on software and services by vertical market (please see Section E for further commentary).

EXHIBIT IV-10

EDI Expenditures by Vertical Market

Industry	Spending ($ Millions)
Trade and Transportation	120
Health Care (no claims)	18
Grocery	25
Apparel/Retail	39
Federal Government (only network spending)	35
Media	50
Oil/Chemical (no transport)	3
Auto	40
Total	330

2. Vendor Revenues and Market Shares

Exhibits IV-11 and IV-12 provide INPUT's customer and revenue estimates for the leading network services and software vendors to the EDI marketplace.

EXHIBIT IV-11

Leading EDI VANs, 1992

Network Provider	1992 Network Revenues ($M)
GE Information Services	48.0
Sterling Software	40.0
IBM Information Network	20.0
RAILINC	13.0
Kleinschmidt	12.0
Harbinger	9.0
Transnet	9.0
BT North America	8.0
Sears Communication Co.	6.0
AT&T	4.0
Electronic Data Systems	4.0
Telecom Canada	3.0
TranSettlements	3.0
Bell Atlantic	2.0
AIR Inc.	1.0
INFONET	.8
EDI Able	.7
MCI	.7
Ameritech	.5
Maersk	.5
US Sprint	.5
ARI Network Services	.3
Total	186.0

EXHIBIT IV-12

Leading EDI Software Vendors, 1992

Software Market	1992 Revenues ($M)
Micro	
SupplyTech	9.07
EDI Inc.	5.17
TSI/Foretell	4.60
ABC (EDE-PC)	3.43
APL Group	3.21
EDS (including Canada)	3.06
GEIS	2.45
Sterling	1.30
Harbinger	1.23
St. Paul (Interconn)	1.02
Datacom (U.S.)	1.00
Trinary	1.00
IBM	0.40
RMS	0.40
DNS	0.31
Bell Atlantic	0.25
PaperFree	0.22
EDI Able	0.20
Unisys	0.19
Piedmont	0.15
Ameritech	0.10
Other	2.00
Total	40.76

EXHIBIT IV-12 (CONT.)

Leading EDI Software Vendors, 1992

Software Market	1992 Revenues ($M)
Midrange	
Premenos (incl. IBM)	11.10
Sterling	4.12
Blue Rainbow	1.60
SSA	0.75
EDS	0.00
GEIS	0.00
IBM (all Premenos)	0.00
Other	2.00
Total	19.57
Server	
ABC (EDI Excel)	2.47
St. Paul-Datatran	0.46
GEIS	0.00
Total	2.93
Mainframe	
Sterling	12.00
DEC	6.00
IBM	4.55
ABC (EDI Server)	3.90
EDI Solution	2.92
GEIS	2.80
TSI International	2.17
Tandem (Mpact)	1.00
TI (gateway and trans.)	0.60
SupplyTech	0.36
Total	37.30

Exhibit IV-13 lists the leading professional services firms that provide EDI consulting, education and systems integration services. Important note: these revenue numbers are entirely INPUT's "educated guess" estimates. They are not numbers formally reported by the vendors.

EXHIBIT IV-13

EDI Professional Services Vendors, 1992

Vendor	1992 Revenues ($M)
EDS	5.0
IBM Information Network	4.0
Price Waterhouse	2.5
Andersen Consulting	2.0
Sterling Software	2.0
Ernst & Young	1.5
Deloitte and Touche	1.0
GE Information Services	1.0
Digital Equipment Corp.	0.5
Other	7.5
Total	27.0

Exhibits IV-14 and IV-15 show the market shares of leading EDI VAN and software vendors. For software vendors, the value used was the combined revenues from all software platforms (micro, midrange, server and mainframe). VANs with less than a 6% market share and software vendors with less than a 7% market share are included in the "other" category.

EXHIBIT IV-14

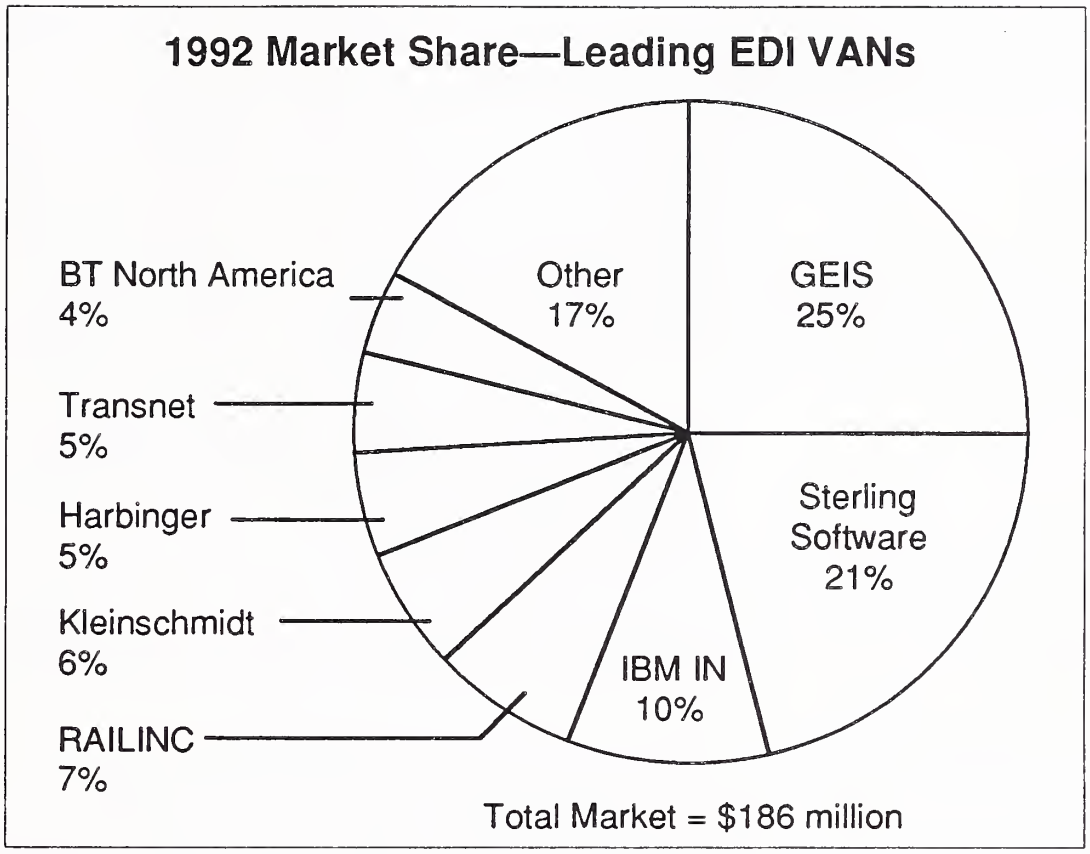
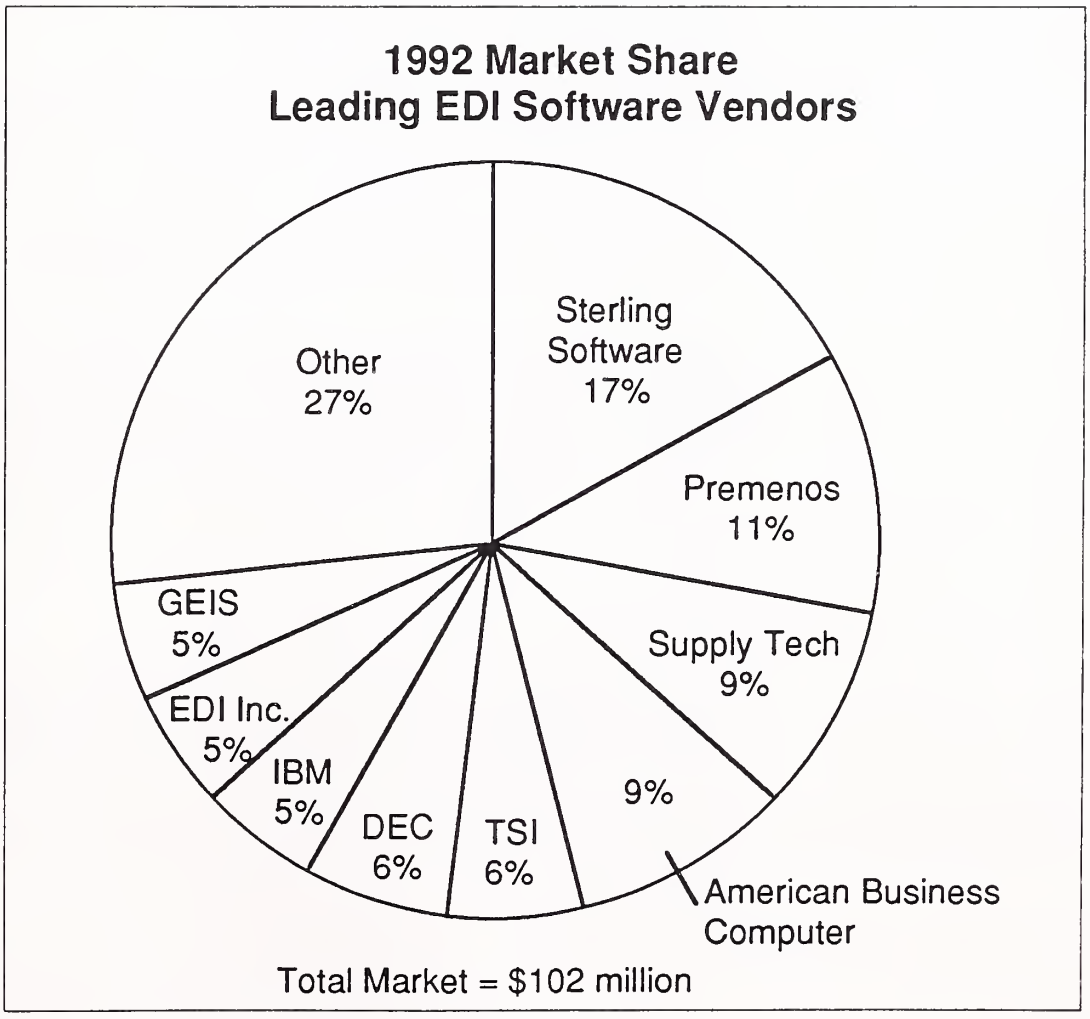


EXHIBIT IV-15



E
Discussion of Estimates and Forecasts

The most significant developments in the market are:

- The rapid year-to-year (1991-1992) growth of software, particularly in the midrange market
- The introduction of the "server" platform market
- The anticipated surpassing of the billion-dollar mark for the entire EDI market in 1997 (although this is contingent on a number of factors, the most significant being what the definitive characteristics of EDI products will be in 1997)
- The inclusion of the "conference" expenditures component of the market (see Section C, Assumptions of the Forecast Model, in this chapter)

1. Explosive Growth in EDI Software

The software segment of the EDI market registered the greatest growth over the period from 1991 to 1992. INPUT identified two factors that account for this.

- Post-recession spending: Pent-up demand for new EDI software is finally being released due to a more favorable business climate.
- Vendor "churn": Users are more frequently replacing or upgrading their original EDI software than they have in the past.

Note: INPUT has revised its estimate for 1991 software revenues since its 1991 EDI market report. The number in this 1992 report ($75 million) is higher. The main reasons for this are that INPUT has increased the number of vendors surveyed, has attained more precise data on maintenance revenues, and has better data on sales per month from leading vendors.

2. Expansion of the Midrange Market

The expansion of the midrange market for EDI software should be viewed along with the solid growth of the EDI microcomputer software market. Growth in both markets, INPUT believes, reflects (1) the growing trend in downsizing and client/server architectures, (2) the relatively saturated mainframe EDI software markets, and (3) the ongoing growth in the number of EDI users (when a company first takes the plunge into EDI, it usually does so on a microcomputer).

EDI server software is typically written for a UNIX operating system and therefore is hardware independent. EDI server software on the market today runs on high-end PCs to mainframes. So the new category "server" will, by definition, subtract revenues that would previously have been assigned under the other three categories in Exhibit IV-12.

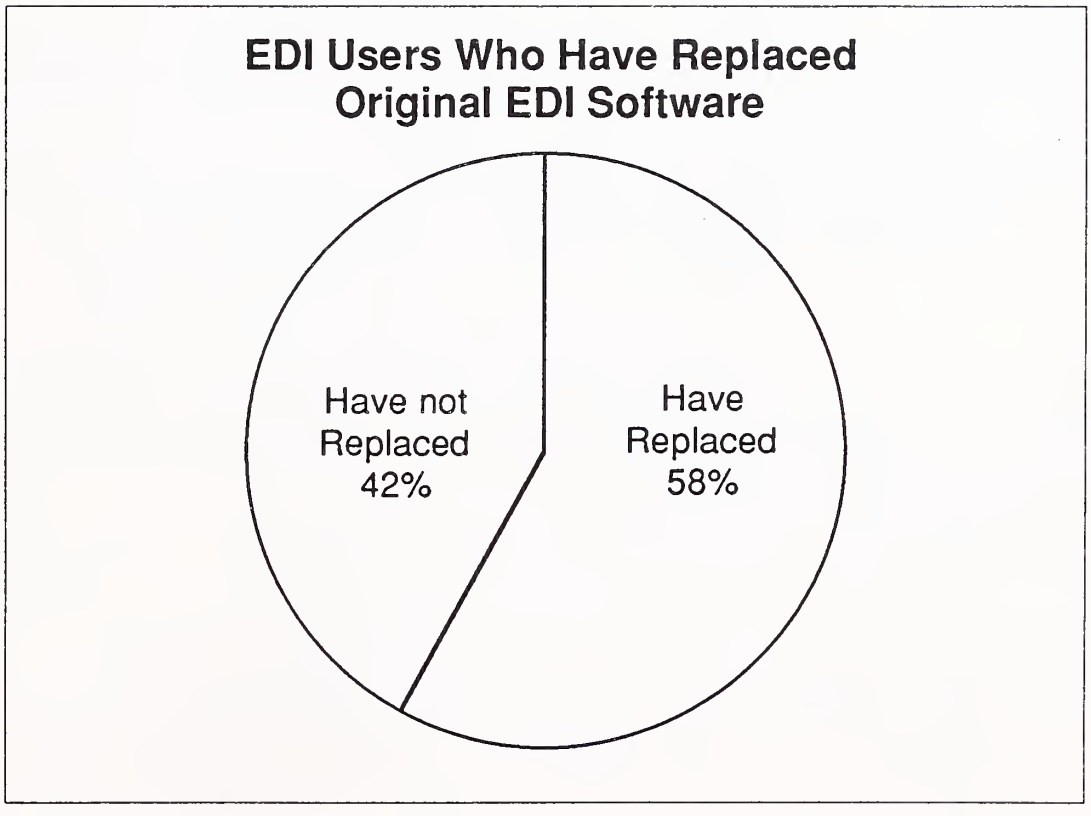
The growth in the smaller platform markets shouldn't reduce the mainframe markets. Sales of mainframe EDI software will continue to grow and there is a certain (and potentially expanding) proportion of EDI users who upsize their EDI platforms from PCs or AS/400s to mainframes.

3. Vendor "Churn"

In this year's survey, INPUT asked users if they had replaced their original EDI software and value-added networks. INPUT found that 58% of the users interviewed had replaced their EDI translation software at least once since they had begun conducting EDI. Only 32% had switched or added a second value-added network service.

Exhibit IV-16 indicates the proportion of EDI users who have replaced their original EDI software at least once.

EXHIBIT IV-16



This replacement percentage indicates that there is a significant EDI after-market.

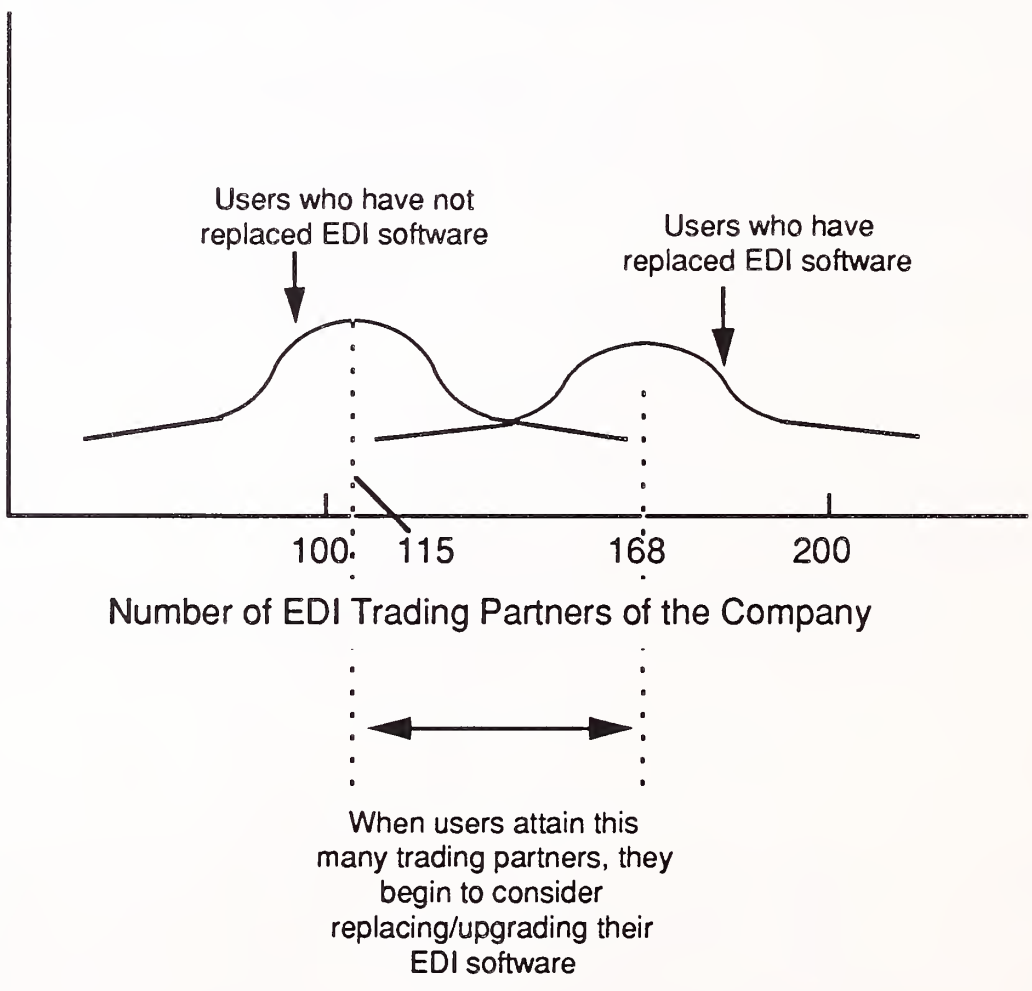
The almost unanimous response to why users switched was that they were seeking performance enhancements.

INPUT confirmed this rationale by discovering in the data that the average number of EDI trading partners of the "software replacer" was higher than that of users who had not replaced software. In other words, after attaining a certain number of trading partners with which it conducts business via EDI, the typical EDI user will upgrade its EDI software to accommodate the increased throughput requirements.

Based on the user survey, INPUT estimates that when the number of trading partners exceeds 100-120, the user company will begin considering upgrading its EDI translation software. Exhibit IV-17 indicates the average number of trading partners of users who have and have not replaced EDI software, and the estimated threshold at which the upgrade may occur.

EXHIBIT IV-17

Point At Which Users Upgrade EDI Software



According to user responses, the average number of trading partners of companies that had not replaced their EDI software was 115. The average number of trading partners of companies that had replaced their EDI software was 168.

The vendor "churn" associated with VAN use is different than with EDI software. Usually the user doesn't replace one VAN with another; it simply adds another VAN as a service provider. The usual reason for this is that the user establishes an EDI trading relationship with a company that uses the services of the other VAN.

4. "A Billion-Dollar Market" and the Evolution of EDI

Exactly what constitutes EDI technology is in for some major definitional changes over the next few years. Real-time architectures, hybrid EDI systems (employing voice response, facsimile, and other messaging tools), auxiliary services to EDI (product catalogs and directories, for example) and many other developments are changing the defining characteristics of EDI technology. Change the defining characteristics of a product—include new, heretofore excluded features and/or exclude heretofore included features—and you will change the size of its market.

Thus, to say EDI will be a billion-dollar market in 1997 is a statement subject to the consideration of a host of interpretive and debatable issues. However, the billion-dollar estimate assumes a very narrow definition of EDI. It assumes that systems conforming to this narrow definition will continue to be implemented in 1997. Both assumptions are conservative.

Also, though the 1997 estimate is purely a straight-line continuation of past expenditure estimates, the growth rates are very conservative.

If anything, the EDI market will be larger than one billion dollars in 1997; or EDI as we know it today won't exist as a distinct technology. It will be part of a larger market category that is more coherently identified as "electronic commerce."

5. Industry Estimates: The Double Counting Factor

Industry estimates for EDI can be misleading. EDI is unlike other information service/technology markets, where a given market (say, for computer-aided design software) can be segmented out into industry niche categories that are mutually exclusive—for example, semiconductors, apparel, textiles, automotive, etc.

EDI connects organizations and thus spans industry categories. Where should Levi Strauss' EDI expenditures be classified: under apparel, textiles, transportation, banking, government or retail? All categories are valid because Levi's EDI system connects organizations in all those industries.

Thus, INPUT's vertical industry estimates are assigned to where the EDI investment is principally being applied. If a manufacturing company is doing EDI principally with transportation companies, then its EDI expenditures are classified under transportation.

Also, to derive the total market, INPUT realizes that a simple summation would not be valid due to double counting. INPUT estimates that approximately 13% of the expenditures in any given industry could probably be assigned to other industries. Thus, from the sum of all industries listed, INPUT has subtracted 13% to allow for double counting.

INPUT's estimates for these industries are developed in detail in its series of reports on electronic commerce. See Chapter I, Section D, Related INPUT Reports.

F

Forecast Reconciliation

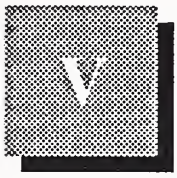
INPUT's forecasts last year for network services revenues appear to be on the mark, at this writing. However, the year is not over.

The software estimates have been substantially revised upward. As noted above, INPUT revised its estimate for 1991 software revenues since the EDI market report published last year. The number in this report, $75 million, is higher. The primary reasons for this are an increased number of vendors surveyed, attainment of more precise data on maintenance revenues, and better data on sales per month from leading vendors.

INPUT has revised revenue estimates downward for the professional services segment of the market. The main reason is that this year INPUT identified the major providers of EDI consulting services in the most exhaustive list that INPUT has yet offered. Many of the firms were very small—often consisting of only one person. INPUT interrogated the leading firms and estimated the revenues of the small shops. This approach was simply more empirical than former approaches, in which INPUT estimated consulting services principally as a function of estimated user expenditures.

This new, more empirical approach to estimating the professional services component inherently adheres to a more restricted definition of EDI professional services. Although much IS consulting may involve work on an EDI project, INPUT's estimate reflects only revenues that consultants are directly attributing to EDI projects.

INPUT's professional services segment does include revenues received by vendors that supply other EDI deliverables, such as software and network services.



EDI Market Trends and Issues

Nowadays two aspects of EDI must be distinguished: the hype, and what is really happening with EDI; how organizations are using EDI—or trying to use EDI—to improve their operations.

This chapter examines user experiences with EDI, technology developments (including standards issues), and competitive environments in which EDI is an important factor.

A
How and Why Organizations Are Implementing EDI

In this section, INPUT examines user responses to questions about the objectives, obstacles, applications, and success of their EDI programs.

1. What Organizations Are Trying to Accomplish with EDI

a. Objectives of EDI Implementation

The most frequently cited objectives of implementing EDI are listed in Exhibit V-1.

These objectives, based on an open-ended question in INPUT's survey, are not mutually exclusive. INPUT has classified the objectives cited by users into general, overlapping categories, based on key words in interviewees' responses.

INPUT lists the most frequently cited objectives in the top half of the box. These objectives are the commonly expected responses because, within the EDI community, these objectives are unanimously agreed upon as being the benefits of EDI. These objectives, in a sense, represent the dogma/ideology of EDI. INPUT expected to find them expressed by people who understand EDI.

EXHIBIT V-1

Objectives of Implementing EDI

Objective	Frequency Cited
Customer satisfaction	49
Speed, timeliness, faster turnaround	18
Reduce costs (incl. staff, paperwork)	22
Operational efficiency (other than cost or speed)	19
Reduce inventory	6
Keep up with technology/the times	5
Expand business	3
Remain competitive	2

In the lower half of the exhibit, INPUT lists recurring responses, where respondents used specific key words in describing the objectives. These objectives, combined with the infrequency of their citation, are interesting in that together, they indicate perceptions of managers toward EDI. They indicate the scope and degree to which users consider EDI strategic or otherwise.

b. Satisfaction with the EDI Program

For the most part, EDI users indicate that they are satisfied with their EDI programs. However, users who are the most satisfied differ markedly from those who are the least satisfied.

Exhibit V-2 lists the frequency distribution of users and their respective levels of satisfaction.

What is the profile of a dissatisfied EDI user?...of a well satisfied EDI user?

EXHIBIT V-2

User Satisfaction with EDI Program

Distribution	Percent
Dissatisfied	3
Somewhat dissatisfied	7
Neither	20
Somewhat satisfied	39
Satisfied	31

INPUT isolated the least satisfied group of EDI users and examined their responses to other questions, to determine if there were any commonalities. The same analysis was performed for the most satisfied group.

i. Comparison: Dissatisfied versus Satisfied EDI Users

In a word, the dissatisfied EDI user is typically *reactive* (to events), while the satisfied EDI user is *proactive*.

The dissatisfied user is doing EDI because one of its customers requested it to do so. It is, usually, a "spoke" company.

The satisfied user is doing EDI because it seeks operational efficiencies, cost savings, and speed. Secondarily, it seeks customer satisfaction. More often than not it will be a "hub" company, but not necessarily.

Exhibit V-3 compares characteristics of dissatisfied and satisfied EDI users.

Complaints. A sample of the complaints of dissatisfied EDI users is given in Exhibit V-4.

EXHIBIT V-3

Dissatisfied versus Satisfied EDI Users

Dissatisfied	Satisfied
Spoke Company	Hub, sometimes spoke
Reactive	Proactive
EDI to satisfy customer	EDI to gain efficiency
Small EDI staff	Large EDI staff
EDI is only a cost	EDI has benefits
Resents EDI and trading partners	Concerned that trading partner isn't getting value

EXHIBIT V-4

Complaints of Dissatisfied EDI Users

"Time waster for us, but good for the customers"

"EDI [software] is an insult to the intelligence; takes too long to figure out"

"Total waste of time; fax works better"

"Problems with network carriers and software; too slow"

Dissatisfied users typically saw themselves as lacking adequate resources to do EDI, and wanting more support from vendors; they felt that EDI was simply a burden that gave no benefit other than maintaining a customer.

Satisfied users, for the most part, had no complaints.

Obstacles. Dissatisfied users were almost unanimous in identifying data mapping and integration of EDI with applications software as the biggest obstacles in implementing EDI. However, these obstacles are frequently cited by all users, dissatisfied or satisfied, as Section C below indicates.

Staffing. In INPUT's sample, satisfied user organizations had more than twice the EDI personnel of dissatisfied organizations.

Exhibit V-5 shows the average staff sizes for satisfied and dissatisfied EDI organizations.

EXHIBIT V-5

Staff Size: Satisfied versus Dissatisfied EDI Users

	Average EDI Staff
Satisfied user organization	4
Dissatisfied user organization	2

Satisfied users were better able to quantify the impact of EDI on their operations. This underscores the point that satisfied users are typically proactively implementing EDI. They have specific objectives and are looking for specific results. This is not to say, however, that quantification is a requirement for satisfaction. Most of the satisfied EDI users spoke of the impact of EDI only in qualitative terms.

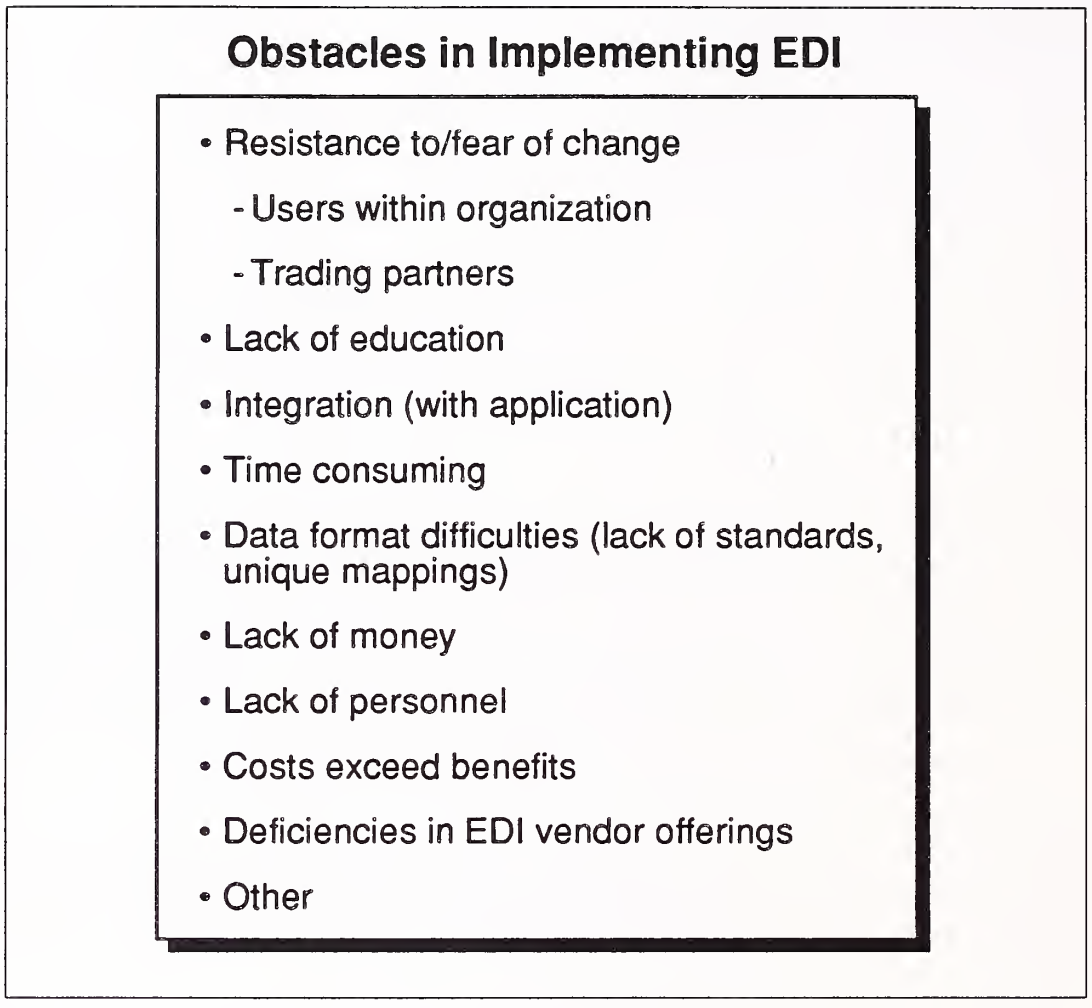
c. Obstacles in Implementing EDI

In an open-ended question, users were asked what the chief obstacles are in implementing EDI. INPUT classified their responses in the categories listed in Exhibit V-6.

Satisfied users also indicated that integration with applications was a big obstacle to implementation.

Change and education—two sides of the same coin—are the most frequently cited obstacles. This shows that the business issues—the strategic context in which EDI plays a part—are more important than simple technologies. EDI has to do with changing work patterns and routine behaviors. Working with people, getting them to see new ways of working, is the real challenge of EDI.

EXHIBIT V-6



d. Management of the EDI Program

An EDI program in a company is most successful when it is authorized at the executive level of a company. EDI requires the integration of many functions within a company—accounts receivable and payable, shipping, sales, etc.—so high-level planning and authorization is required (otherwise a single department is seen as encroaching on others' turf).

INPUT found that two-thirds of the companies it interviewed had executive-level approval/sanction of the company EDI program.

Exhibit V-7 shows the different levels of management authorization for EDI programs.

EXHIBIT V-7

Level of Management Authorizing EDI

Level	Percent of Companies
Executive	66
Middle management	21
Operations	7
No answer	6

Furthermore, interviewees were unanimous that the given level of management responsible for the EDI charter was appropriate.

e. Impact of EDI

There is a large contingent of EDI users who are ambivalent about the impact of EDI. Many allude to operational efficiencies, but few can indicate bottom-line, quantifiable results. Many, as indicated in the sections above, see the impact of EDI entirely in negative terms: it has only prevented the company from losing a customer; otherwise it is all cost, and one more procedure to attend to.

2. How Well Organizations Have Integrated EDI with Their Operations and Applications

Integrating EDI translation software with applications software is the greatest difficulty users experience in building EDI programs for their organizations. Integration has always been the main problem; it is cited year after year in INPUT surveys and continually acknowledged by users in the press, at trade shows, in other interviews, etc.

Integration of translation with applications software is the essence of EDI. Without a seamless flow of data from one company's application (i. e., accounts payable) to another company's application (accounts receivable), the whole purpose and value of EDI is lost. Avoiding rekeying of data is the whole point of doing EDI.

INPUT estimates that over half of the 25,000 EDI users in the United States today have not integrated EDI with their applications. Perhaps as much as 80% of implementors are using their EDI translation software platforms as expensive facsimile machines. EDI orders come in, the user prints them out on paper, and someone rekeys the data into the application.

If 80% of EDI users have not integrated EDI with applications, and integration is the definitive feature of EDI, then EDI is not occurring to the degree that user expenditures would suggest.

a. Most Common EDI Applications

Most companies that are conducting EDI today are spoke suppliers to a large hub company. They have implemented EDI at the request of their important customer(s) and, through EDI, are capable of receiving an electronic purchase order (typically in the ANSI X12 850 format).

Because most EDI users today fit this profile, it is not difficult to understand why the most common EDI application is order entry.

After some period of time, the small spoke company gets acquainted with receiving EDI purchase orders and it moves on to billing its large customer(s) via EDI. Thus, the next most common application of EDI is for accounts receivable. This is the sending of, typically, an ANSI X12 810 invoice.

Exhibit V-8 lists the most common EDI applications.

EXHIBIT V-8

The Most Common EDI Applications

Application	Percentage of EDI Users Who Use*
Order entry	53
Accounts receivable	38
Purchasing	33
Accounts payable	28
Inventory	27
Funds transfer	24
Traffic management	22
Large file transfer	13
Manufacturing resource planning	10

* Total percentage does not equal 100 because users may use more than one application in their EDI program.

Sending electronic purchase orders from a buying company to its suppliers is the third most frequently used EDI application. Mostly hub companies develop this application.

After the hub company develops the ability to send a PO electronically, and the spoke company develops the capability of receiving it, the spoke company develops the capability of sending an invoice to the hub. The fourth most common application, then, is for the hub company to develop the capability of receiving invoices electronically. Thus, the company integrates EDI into its accounts payable application.

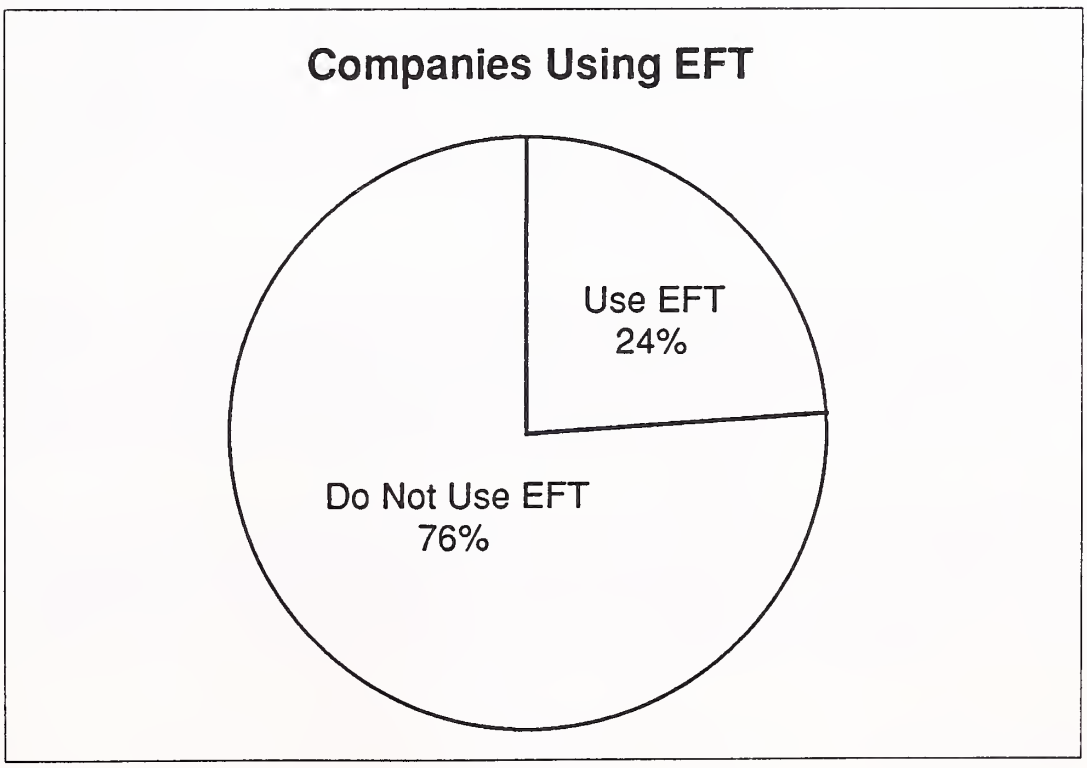
At this point the basic moves of the commercial transaction are complete except for the payment by the hub company to the spoke. As Exhibit V-9 indicates, however, the hub company will integrate an inventory application before moving on to payment. Payment is tricky, because it usually involves two additional parties: the respective banks of the two parties in the transaction.

Of the most common applications cited by EDI users, two are especially noteworthy for further development: funds transfers and the movement of large binary files.

b. Funds Transfer

Almost one-quarter of the people interviewed in this year's survey, as in last year's, maintained that they conduct some form of electronic funds transfer with their trading partners. Exhibit V-9 shows the results of this year's survey.

EXHIBIT V-9



At first glance, this proportion seems high. After all, there are only around 100 U.S. banks that offer any form of corporate electronic trade payments capability, and the market for this kind of business is practically nil (see INPUT's report, *Developments in Corporate Electronic Trade Payments*).

In explanation, it appears that companies that are performing some kind of funds transfer are not necessarily paying or being paid by their trading partners electronically. That is, the EFT that they are using is not necessarily their customer's bank transferring funds to their bank. Or if it is, it may not be true EDI/EFT, as in the case of utilities, where even residential customers pay bills electronically. Nevertheless, these companies are using some form of EFT in relation to receiving or making payments with their trading partners.

(INPUT was careful to specifically exclude lockbox or other bank services that allow a corporation to move funds from one bank account to another. Consumer-side EFT—such as direct deposit of payroll—also was excluded.)

In other words, the companies that are using an EDI/EFT application typically are in an industry in which there is some third-party processing service involved in dealing with trading partners.

Respondents in two industry sectors—transportation and health care—cited the use of EDI/EFT much more often than did respondents in other sectors.

The transportation and health care industries make extensive use of third-party bill processing and collection services. In transportation, companies such as Cass Logistics and Tranzact Systems perform the billing and collections for carriers to their shipper customers. While the shippers cut paper checks and send them to the third-party processor, the third-party processor sends the collected money to the carrier's bank electronically. (See INPUT's report, *Electronic Commerce in Trade and Transportation*, for more details.)

In the health care industry, a similar situation exists. Hospitals and physicians' offices send insurance claims to third-party processors (often electronically). The processor sends bills to the insurance carriers. The moneys are transmitted electronically from the carriers to the providers. (See INPUT's report, *Electronic Commerce in Health Care*, for more details.)

In both the transportation and health care industries, these third-party processing services are market niches of hundreds of millions of dollars each.

EDI/EFT in health care and transportation does not involve the actual customer paying the actual supplier electronically. Nevertheless, EDI/EFT does occur in these industries.

Where the classic case of EDI/EFT does occur is in isolated areas: the auto industry, chemicals, petroleum, and large conglomerates. In classic EDI/EFT, a paying company's system generates an electronic payment instruction (an ANSI X12 820) along with payment advice and sends it into the banking system (either via its bank, its trading partner's bank, or its trading partner—there are many ways for a paying company to trigger a payment).

Also, utility companies are having their customers (industrial, commercial and residential) pay their bills electronically. This is not EDI/EFT. It only uses the authorized debit form that the ACH makes available to banks.

c. Large Binary File Transfer

Thirteen percent of those surveyed said that they were using EDI in conjunction with sending large binary files to and from trading partners. This is happening in many areas of manufacturing—particularly in automobiles, apparel, aerospace, and electronics. CAD/CAM files are sent to trading partners attached to EDI purchase order or request-for-quotation formats.

3. The Extent to Which EDI Supports Commercial Transactions

As noted in the end of the introduction to Section 2 above, EDI is not occurring to the extent that user expenditures on EDI products and services suggest. Is EDI a viable technology?

EDI requires organizations to communicate with each other using highly structured electronic messages. Each data element must be defined in advance of use so that the computer systems of each party "understand" the messages.

Such structured communication formats cannot always accommodate the many ways that companies do business. In the grocery industry, for example, the food broker makes the purchase order (with prices, terms and quantities) over the phone. EDI messages follow later to confirm and invoice.

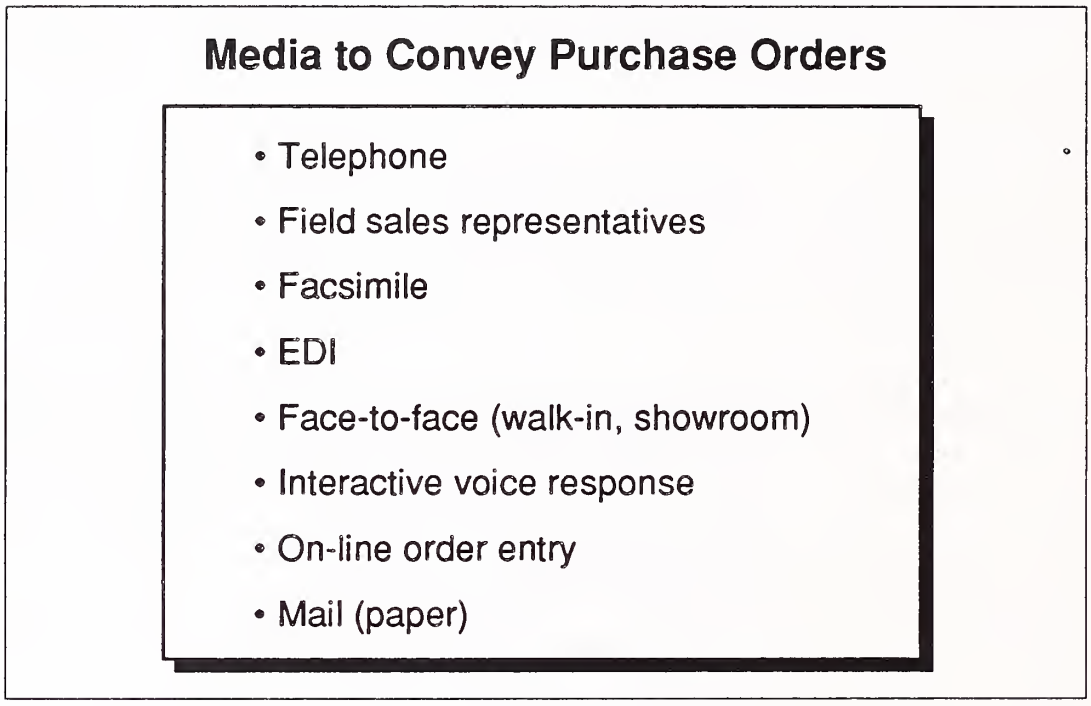
In distribution areas, speed often is of the essence, and real-time, terminal-to-host linkages are required. For example, farm equipment dealerships are on-line with equipment manufacturers so as to be able to check available inventories, place orders and check the status of orders.

Still, in other sectors, free-form communications are required. Structured documents won't work. Here, users are turning to facsimile.

a. EDI versus Alternative Communication Technologies

INPUT measured the use by EDI-using organizations of alternative ordering systems (in addition to EDI). These alternatives are listed in Exhibit V-10.

EXHIBIT V-10



The mix of these modes used by a particular company is changing. Not only does the type of business and purpose of communication determine the most appropriate mode, but technological developments are recasting the price/performance of each mode almost daily. Facsimile and interactive voice response appear to be the modes most rapidly growing in use.

There are companies that rely exclusively on one mode. Most companies use many of the modes. INPUT asked EDI users about the degree to which they use the various modes. Exhibit V-11 lists results of the survey.

Exhibit V-11 shows the relative importance of the different modes for conveying purchase orders. It tells us, for example, that 14% of the companies surveyed do more than 50% of their buying and/or selling over the phone. Thirty-six percent of the companies make or receive their purchase orders via EDI. (INPUT did not separate the ordering process into PO generation and PO receipt.)

EXHIBIT V-11

Relative Use of Purchasing Media

Mode	Percent of Companies Receiving More Than 50% of Sales in Mode
EDI	36
Telephone	14
Mail (paper)	13
On-line order entry	8
Field sales representatives	6
Facsimile	2
Face-to-face (walk-in, showroom)	2
Interactive voice response	1
Other	1

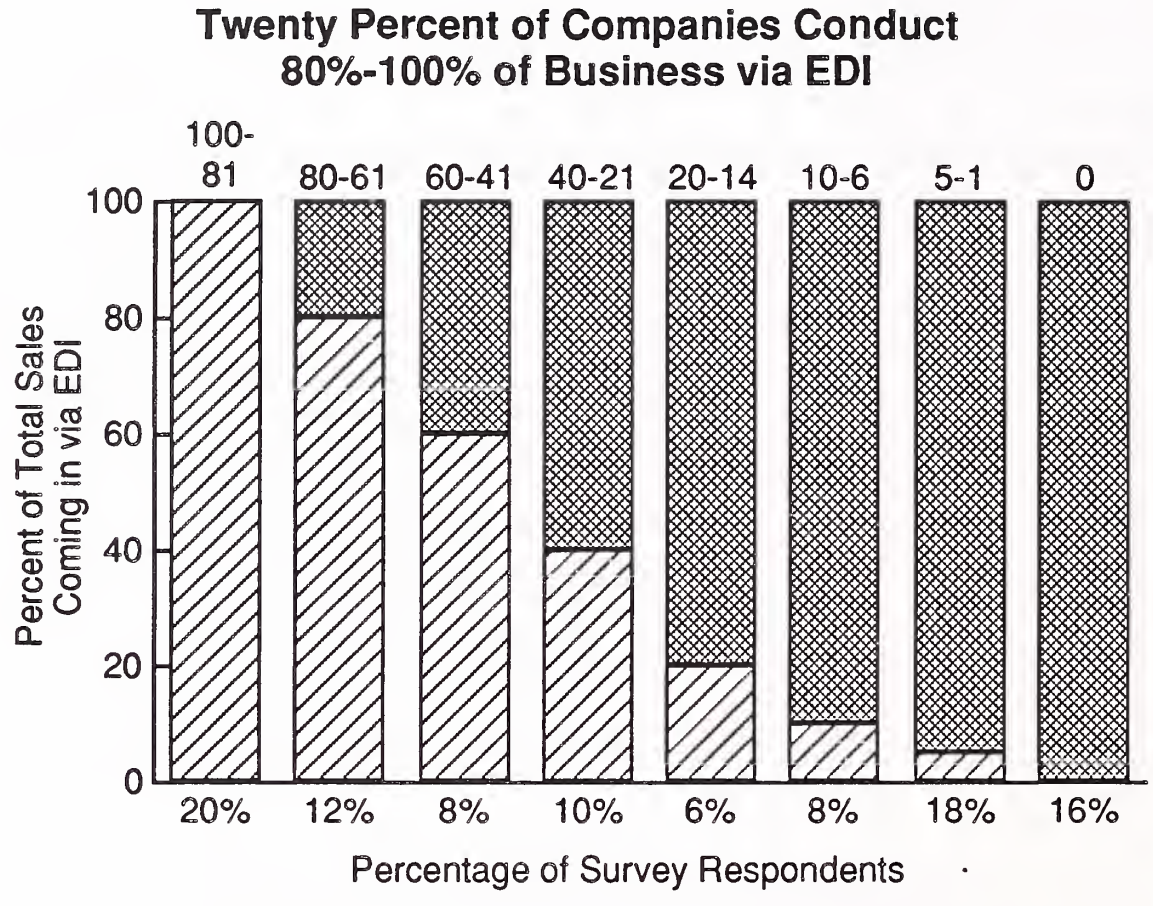
Note: These percentages are not necessarily applicable to the seven million businesses in the U.S. economy. These percentages apply to the 135 companies that INPUT surveyed. All these companies use EDI at some level. And all the persons interviewed are EDI managers. This explains why EDI stands out as the predominantly used mode.

The percentages also should not be viewed as precise values. It is better to consider them magnitudes that indicate the relative importance of the given mode by organizations that already use EDI.

Some companies use EDI to place and/or receive from 80% to 100% of all sales.

Exhibit V-12 shows the various degrees to which EDI is being used to send and receive purchase orders.

EXHIBIT V-12



The chart shows that 20% of the companies surveyed receive or send 80% to 100% of their purchase orders via EDI. Eighteen percent receive/send no more than 5% of their orders this way. Sixteen percent have no EDI capability for buying or selling (although they may use EDI for other purposes such as inquiring about shipments).

INPUT examined companies that conducted significant volumes of their business using the various other modes of ordering. Specifically, INPUT looked at the kinds of equipment used by these companies.

In companies where field-sales representatives accounted for more than 20% of sales, almost half claimed to have portable computers integrated into their EDI program. This makes sense. Where field representatives are employed, so too are portable computers.

Portable computers also figured prominently in EDI systems in which phone ordering accounted for more than 20% of sales.

Local-area networks were a common feature of EDI systems in companies that had high sales via facsimile, interactive voice response, or on-line order entry. These companies—manufacturers, large retailers, distributors, and insurance companies—have large, diversified information technology environments.

This also indicates that users are beginning to build facsimile, IVR and EDI access to the same order-entry data base application.

In addition to local-area networks, facsimile users also showed a propensity to incorporate bar-coding systems into their EDI programs. Facsimile-using companies were mostly in distribution and manufacturing. As noted below, integrated EDI, fax and bar-coding systems may be a huge opportunity in the future.

Companies in which a large share of sales came via on-line order entry (large retailers and insurance) also used bar coding more than the average of all users.

b. EDI Standards Issues

Part of the difficulty in implementing EDI is the structure of the data formats. INPUT believes a large portion of intercompany communication is not conducted via EDI because the data formats—EDI standards—don't accommodate specific business practices.

There are two principal EDI standards families in EDI: ANSI X12, an America-originated standard; and, EDIFACT (EDI for Administration, Commerce and Trade), a United Nations-originated standard whose development has been carried out mostly in the European community.

A third EDI standard has just been officially sanctioned this year and may become a principal EDI standard family. It is the CII Standard, from the Center for the Informatization of Industry, part of the Japanese government's Japan Information Processing Development Center. The CII standard accommodates the ideographic characters of Japanese (and Chinese) using 16-bit character codes.

In addition to the three main standards bodies, there are many industry-specific standards, such as UCC (Uniform Code Council), WINS (Warehouse Information Network Standard), ODETTE and others. Many of these standards began using their own self-defined proprietary syntax, but are now moving to adopt X12 or EDIFACT syntaxes.

The standard family with by far the largest user base is ANSI X12. EDIFACT, at this writing, has two production-level formats (the invoice and the purchase order), compared to X12's 150+ formats. Although there is a tendency to assume that the different standards families are "competing" with each other, this is a false perception.

- First, general standards always are modified to fit the needs of a particular company, group of companies and/or trading community.

- Second, the different standards are being used for interorganizational exchange in different arenas: X12 is being used by American, Canadian, Australian and other countries for domestic trade. EDIFACT is being used—by the same companies using X12—for international (cross-border) trade.

- Third, with a decent EDI translation software package, standards are a non-issue.

Despite the fairly robust set of working standards (at least, in X12 syntax), users report having difficulty with standards. Below, INPUT lists the most frequently cited problems.

Based on previous user surveys, INPUT estimates that only 40% of companies that use standard EDI data formats (X12, UCS, TDCC, or other EDI standards) strictly adhere to the standard. Twenty percent regularly fill in data fields with noncompliant data (such as free text, private codes, etc.), do not use data elements, or add new data elements to the format.

Noncompliance with standards by users is a result of the standards not adequately accommodating the existing practices of companies. The following examples demonstrate the kinds of problems users are facing in standardizing their data interchanges.

Standards Not Accommodating Business Practices

A data field on invoices (for example, the X12 810 format) would permit companies to assign an invoice to a particular cost center, retail outlet, and/or division of a company that is responsible for the invoice. Pizza Hut charges its costs back to its individual restaurants (half of which are independently owned franchises). Its suppliers—especially for overhead expenses such as courier services, utilities, and trash services—have agreed to place cost center reference numbers on each invoice so that Pizza Hut corporate accounts payable can charge a given restaurant its respective cost. Some of these vendors are placing a cost center reference number as the last 10 characters of the address segment of the invoice. Pizza Hut's computer can read this. But a separate data field would be desirable because not all vendors consistently place the number in the last ten digits or always use reference numbers (sometimes they write free text).

- For technology companies, particularly electronic system vendors, purchasing has an intimate tie into product enhancements and upgrades. As a company upgrades its product, the components that go into the product must be upgraded. Buyers of custom components—such as

ASIC chips—must often communicate to their suppliers/subcontractors not only design changes, but also when design changes go into effect and, therefore, when the supplier should ship the components that meet the new design specifications. At Tektronix, buyers have modified the X12 850 purchase order to include a date field for a product revision. This date tells the supplier when it should start shipping the ordered product according to a new product specification. Tektronix sends POs often months ahead of when delivery is expected. For example, it will send a PO to Motorola for a certain kind of ASIC. The PO has a revision date within it. The date tells Motorola that all shipments for the given ASIC after the given date must conform to the new design specification.

- John Deere requires suppliers to place the part numbers that John Deere uses to reference the supplier's parts on the invoice that the supplier sends. This is accomplished by using a comment data element.

Standards Incapable of Characterizing Products

Ship line tariffs are legal documents that include the fees and rules that ship lines use to charge for their services. Tariffs are a combination of rules and mathematical formulas. Tariffs are calculated based on hundreds of factors contingent on what is being shipped and where it is going. Currency adjustments, surcharges for high-risk ports, and other details are part of the tariff structure. Incorporating these rules and formulas in automated systems is proving difficult. Artificial intelligence techniques are being used. This difficulty underscores the fact that even in a market as seemingly straightforward as transportation—where the product is to move X from point A to point B—there is a high degree of product differentiation.

In the apparel industry, building standardized messages for ordering fashion items is difficult. Basic items (blue jeans, for example) stay the same year after year. But other fashion items change from one season to the next. Developing UPC (bar) codes for fashion items is nearly impossible. These codes, however, are the foundation for moving merchandise items from manufacturer to retailer to consumer. The codes are scanned at point-of-sale cash registers, which generate purchase orders with attached codes, which are sent to apparel vendors that monitor production and shipping by using the codes. Without a code for fashion items, the process cannot be automated.

Evolving Standards Lead to Data Errors

Another problem is the transmission of erroneous data from one trading partner to another because one partner upgraded its data format without telling the other. The U.S. Customs' Automated Broker Interface (which handles 80% of all broker import releases) changes its data requirements

periodically. Brokers who fail to keep up with the changes by modifying their software and data entry procedures end up having their release entries rejected. Customs is considering penalizing brokers who fail to update their systems.

Hierarchical Design Is Hard to Process

The hierarchical design of X12 ship notices is the source of great discontent among EDI users. Different shippers interpret the levels differently. Also, each level is not identified explicitly. The sublevel of a truckload is assumed to be a pallet, the sublevel of pallets is assumed to be boxes. This ambiguity is causing problems.

An automotive parts supplier claims that a "Big Three" car manufacturer interprets the hierarchies on the advance ship notice (X12 856) differently from the interpretations of the other two "Big Three" manufacturers. The manufacturer considers carton and pallet segments to be on the same level, whereas the other two consider cartons subordinate to pallets.

Also, the same manufacturer wants additional information put on the ship notice—such as weight of each carton—in addition to attaching a specific kind of trailer on the interchange. The result is extra work for the parts supplier without any payback except keeping its customer satisfied.

Furthermore, as real-time transmissions of EDI messages are under consideration and have been implemented in a few instances, the hierarchical design won't work. In real time, each segment is passed from one computer to another one at a time. Each segment is verified on the spot by the receiving CPU—the entire transaction set or interchange (group of transaction sets) is not sent in a single batch. When each segment is sent individually, every segment must be identified explicitly.

Quick Response Transaction Sets

The retail, apparel and textile industries, under the direction of the Voluntary Interindustry Communication Standards (VICS) committee, have developed "quick response" transaction sets.

These sets are to be used in lieu of earlier X12 transaction sets, namely the 867 (sales data) and the 846 (inventory data). One of the quick response transaction sets allows companies to send sales and inventory data to their trading partners. The other allows them to send forecast and modeling information. The transaction sets are designed to work in the advanced implementations of EDI where suppliers, not customers, determine replenishment quantities of product items. This radical departure from conventional buying practices is most popular in distribution industries (retail, mass merchandise, grocery, and auto parts stores).

A sales trend analysis transaction set is another transaction developed by VICS. It allows a supplier to let a retailer know how well it is selling a particular product compared to the aggregated sales of all other retailers in the same geographic area. The retailer uses this data to measure its outlet's performance. Procter & Gamble Co., Gillette, and Levi Strauss are pioneering this kind of EDI with key retailers.

People Data Formats

EDI exchange of university transcripts, mortgage applications, and insurance enrollment forms are under development. For the first time in the history of EDI, transaction sets are being designed to convey information about people, not things. Data formats would characterize such personal attributes as educational accomplishments, financial status, medical history, family member profiles, etc. Such information is—like fashion and transportation tariff information—hard to represent in machine-readable code. Personal names, for example, have many variations.

Real-Time EDI Formats

There is an increasing call for real-time EDI, where messages are exchanged directly between one trading partner's computer and another without sitting in a third-party mailbox. Ship notices between suppliers and manufacturers and cargo space reservation systems are two specific areas where real-time systems have been implemented. The design for real-time data formats would be radically different than the existing EDI architecture, which is store-and-forward or batch transmissions. Specifically, real-time transaction sets would be sent segment by segment, and transactions set by set: there would not be a mailbag/interchange of many transaction sets all at once. Passing segments one at a time from one processor to another would require additional data elements on the segments to identify segments and relate them to the overall EDI message. The meanings of many segments in the X12 architecture as they stand today are implied by their sequence/context within a transaction set.

Disuse of Data Elements and Transaction Sets

In addition to a lack of appropriate data elements, many transaction sets today contain redundant/unnecessary data elements. In part, the design of quick response transaction sets (as mentioned above) addresses this issue. Food wholesaler SuperValu Foods (Eden Prairie, MN) uses, on average, only 20% of the data elements on UPC EDI transaction sets. An X12 850 purchase order has approximately 120 possible field types in it, many of which are unused by most EDI users. In addition to unused data elements, a number of TDCC transaction sets are being discontinued because of disuse.

Standards Bodies Not Fast Enough

Users and vendors alike have expressed concern that the EDI standards organizations are not keeping up with the demand for new and/or revised data formats. This leads to companies developing their own (nonstandard) formats—a self-defeating action in the long run.

Conclusion

These trends in standards development point out some of the current shortcomings in standards design, the challenges ahead, the fact that making EDI work means embodying business practices in machine-readable code, and that EDI still has a way to go before such optimal design is attained.

The examples also demonstrate that not all forms of intercompany communication will be conducted through EDI. Many kinds of transactions do not occur often enough to warrant the establishment of an EDI infrastructure and relationship. These transactions may also lack the requisite clarity of terms. The telephone, face-to-face communication, facsimile, etc. will all exist alongside EDI.

B

Trends and Developments in EDI and Related Technologies

This section reviews some of the new developments in EDI software and services. INPUT examines user deployment of EDI in the larger context of corporate information technologies, and looks at new vendor offerings and product/service features.

This section is not intended to be a comprehensive review of EDI products and features and vendor offerings. A more detailed and comparative review of vendors and their offerings can be found in INPUT's report, *EDI Vendor Profiles and Analysis*. Also, other INPUT EDI reports, including the annual market reports of 1991 and 1990, and the *EDI Business Integration Issues* report contain details on product vendors and their offerings.

1. IT Environment In Which EDI Operates

Local-area networks, portable computers, and bar code scanners are increasingly being incorporated into EDI systems. From one-quarter to one-third of the companies interviewed for this report said that they had at least one of these devices built into their EDI program.

Imaging systems are not playing a significant role in EDI programs, it appears.

Exhibit V-13 lists some of the most common devices/technologies used in conjunction with EDI systems.

EXHIBIT V-13

Devices Used to Collect or Carry EDI Data

Device	Percent of Respondents Who Use
LAN, office E-mail	36
Portable computers	31
Bar code scanners	24
Facsimile	14
Handheld data collection device	7
Smart cards	5
Image systems	4

Placing the EDI translation software on a local-area network is increasing in popularity. Some of the first networked EDI translators were simply front ends to mainframes, where the applications resided.

Now, translation software is being placed on a local-area network in client/server architecture, where applications running on other processors (micro, midrange, mainframe) on the network can access it. This kind of implementation has dramatically increased in popularity since early 1991. It will continue to be adopted, and may soon become the standard architecture for EDI.

Spread of this type of architecture depends on the growth of LAN use in general. More than half of the EDI users interviewed held that they had no LAN in their company at all.

Exhibit V-14 shows the frequency of occurrence of local-area networks in EDI-using companies and whether or not the EDI translation software is accessible via the LAN.

EXHIBIT V-14

Local-Area Networks and EDI Software

Configuration	Percent
EDI software connected on a LAN	33
No LAN (but use EDI software)	52
Have LAN, but EDI software not connected	10
No answer	5

2. Facsimile

Although not as frequently used as LANs, portable computers, and bar coding at this time, facsimile systems are critical to an EDI program and will become even more critical in the future, INPUT believes.

Improvements in facsimile technology are allowing facsimile to be integrated with EDI systems. Also, market demand for facsimile used in conjunction with EDI transmissions is very strong. At present, there are roughly 200 times the number of facsimile users as there are EDI users in the U.S. (25,000 versus 5 million).

Some of the recent developments that integrate EDI and facsimile technologies are:

- EDI-to-fax conversion services, performed by value-added networks. These services allow a large hub company to send all purchase orders in an EDI mode, even to smaller supplier companies that have no EDI capabilities to receive them (the POs are received on facsimile machines).

- EDI translation software that has built-in facsimile capabilities. The sending company can, on its own, convert EDI messages into fax messages.

- Hybrid EDI/fax systems, where some communications of the commercial exchange between two companies (shipping notices, invoices, for example) are fax and others are EDI (purchase orders)

- Fax-to-EDI conversion, still on the drawing boards but already being attempted in Hong Kong, where 99% of the trading community prefers fax and no computer-generated communications (because writing in Chinese is more difficult on a keyboard than by hand on a piece of paper)

- Dual data entry systems, where fax or other image documents are fed into a split screen for data entry clerks to rekey data and file along with EDI transmissions

3. UNIX and Client/Server Architectures

American Business Computer and St. Paul Software are two of the pioneering EDI software vendors that have created UNIX-based EDI software.

The great advantage of UNIX-based EDI software is that it is hardware independent. Users protect their investment in EDI software because it easily ports from one proprietary hardware system to another (as long as all platforms have a UNIX operating system).

Corporations have heterogeneous hardware environments, they change their hardware infrastructures more quickly than before, and EDI implementation (as an MIS project for a large corporation) is usually a slow, multiyear proposition. The flexibility that UNIX offers is a great advantage.

UNIX-based EDI software came out in 1991 and has been selling well, although the user base is (by mid-1992) no more than 100. Typical UNIX-based systems sold to date are mainframe equivalents ranging in price from $20,000 to $200,000. The merits of UNIX are easy to identify in theory, but due to the relatively new and scant experience with UNIX systems, they have not been proven. Nevertheless, INPUT believes that UNIX-based EDI software will become a preferred platform for users above the PC level.

4. Mappers and Development Platforms

Mapping software allows the user to map data fields in applications to the data fields of EDI standardized data formats. Mapping software has increasingly become a touted product offering by vendors.

Mainframe EDI software vendors are pushing mappers that make it easy for users to integrate their EDI software with internal applications. The mapping task will typically be done on a PC. The completed data map is downloaded into the translation software on the mainframe.

In addition to mapping software, some EDI vendors are making more extensive EDI development tools. Premenos and Texas Instruments are leaders in this activity. These CASE-like tools are designed to make the IS environments in which applications are running more EDI capable.

For more detail on mapping software and development platforms, see INPUT's *EDI Vendor Profiles and Analysis.*

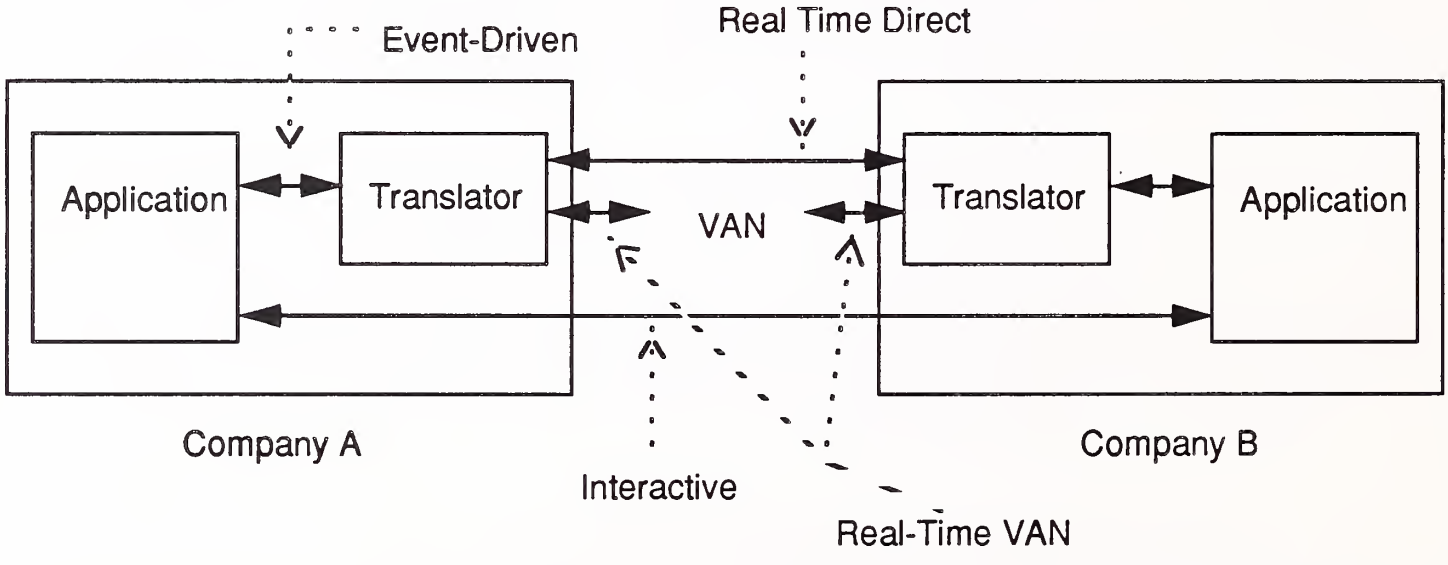
5. Real Time

Real-time EDI has become an issue to large EDI users and communities in the past two years. Real-time systems have an important bearing on the kind of data communication services an EDI user will use.

Exhibit V-15 identifies three types of "real-time EDI." True real-time EDI is when the application at one company is directly interacting with the application at another company.

EXHIBIT V-15

The Different Kinds of Real-Time EDI

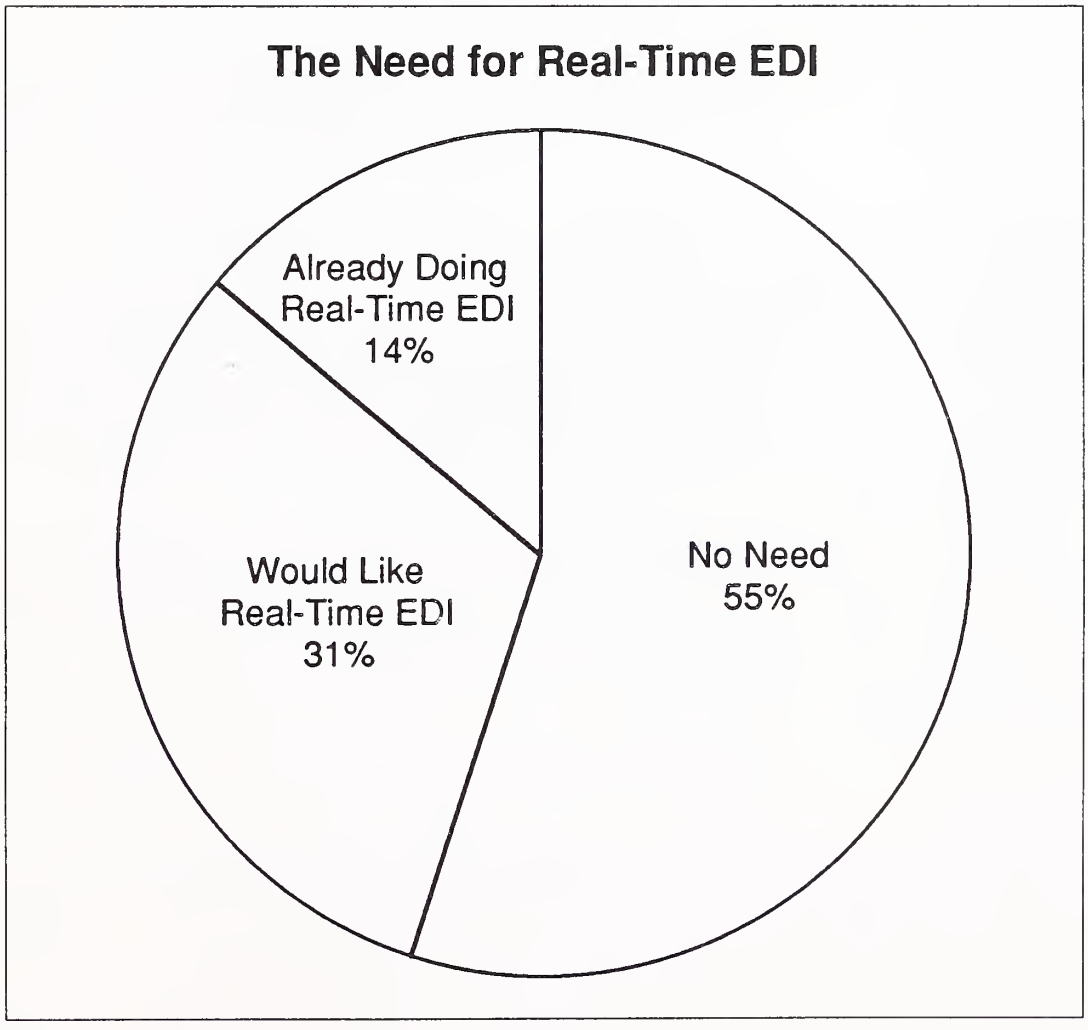


- Real time—Messages are sent between trading partner gateways/translators with no or little delay (15 minutes) in turnaround after receipt
- Event driven—Applications and translator exchange message sets as soon as they are created or received
- Interactive—Two applications exchange data directly within a preprogrammed context of conversational possibilities; may involve a human operator

Today's EDI value-added networks, though offering some real-time capabilities, are predominantly offering store-and-forward, batch, mailbox-architecture EDI. The move to real-time EDI on the part of users reduces the amount of value-adding services that a third-party network service can provide. The user merely needs a telecommunications pipeline. Real-time EDI means the end of value-added services as they have been traditionally defined, and the beginning of point-to-point EDI.

In this year's survey, approximately half (55%) of the respondents expressed no need for real-time EDI. However, slightly fewer than one-third (31%) expressed a positive need, while a sixth (14%) said they were already doing real-time EDI. (This latter group was using a broader definition of EDI, because no standardized formats have yet been developed for real-time EDI.) Exhibit V-16 shows relative interest levels in real-time EDI.

EXHIBIT V-16



These responses, compared to the results of last year's survey, are different: though the proportion of organizations already doing EDI has remained the same, the affirmative and negative responses to real time reversed. That is, last year about half the respondents expressed interest in real time, while one-third (36%) expressed no interest.

INPUT believes that the greater interest in real time one year ago can be explained as a sampling error. This year's sample is almost three times the size of last year's. This year's survey results more accurately reflect market needs. INPUT believes that the proportions shown in Exhibit V-16 are approximately correct for all EDI users today.

Just because last year's report found that half the respondents wanted real time and this year only a third do, INPUT does not believe that EDI users are losing their interest in real time. On the contrary, INPUT believes that real time will become a more sought-after requirement in EDI systems, as "quick response" and "just in time" replenishment strategies become widely adopted throughout all sectors of manufacturing and distribution.

The kinds of organizations claiming to be doing real-time EDI already were in the manufacturing (toys, electronics, food, pharmaceuticals, auto parts, luggage), distribution, banking (including the Federal Treasury), and health care industries.

Independently of the survey, INPUT has identified specific industry niches in which real-time EDI and EDI-like communications are strongly needed by user organizations. Exhibit V-17 lists these industry niches.

a. Implications for Network Services

As mentioned above, real-time EDI means the end of value-added services that have been traditionally defined, and the beginning of point-to-point EDI. The employment of value-added services by a third party will likely diminish as real-time EDI systems proliferate. Respondents to this year's survey supported this hypothesis.

Real-time EDI users are twice as likely to expect a reduction in value-added network usage than those who are doing standard, batch EDI. Those who are not doing real-time EDI (and are only doing batch EDI) generally expect to increase VAN usage.

Forty percent of the organizations that maintain real-time systems use no VAN at all, while only 35% of the total population surveyed don't use a VAN.

6. Applications and PC Software with EDI Hooks

It is becoming evident that selling EDI as a standalone technology (i.e., as a piece of translation software and a mapper) will appeal to only a limited number of buyers. Expecting users to integrate EDI software with internal applications on their own inhibits the willingness of users to adopt EDI.

EXHIBIT V-17

Real-Time Niches

Banking/Finance
Banks with correspondent banks
NACHA directory of ACH-capable banks
POS applications (credit card, check authorization, auto-reorder
Tax (state, federal, corporate, sales, liquor, transport)
SWIFT
Equipment leasing
Real estate
Distribution: Manufacturer to Wholesaler/Distributor
Electrical equipment
Animal health
Pharmaceuticals
Videocassettes
Grocery
Distribution: Manufacturer to Dealer/Retailer
Auto/Truck dealers (warranties, orders...)
Farm and outdoor equipment
Auto parts
Videocassettes
Books
Grocery
Apparel (UPC catalog)
Film
Office furniture
Any point-of-sale application

EXHIBIT V-17 (CONT.)

Real-Time Niches

Transportation
Port communities/Customs
Trucking (freight bill processing)
Third-party logistics
Tariff data bases
Airline reservations
Among Manufacturers
Gas industry
Oil industry
Chemical industry
Government
Welfare/Redistribution (tax, health care, EBT)
Regulation (EPA, EDGAR)
Procurement (CALS, Vendor Express, DoD Programs)
Other
Education (transcripts, Library of Congress)
Construction
Media
Utilities

A way around this barrier is to sell EDI already packaged into applications software. This has occurred in specific industry niches since the early 1980s (in transportation and some warehouse management software systems, among others).

Making applications with built-in EDI functionality typically requires alliances between EDI software manufacturers and applications software manufacturers in specific application categories (manufacturing, distribution, financial, etc.).

Some examples of alliances between EDI and applications software vendors are shown in Exhibit V-18.

EXHIBIT V-18

EDI and Applications Software Alliances

EDI S/W Maker	Applications S/W Maker	Industry/Function
Sterling	American Software	Manufacturing
The APL Group	Greentree Software	Procurement
EDI Inc.	Information Associates	University
American Bus. Comp.	Vocam, Symix	Distribution

(For more information regarding alliances between EDI software and service providers, see INPUT's report, *EDI Vendor Profiles and Competitive Analysis*.

INPUT believes that, by building EDI hooks into applications software, a very large opportunity exists for EDI capability being built into mass-market, "consumer" software such as spreadsheets, data bases, word processors, groupware/messaging software and PC/network system software.

- More than eighty percent of EDI users are running their EDI on a PC platform. For EDI to be "a function key away" (for example, in routing a requisition form, in connecting to a Borland data base, etc.) would take advantage of the largest single platform type of EDI installations.

- Spreadsheets in particular have been incorporated into some leading EDI programs (viz. Wal-Mart, APL). The hub company wants the spoke company to maintain at least a minimum level of processing power to automatically manipulate incoming EDI data. For example, sales data is transferred using EDI ANSI X12 format 852. The data is fed into the spreadsheet for analysis by the supplier. Microsoft's Windows software is being used in one EDI program where Windows' DDL allows data to be transferred from the EDI translator to the spreadsheet.

Incorporating EDI into PC software would be best accomplished in the same way that the MHS network E-mail protocol was established as the de facto standard. Enough key PC software vendors need to incorporate it into their products and enough third-party software developers need to be given cheap support in building applications using EDI.

INPUT expects some vendor (or group of vendors—not necessarily the EDI market leaders of today) to initiate something along these lines by 1994. Microsoft, Borland, and Lotus, although possibly not the initiating vendors, will undoubtedly be vendors who will have EDI capability in their products.

7. EDI as a Component of a Larger Product/Service Offering

As mentioned above, selling EDI as a standalone technology will reach only a limited number of buyers. Some EDI vendors are discovering that packaging EDI as part of a larger solution will increase market penetration. These vendors are changing the way they offer EDI to the market.

- Small EDI software vendors (EDI Inc., American Business Computer, and others) are allying themselves with larger service firms to take advantage of the larger firm's distribution and service channels.

- Network services and processing firms are selling turnkey trading community systems. GEIS' Pubnet and its emerging retail industry offering is an example of this, as is Sterling Software's LINX program for the Ports of Seattle and Tacoma.

- Professional services firms that offer EDI consulting (Price Waterhouse, Andersen Consulting, etc.) are offering EDI consulting as one component of a larger program of re-engineering the client's business processes.

Price Waterhouse (PW) merged its formerly distinct EDI and Business Process Re-Engineering practices. According to Tom Colberg, head of the EDI practice, every EDI project turned into a re-engineering project and every re-engineering project turned into an EDI project. So Price Waterhouse merged the two practices.

Mr. Colberg said that it makes much more business sense to PW to do this. The EDI practice generates $1 million to $2 million per year. The Re-engineering practice generated $20 million last year and expects $30-$40 million this year. Tom says that because the scope of re-engineering is much wider than EDI, so is the business opportunity.

By packaging EDI within a more comprehensive solution, the user is better able see how the proposed solution addresses (or does not address) its business concerns. The user does not have to bother with understanding the nuts and bolts of EDI technology (at least, initially). This approach to selling EDI is touched upon in Chapter VI, Conclusions and Recommendations.

8. Other Related Technologies

The growth of electronic networking of corporations has spawned a wide variety of specific technologies that facilitate interorganizational communication and commerce. These many other technologies are what INPUT calls electronic commerce. Electronic commerce consists of interorganizational systems that facilitate the many kinds of communications and transactions that are involved in a commercial exchange.

For more information on these technologies, examples of their use, the impact they are having on organizations and trading communities, the amount of money users are spending on them, who their providers are, and other issues, please refer to INPUT's series of reports and advisory services on electronic commerce.

C

Competitive Environments and EDI: Corporate and Intercorporate Re-engineering

This section looks at how EDI is changing the structure of industries. The re-engineering that EDI requires is not limited to the confines of a single organization. EDI and other electronic commerce systems potentially restructure entire industries and value chains.

This section examines two dynamics in EDI-induced value chain restructuring. One dynamic is the very straightforward effect of EDI eliminating intermediaries and altering the competitive environment. The second dynamic is how organizations change their market offerings and how new profit-making opportunities appear as a result of a changed competitive environment.

1. Elimination of Intermediaries

EDI clearly plays a role in re-engineering value chains. But whether this will cause expansion or restriction of EDI use in the future is not clear.

In particular, EDI and EDI-like systems are changing the face of distribution. Wal-Mart, for example, is bypassing food brokers and dealing directly with food manufacturers. EDI has enabled this.

Magazine subscription agencies, pharmaceutical distribution, videocassette distribution, and general merchandise wholesaling are experiencing a shrinkage of competitors in their respective niches dues to the improved communication that EDI provides.

Customs brokers and freight forwarders are facing obliteration by the electronic entry programs of U.S. Customs.

Intermediaries are being eliminated, competitive markets are contracting, and value chains are being re-engineered. Only the lowest cost providers are able to compete. EDI and other interorganizational, electronic systems that facilitate commercial exchange are changing the economics of industry organization.

EDI and EDI-like linkages among companies are driving trading communities to re-mix the composition of functions that independent organizations can offer in a market relationship. New EDI and EDI-like linkages are causing community participants (vendors and users and sometimes a hybrid of the two) to consider the possibilities of outsourcing or insourcing certain functions, including logistics, procurement, distribution, accounts receivable, accounts payable, and others.

When a value chain begins to reconfigure itself, the use of EDI will switch not only from one company to another, but from one type of company to another. Manufacturing and distribution businesses illustrate the different roles EDI plays in value chain relationships.

For the manufacturer, EDI is predominantly used to link the company with its customers. (The exception to this is the large hub manufacturer that uses EDI to link with its suppliers. Obviously, there are fewer of this type of manufacturer than smaller, supplier manufacturers.) A manufacturing company's strategy for EDI is fairly straightforward: use EDI with customers to satisfy them. If a company is big enough, it can use EDI with suppliers to reduce inventory costs.

For companies that perform distribution functions, particularly at the wholesale level, the EDI strategy is far less clear. It is less clear because the distribution business environment is much more dynamic and unstable than manufacturing as a result of, among other things, communication technologies including EDI.

Distributors are using EDI with customers and suppliers.

Exhibit V-19 lists general functional industry sectors and the predominant trading partner types that implement EDI.

EXHIBIT V-19

Predominant EDI Trading Partner

Industry	Typical EDI Trading Partner
Manufacturing	Customer
Distribution	Customer, Supplier, Internal
Transportation	Customer, Supplier
Utilities	Customer, Supplier
Telephone	Supplier
Health care	Supplier, Payor
Government	Supplier, Regulatee
Bank	Corporate Customer
Insurance	Internal
Education	Supplier, Other institution

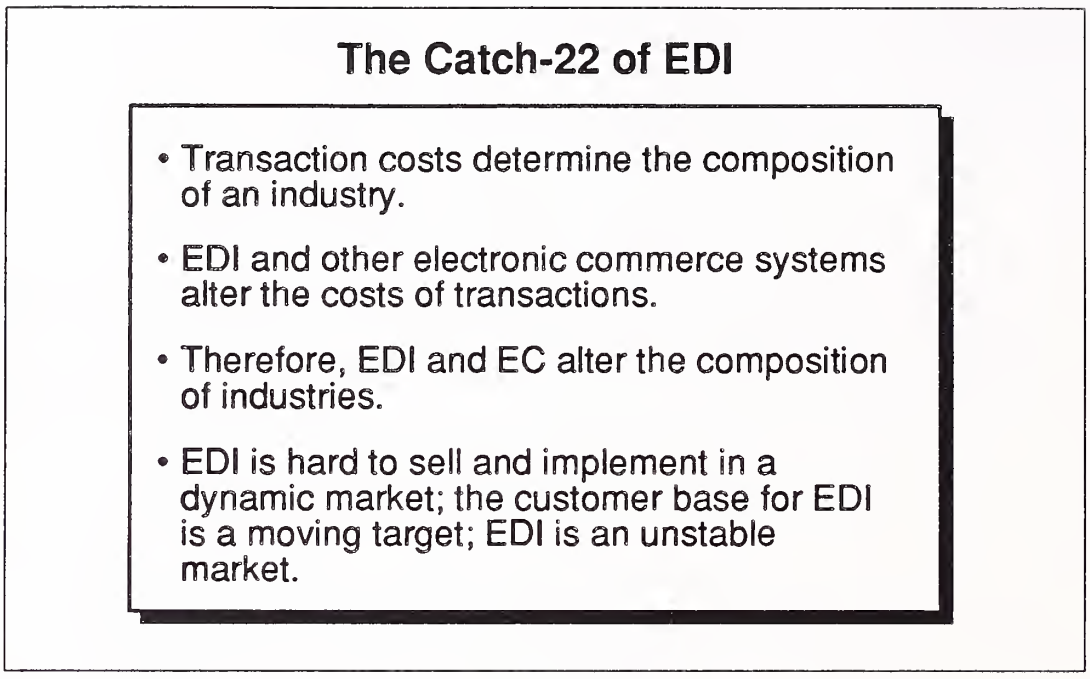
a. The Catch-22 of Implementing EDI

Potentially, EDI and EDI-like systems can destabilize an industry. Users and vendors must be able to adapt to and take advantage of changed competitive environments.

Vendors of EDI and similar systems face the catch-22 of putting their customer base out of business. By making the industrywide function of their customer base—let's say, all the pharmaceutical distributors in the U.S.—more efficient, the systems vendor ends up eliminating many of those distributors, its customers. In other words, by helping to clear the exchange between manufacturer and retailer (the role of distribution), EDI vendors help to minimize the role of distribution. EDI eliminates, through electronic routing of the myriad offers of sellers and the myriad requests of buyers, what formerly had been a large industry employing hundreds of thousands of people, buildings and equipment.

Exhibit V-20 outlines the catch-22 of EDI and EDI-like systems.

EXHIBIT V-20



2. New Profit Opportunities and Shifting Corporate Focus

In addition to the dynamic mentioned above in which value chains are consolidated because interorganizational systems eliminate intermediaries, another change in industry organization/competitive environment occurs as a result of informatizing an industry.

Profitable value-adding activities within a value chain will shift from one domain to another. Often the ostensible business of a given player is less profitable than the communication-information functions surrounding the business. For example, providing an airline service to transport passengers has become less profitable than providing an electronic marketplace where passengers can procure these services from airlines. Again, like the consolidation mentioned above, much of this shift of business focus/competence is in the distribution areas.

Aspects of this trend include:

- EDI user companies often become vendors of EDI software and services. Texas Instruments, the large transportation companies, Levi Strauss, Digital Equipment, and EDS are examples.

- Information initially generated for EDI communications becomes useful (has market value) in other domains. The sale of market data and point-of-sale transaction data are examples of this.

- Continual outsourcing of corporate functions (particularly logistics, accounts receivable, accounts payable, product design and development and, more generally, corporate information systems) is being facilitated partly or, in some cases, entirely through EDI.

- EDI vendors, more and more, are partnering with other EDI and IS vendors to provide integrated solutions to EDI users, often where the EDI component is invisible to the user. This suggests that value adding is not a simple proposition of saying, "Here's my product, please buy it." It is a matter of placing one's product within a larger infrastructure offering. Only then will the ultimate buyer of the product find value in it.

In the 1990s, we are seeing a continual, rapid shifting/dissolving of corporate boundaries. There now exists a very fluid environment in which parties compete in one sphere, cooperate in another, buy from one another, and sell to one another. *Product* has become a more intangible term. The capacity for inducing action is more of an asset than is a physical object. The scenario for the future is to add value by controlling information and communication/distribution channels in a global, polymorphous media industry.

For more information on how important the media industry will become when EDI and other internal IS systems are interconnected among organizations, see INPUT's report, *Electronic Commerce in the Media Industry*.

3. Pricing/Financing the EDI Infrastructure

Because EDI requires the buy-in of so many parties in a trading community and because it alters the relative competitive advantages of those parties, responsibility for bearing the costs of the EDI infrastructure is subject to negotiation among parties and is key to the development and impact of the EDI solution within a given trading community.

Users need to be aware of the different pricing strategies of EDI vendors in order to make more informed purchasing decisions and to better analyze their EDI investment strategy. Also, large users (the "hub" companies) often play the role of the EDI vendor. Thus, the following listing of pricing strategies will help this kind of user provide EDI to its trading community.

EDI vendors are taking different approaches to selling their EDI offerings. Often the approaches overlap; all vendors, to some extent, have a little of each approach built into their own.

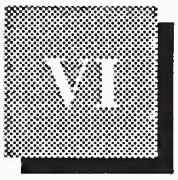
The basic approaches, in ascending order of risk, are:

- Line-item pricing. The vendor charges a basic retail price for each component of its EDI offering, whether it is translation software, communications, consulting services, mapping software, transaction set modules, etc. The cost of the service is the sum of the line items.

- Annuity/transaction-based pricing. The vendor (or large user) is more interested in capturing a whole trading community or at least the EDI services necessary for all the trading partners of a large hub account. For example, implementing J.C. Penney's EDI program (including bringing up its trading partners) or supplying a trading community system at a shipping port are not single sales, but streams of payments over time. The vendor may make up-front discounts on individual components as long as it can guarantee an ongoing stream of monthly network and/or software maintenance revenue from the parties in the trading community.

- Equity partner pricing. The vendor (or large user) takes on the user's (or trading partner's) EDI program as part of a larger outsourcing contract. The vendor's outsourcing fee is contingent on cost reductions that it can provide because of the efficiencies it can bring (no cost reduction, no pay). In some cases, the vendor may even pay in advance for the EDI/data processing business as long as the client promises to give all its EDI/data processing business to that vendor. EDS and, to some extent, GEIS are the only general EDI vendors known to have taken this approach. National Data Corporation is providing a somewhat similar offering to banks. Some large retailers and large transportation companies are pursuing variations of this approach with their trading partners.

To learn more about how these different pricing approaches are being used and how they affect trading communities, see INPUT's report, *EDI Vendor Profiles and Analysis.*



Conclusions and Recommendations

In this final chapter, INPUT offers some generalizations about the state of EDI implementation today and the problems it faces. Specific recommendations to users and vendors of EDI systems are also given.

A
The Predicament of EDI

As a technology, EDI is not like typical applications software because it both spans and ties together organizations. Most applications software and other information systems are self-contained within a single company and usually within a single functional department. The implementation of a self-contained application, therefore, is much less complicated than implementing EDI.

The difficulty for the user in implementing EDI comes from EDI's inherent necessities to:

- Integrate the diverse business practices, data structures, and information system environments of several corporations (one's trading partners). The coordination challenge is to have one's many trading partners buy into and synchronize their EDI programs and to do this continually as data formats/elements and other requirements change.

- Integrate the diverse business practices, data structures and information systems platforms of several functional departments within a single corporation (IS applications include order entry, shipping/fulfillment, accounts receivable, accounts payable, etc.). Here, the coordination challenge is to have departments of the company work together to build a unified system.

- Develop and employ a universal communication standard by which functional groups within a company and among companies can communicate business requests, promises and related information. Corporate representatives must work with others in the industry (often competitors) to agree on and maintain standards.

- Integrate and coordinate the products and services of many IS vendors to provide a single EDI solution. This is a variation of the three requirements listed above. The coordination focus, however, is now on the vendors that supply a given EDI user or group of users. Vendors must work together to provide integrated solutions to users. No single vendor can provide all the necessary components of an EDI implementation. Expertise in EDI software, applications software, systems software (such as network systems software), specific hardware-dependent applications (such as bar code scanning, wireless data devices, etc.), professional services, network services, education, and vertical market expertise are all necessary in developing a successful EDI implementation.

Thus, while the idea of EDI is simple, and its technology relatively unsophisticated, it is the vast number of parties and components requiring coordination that make EDI difficult to implement.

Users don't seek EDI *per se*, they seek to operate more efficiently and closely with their trading partners and internal departments. EDI is just one tool that helps accomplish this larger business strategy.

There are other tools that compete with EDI, including interactive voice response, proprietary on-line systems, E-mail, and some versions of facsimile. EDI is unable to accomplish some integration objectives, due to standards being insufficiently robust and/or too rigid, a requirement for real-time, a requirement for flexibility, EDI's substantial overhead costs, and other reasons.

For most companies, EDI is a complicated, time-consuming project to implement and yet, for all the work involved in this task, it is only a means to a higher end. Furthermore, successfully implementing EDI does not guarantee successfully accomplishing the business strategy.

B

General Recommendation: Be a Market Maker

Because EDI is a "group sell" and requires acceptance by and participation of many parties, in order to build a successful EDI system, the EDI initiator (a user, vendor, trade association, government body, or combination thereof) should position itself as a "market maker." A market maker renders participation in the building of the project—in this case, an EDI system—attractive to all relevant parties in a given commercial context.

Market makers establish a situation in which people can make money. The market maker sets the rules of the game so that it is attractive to play it. This may mean giving away software, network services, etc. These giveaways pay for themselves in the long run because more people end up doing business with the market maker.

Market makers *include*, they do not *exclude*. Proprietary systems and strategies limit the number of people who can play in the market maker's game. This limits the amount of money that can be generated in the long run. Proprietary systems and exclusion have immediate attractiveness in that the provider of the marketplace system has a monopoly and can control and charge for it. Not only is the current EDI marketplace switching from proprietary to open systems, but history provides example after example of closed system failures (the Soviet Union, for example).

Market makers make it simple. Complexity discourages people from wanting to participate. To be successful at making the market, you must make it easy for people to enter and participate. Simplicity in this case requires easy-to-integrate EDI software and a small list of guidelines for EDI use in the trading community,

For more information on being a market maker, see INPUT's report, *EDI Vendor Profiles and Analysis.*

C
User Recommendations

1. Users as Market Makers

If you are a user of EDI, be a market maker by:

- Helping your trading partners perform EDI: provide an incentive or otherwise make it attractive for them to trade with you electronically. Establish an environment in which everyone makes money by trading with you.

- Making sure that every group within your organization sees a positive benefit from participating in implementing EDI throughout the company.

- Negotiating/attaining discounted prices with EDI vendors for software and services. Do this on your own or with/through other trading partners in your trading community. Enlist the support of trade associations.

The user as a market maker is typically a hub company. The company helps its trading partners establish EDI. Often the hub company subsidizes the cost of software, network services, company education, and other expenses associated with implementing EDI. Transportation companies have taken this route—particularly with their customers—giving them EDI software so that the customer can electronically send bills of lading. Retailers Sears and Wal-Mart have also adopted this strategy, giving their trading partners inexpensive network transmission

services and, in the case of Sears, inexpensive EDI software. Wal-Mart requires its suppliers to buy their own EDI software, but Wal-Mart has negotiated a wholesale price for its suppliers to purchase software from TSI International.

User market makers should work with EDI vendors to help initiate their trading community, as Wal-Mart has done with TSI (above) or as trade associations (e.g., the National Wholesale Druggists' Association; American Publishers Association) are doing with GEIS, Sterling Software and IBM. The objective is for the user organization/representative to contract with the vendor to help it bring electronic trading to its network of commercial relationships.

2. Other User Recommendations

- Plan to re-engineer your company. Your whole business work flow will potentially be altered by adopting EDI. Plan to educate people in your organization to understand, to accept, to welcome, to embrace the new way of doing business. Education can be gained from many sources: attending conferences; joining your local EDI users' group (every major metropolitan area in the U.S., and some parts of Asia, Europe, and Latin America have user groups—call INPUT for assistance); purchasing the now plentiful management handbooks on EDI; requesting free educational material from EDI vendors; hiring consultants; subscribing to INPUT's *EDI Reporter International* newsletter and reading its many studies on EDI and electronic commerce.

- Decide whether you want to bring up many trading partners with a single application or many applications with one or a few trading partners.

- Take advantage of help from EDI vendors. It is a buyers' market. Vendors will be open to providing you with, at least, free educational materials on EDI. You can get competitive offers.

- Remember, EDI is one component of a larger solution. The larger solution addresses business issues and the strategy of the organization. The user organization must be absolutely certain of what its larger strategy is before it makes any decision about EDI. The executive's approach to implementing EDI must be to articulate (to the company's employees, trading partners, and IS vendors) a business strategy. The employees, trading partners and especially the IS vendors should then respond with a solution. The executive should not get bogged down in attempting to articulate the technical specifications of an EDI implementation.

D
Vendor Recommendations

1. Vendors as Market Makers

If you are a vendor of EDI or other information software/services, be a market maker by:

- Helping EDI users implement EDI across the trading community. You can charge for this, but be prepared to assume up-front costs in return for annuity-type revenue streams in the future. Ideally, you want to capture a market in a given niche.

- Organizing a series of relationships with a multitude of IS vendors (applications software companies, third-party developers, vertical market specialists, general professional services firms, systems integrators) to offer an integrated solution to a particular market niche/industry.

The trading partner implementation program is the best strategic marketing approach that a vendor can take with EDI. The objective is to get many companies in a trading community conducting business via EDI. The vendor (or alliance of several vendors) helps a large hub company bring up all its suppliers or customers in a project management type of approach. This also works with generalized trading communities, such as shipping ports, that are not necessarily grouped around a single hub company.

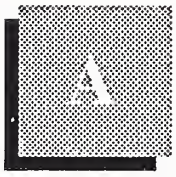
This kind of market maker offering by a vendor will increasingly require alliances among vendors. No single vendor has all the expertise and competence required to make the infrastructure for a market. Network services, software, technical implementation services, maintenance and customer support services, application integration, business process re-engineering consulting at the company and community levels, and electronic information services (particularly community product catalogs and directories—see INPUT's report, *Electronic Commerce in the Media Industry*) are some of the many resources necessary to make an electronic marketplace. (For more information on EDI vendor alliances, see INPUT's forthcoming report, *EDI Vendor Profiles and Analysis.*)

2. Other Vendor Recommendations

- Help your customers integrate EDI with their companies and applications. This may require allying yourself with other IS vendors, particularly applications software vendors. Sell your EDI translation software through VAR and OEM arrangements. Have your product built into other products.

- Develop long-term relationships with EDI customers; continually sell EDI products and services. The EDI sale is not a one-time sale, with an annual maintenance source of revenue. EDI customers need continuous help in maintaining their EDI systems: upgrading standard formats when new versions come out, modifying trading partner profiles, adding new transaction sets/message types, integrating new applications, adding new trading partners, re-engineering business workflow, obtaining ongoing education of the work force, and so on. All of these needs can be met through commercial offerings. Prepare your company to offer these to the customer. You may have to make alliances to achieve this.

- Determine the kind of pricing you want from selling your software and services (line-item, annuity, equity partner) and position yourself accordingly.



Glossary of EDI Terms

ACCS—"Access," the Aluminum Customer Communication System.

ACH—Automated Clearinghouse, a banking industry mechanism for electronic funds transfer. *Also see* NACHA.

AIAG— The Automotive Industry Action Group, a trade association. Also refers to EDI formats developed by the association.

ANA--Article Numbering Association. The U.K. industry group that introduced bar coding to that country and developed the Tradcoms EDI standard.

ANSI—American National Standards Institute.

ASC— Accredited Standards Committee.

Bar Coding—A standardized product identification method that facilitates data entry through scanning of coded printed labels.

Batch Processing—A data processing/data communications method that groups transactions. *Compare to* Real-Time Processing.

CAD/CAM—Computer-Assisted Design and Computer-Assisted Manufacturing, a set of applications that use graphics to manage these functions.

CARDIS—Cargo Data Information System, a concept for trade documentation automation promoted by the National Council on International Trade Documentation. Never implemented in its proposed form, "CARDIS Element Systems" have been developed by several vendors serving the international trade community.

CCD— Cash Concentration and Dispursement, an electronic funds transfer format.

CEFIC—The Brussels-based Council of European Chemical Manufacturers, which sponsors an EDI project.

CIDX—Chemical Industry Data Exchange, a standard based on X12.

CLM— Car Location Messages, applied to railcar logistics.

CLO—Computerized Loan Origination. An EDI application being developed by the mortgage banking industry.

Compliance Checking—A function that verifies that document information is received in the right order and in the proper format.

COMPORD—Computerized Ordering, an EDI system developed by the American Iron and Steel Institute.

COPAS—Council of Petroleum Accounting Standards, an industry association developing EDI standards.

CSI—Commercial Systems Integration. A professional service whereby vendors take complete responsibility for designing, planning, implementing, and sometimes managing a complex information system.

CTP—Corporate Trade Payments, an electronic funds transfer application.

CTX—An electronic funds transfer mechanism that is compatible with the EDI X12 standard, and which carries information about a payment as well as transferring value.

DISA—The Data Interchange Standards Association, the ANSI X12 secretariat.

DISH—Data Interchange for Shipping, a project sponsored by a European group of shippers, carriers, and agents.

EDI—Electronic Data Interchange. The computer-to-computer communications based on established business document standards, or using translations by EDI software housed on users' computers, located at remote computer service bureaus or on value-added network processors.

EDIA—The Electronic Data Interchange Association, formerly known as the Transportation Data Coordinating Council.

EDICT—Istel's U.K. EDI service.

EDIFACT—EDI for Administration, Commerce, and Transportation, the evolving international EDI standard.

EDX—Electronics Industry Data Exchange, based on the X12 standard.

EFT—Electronic Funds Transfer, the transfer of monetary value.

Electronic Mail—The transmission of text, data, audio, or image messages between terminals using electronic communications channels.

Electronic Mailbox—A store-and-forward facility for messages maintained by a transmission or processing facility.

EMBARC—An EDI standard being promoted for use in the paper, printing, and publishing industries.

EMEA—Council for Mutual Economic Assistance, an Eastern European bloc EDI association.

FASLINC—The Fabric and Supplier Linkage Council, a textile industry association dedicted to EDI development and other industry needs.

GTDI—General Trade Data Interchange, an international standard, developed from TDI, accommodating compromises of French participants in SITPRO, the agency behind U.N. certification of the standard. Is evolving into EDIFACT.

HCFA—Health Care Financing Administration, a U.S. government agency responsible for Medicare administration. Also describes a format (HCFA 1500) for healthcare insurance claims.

ICOPS—The Industry Committee on Office Products Standards, sponsored by two office products trade associations, for EDI applications.

IGES—International Graphics Exchange Standard, by which CAD/CAM graphics can be transferred electronically.

IIR/ACORD—Standards for paper and electronic insurance documents, developed by the Insurance Institute for Research and the Agent Company for Research and Development organizations, which have merged.

Interface—The insurance industry term for EDI, applied to agent/company communications, ideally using IIR/ACORD formats.

IRC—International Record Carrier, a common carrier providing messaging and network services, no longer limited to international communications.

IVANS—Insurance Value-Added Service, provided on IBM's Information Network by an insurance industry association.

JEDI—The Joint Electronic Data Interchange Committee, which consisted of representatives of industry trade associations coordinating development of a reference EDI dictionary for the creation of new EDI transactions, segments, or data elements for international use. Its work has largely been supplanted by UNECE Working Party 4.

JIT—Just-in-time, an inventory management philosophy that plans delivery of needed materials and components immediately prior to final manufacture or assembly.

LDI— Logistics Data Interchange, information about the location of materials in transit through the manufacturing/distribution cycle.

Mapping—The process of linking specific fields of internal document layouts to an EDI standard by segment, data element, and coded value. This needs to be done for each application receiving or sending EDI data.

NACHA—National Automated Clearing House Association, a banking services industry group.

ODETTE—Organization for Data Exchange through Teletransmission in Europe, an automaker's association EDI standard.

Ordernet—Sterling Software's EDI service. Also refers to EDI standards developed by the National Wholesale Druggist's Association for use in pharmaceuticals.

Rapporteur—Used to describe an expert appointed by the United National Economic Commission for Europe Working Party 4, the primary group developing the EDIFACT international EDI standards.

RCS—A Remote Computing Service facility that arranges to process some or all of a user's workload. Similar to a VAN (below) but without network services.

Real-Time Processing—A data processing or transmission method with data entered interactively. Response to input is fast enough to affect subsequent input. The results are used to influence a currently occuring process.

SAFLINC—The Sundries and Apparel Findings Linkage Council, an association in the apparel and related industries promoting EDI and other industry needs.

SAM—Shippers Administrative Messages, a logistics service/application.

Secretariat—The administrative organization providing business and coordination services for various EDI standards-creating and maintenance bodies.

SITPRO—Simplification of Information Trade Procedures, a European EDI standards and trade facilitation agency that reports to the Department of Trade and Industry.

SMMT—Society of Motor Manufacturers and Traders. An automotive industry association responsible for the ODETTE project.

Store-and-Forward—The capability of a transmission or processing facility to hold messages or data until requested, or until a prescheduled time.

SUPER—Study for the Utility of Processing Electronic Returns, an Internal Revenue Service test for electronic filing.

SUPERB—The IRS' electronic filing test program for business returns.

TALC—Textile/Apparel Linkage Council, a subcommittee addressing EDI standards.

TAMCS—Textile/Apparel Manufacturers' Communications Standards.

TCIF—Telecommunications Industry Forum, an industry group involved in EDI, bar coding, and similar technologies.

TDCC—The Transportation Data Coordinating Committee, an early advocate for EDI, now known as the Electronic Data Interchange Association. Also refers to U.S. EDI standards.

TDI—Trade Data Interchange, an international shipping standard. *Also see* GTDI.

TEDIS—An EEC program to promote trade EDI throughout industry and government.

Tradanet—An ICL (U.K.) EDI service.

Translation—Transforming information sent in one format to another format.

UB82—A format for health claims insurance submissions.

UCS—Uniform Communications Standards, the EDI standards used by the grocery industry, based on X12, and coordinated by the Uniform Product Code Council.

UNECE—United Nations Economic Commission for Europe. Despite its name, a broadly-based representational body developing the international EDI standards called EDIFACT.

UNJEDI—United Nations Joint EDI committee developing technical and procedural standards on EDI.

VAN—Value-Added Network. A common carrier network transmission facility, usually augmented with computerized packetizing, which may also provide store-and-forward switching, terminal interfacing, error detection and correction, and host computer interfaces supporting various communications speeds, protocols, and processing requirements.

VANGUARD—A U.K. Department of Trade and Industry-sponsored awareness and promotional program for VAN and EDI services.

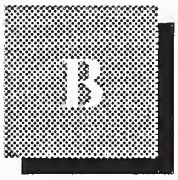
VICS—Voluntary Interindustry Communications Standards, a committee developing EDI standards between retailers and manufacturers.

WINS—Warehouse Information Network Standards, promoted by two representational associations, the International Association of Refrigerated Warehouses, and the American Warehousemen's Association.

WP4—Working Party 4 of the Economic Commission for Europe, commissioned by the U.N. to develop trade facilitation procedures and international EDI standards.

X.400—An international electronic messaging standard.

X12—A set of generic EDI standards, approved by the American Standards Committee.

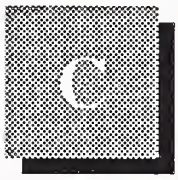


Forecast Reconciliation

EXHIBIT B-1

Forecast Reconciliation
($ Millions)

Delivery Mode	1991 Market				1996 Market				91-96 CAGR per data 91 rpt (%)	91-96 CAGR per data 92 rpt (%)
	1991 Report (Fcst) ($M)	1992 Report (Fcst) ($M)	Variance from 1991 Report ($M)	Variance from 1991 Report (%)	1991 Report (Fcst) ($M)	1992 Report (Fcst) ($M)	Variance from 1991 Report ($M)	Variance from 1991 Report (%)		
EDI	231	247	16	7	596	840	244	41	21	27



User Questionnaire

This survey seeks to determine the current usage of EDI systems and the anticipated future requirements of such systems by organizations such as yours. In this survey, therefore, we will ask you (1) the management structure you have established to implement EDI (2) the magnitude of EDI usage and how much you expect it to increase (3) the kinds of applications and equipment that are integrated in your EDI system (4) how much your EDI system is costing (5) the requirements you have for EDI software and network services, and (6) the obstacles and the impacts to your organization of implementing EDI.

All answers will be held in strictest confidence, and numbers will only be used for statistical analyses such as ranges, averages and frequencies of occurrence. Your organization will never be linked to specific data elements.

When the report is completed, we will send you a copy of the Executive Overview as a way of thanking you for your time and contribution.

---

1. Are you a
- ☐ vendor of EDI products and services
- ☐ a user of EDI products and services
- ☐ both
- ☐ another kind of organization (e.g., trade association)?

If the person is not a user, please thank them and end the interview now.

2. In which specific industry is your company (e.g., grocery, aerospace, etc.)?

3. List your three core objectives for implementing EDI.

_____

_____

_____

4. What level of management has final authority in implementing EDI in your company?

   ____Executive _____Middle management _____Operations

5. In your opinion, is this management level effectively getting the job done?

   _____Yes _____No

6. What management policies do you think are needed for your organization to more effectively implement EDI?

   _____

   _____

   _____

7. How many employees work on the EDI project full time in your company? _____

8. With how many suppliers do/will you conduct EDI?

   Now _____ 12 months from now _____

9. With how many customers do/will you conduct EDI?

   Now _____ 12 months from now _____

10. How many message units/transaction sets does the EDI translation software currently process per month? _____

11. How many message units/transaction sets do you anticipate the software will process per month 12 months from now? _____

12. Of the following applications, please indicate which are integrated into your EDI software. "Integrated" means that data generated or used in the following system/application are directly transferred into or out of EDI transmissions with trading partners without any human rekeying of data.

    - ☐ Sales/order entry
    - ☐ Purchasing
    - ☐ Accounts payable
    - ☐ Accounts receivable
    - ☐ Funds transfer
    - ☐ Manufacturing resource planning
    - ☐ Traffic management/logistics/transportation
    - ☐ Inventory control/receiving
    - ☐ Exchanges involving large file transfers (e.g., telephone bill detail, graphics files, software updates, etc.)
    - ☐ Other_____

13. Which of the following devices are used to collect or carry data that is used in the EDI transmission? Check all that apply.

- ☐ Bar code scanners
- ☐ Portable computers
- ☐ Handheld data collection devices (excluding bar code scanners and portable computers)
- ☐ Local-area networks/office environments/E-mail systems
- ☐ Smart cards or any magnetic stripe card
- ☐ Image systems
- ☐ Facsimile machines, fax servers, and/or enhanced fax services

14. Of the following methods for receiving purchase orders from your customers, please estimate (as a percentage of the total) how much each one is used.

(prefer both columns of information)

	Percent of Transactions	Percent of Dollar Volume
Field sales representatives	_____	_____
Walk-in, showroom orders	_____	_____
Phone conversation	_____	_____
Mail POs/invoices	_____	_____
Interactive voice response	_____	_____
Facsimile	_____	_____
On-line electronic order entry	_____	_____
EDI	_____	_____
Other (_____)	_____	_____
	100	100

15. Before you began doing EDI, how much did you spend (in thousands of dollars) on EDI education and consulting services?

$_____

16. Now that you have begun EDI, how much did you spend (in thousands of dollars) on each of the following items in 1991 and how much do you plan to spend on each in 1992?

	1991	1992
Third-party EDI software	_____	_____
Internal EDI software development	_____	_____
EDI network services	_____	_____
EDI consulting/programming by outside consultants	_____	_____
EDI conferences, educational materials	_____	_____

17. Have you replaced EDI software since you began doing EDI?

_____Yes _____No

Why?_____

_____

_____

18. Have you replaced or added an EDI value-added network since you began doing EDI?

_____Yes _____No

Why?_____

_____

_____

19. Of the following third-party network services, check all that you use:

- ☐ On-line product catalogues; data bases; directories
- ☐ Converting EDI transmissions to paper or facsimile
- ☐ Graphics files transfers
- ☐ Trading partner implementation programs
- ☐ Reports on distribution chain activity; marketing/sales activity reporting
- ☐ Interactive voice response services
- ☐ Buy-sell bulletin boards
- ☐ Electronic mail
- ☐ Electronic funds transfer
- ☐ Other (please explain) _____
- ☐ Just basic services (store and forwarding of messages; compliance checking; monthly audit reports)
- ☐ Don't use a VAN at all

20. Are you planning to decrease, increase, or keep unchanged your reliance on third-party value-added networks in the future?

- ☐ Decrease
- ☐ Increase
- ☐ Keep the same
- ☐ Don't use a VAN

21. Does your company have a local-area or wide-area network on which EDI software is connected?

- ☐ Yes, have network with EDI connected
- ☐ No, don't have a network
- ☐ No; have network but EDI is not connected
- ☐ None of the above

22. Do you have a current need for conducting EDI in a real-time mode instead of a batch mode or would you have such a need in the future? Would you like to see some EDI transmissions done in a real-time mode in the future?

- ☐ No need
- ☐ Already doing this
- ☐ Would like to have real time

23. If more than one department in your company is doing EDI, does each department have its own translation software or does it access centralized software on a network?

- ☐ Only one department does EDI
- ☐ Each has its own
- ☐ Centralized (one serves all)
- ☐ Other (specify) _____

24. What are your plans for international EDI use?

- ☐ Already doing it. How many trading partners do you have? _____
- ☐ Plan to do it in the next 12 months
- ☐ Plan to do it in the next three years

25a. Are you using EDI/EFT to pay or receive payments from trading partners (please do not count lockbox payments)?

_____Yes _____No

25b. If yes, with how many trading partners? _____And, are you using the X12 820 format?

_____Yes _____No

25c. If no, will you in the next 12 months?

_____Yes _____No

_____Don't know

26. On a scale of one to five (five being most satisfied), how satisfied are you with your EDI program? (please circle)

Least satisfied 1 2 3 4 5 Most satisfied

27. If you are dissatisfied in any way, please explain why:

_____

_____

_____

28. What are the three biggest obstacles in implementing EDI?

_____

_____

_____

29. What quantifiable impact has EDI had on your company?

_____

_____

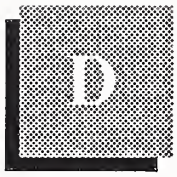
_____

30. What is the approximate size (number of employees) of your company?

- ☐ Under 100
- ☐ 100-499
- ☐ 500-999
- ☐ 1,000 and over

31. What are your company's approximate annual revenues?

- ☐ Under $19 million
- ☐ $20 million to $49 million
- ☐ $50 million to $99 million
- ☐ $100 million to $499 million
- ☐ $500 million to $999 million
- ☐ Over $1 billion



Index of Companies

U

V

W