INPUT

MARKET FORECAST

The U.S. EDI and Electronic Commerce Markets

1993-1998

EDI / Electronic Commerce Program

THE U.S. EDI AND ELECTRONIC COMMERCE MARKETS

1993-1998

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Abstract

This report sizes the market for software and services that support electronic commerce. Electronic commerce is the conducting of business transactions over electronic networks.

Central to the notion of electronic commerce is electronic data interchange, the exchange of structured electronic files between independent computer systems of independent companies. This report carefully scrutinizes the EDI market in terms of user issues, vendor revenues and activities, and technology trends. The report goes beyond just EDI, however. It also examines E-mail used among companies, electronic information services that support commercial exchanges, enhanced facsimile services, and other intercompany network applications.

The report is 80 pages long and contains 40 exhibits.

Published by
INPUT
1280 Landings Drive
Mountain View, CA 94043-0848
U.S.A.

Electronic Data Interchange Program

*The U.S. EDI and Electronic Commerce Markets,
1993-1998*

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Introduction

This report sizes the market for software and services that support electronic commerce. Electronic commerce is the conducting of business transactions over electronic networks.

Central to the notion of electronic commerce is electronic data interchange, the exchange of structured electronic files between independent computer systems of independent companies. This report carefully scrutinizes the EDI market in terms of user issues, vendor revenues and activities, and technology trends. The report examines more than just EDI, however. It also examines E-mail used among companies, electronic information services that support commercial exchanges, enhanced facsimile services, and other intercompany network applications.

This chapter defines the components of electronic commerce, explains INPUT's methodology for preparing this market study, and lists related INPUT studies in which the reader of this report may also be interested.

A
Definitions

Electronic commerce is the conducting of business over electronic networks.

The specific information technology products and services that support this can be classified according to type or function. Section 1 below classifies them according to type; section two according to function.

1. Information Software, Service and Technology Components of Electronic Commerce

Many software and information products and services come into play to allow companies to trade electronically.

The information products and services for electronic commerce can be classified as follows:

- *Software products*, including EDI translation software, E-mail software intended for intercompany use, payments software, and other "interface" types of software (typically used in conjunction with a specific network application or electronic information service)

- *Network services*, which are subdivided into two major categories:

  - *Network application services*, which are primarily the data transfer services involved in EDI, intercompany E-mail, and enhanced fac-simile services, but also include the miscellaneous network applica-tion services of directories and bulletin board services

  - *Electronic information services* that support commercial transactions. These are a subset of the larger category of electronic information services that are on-line and CD ROM-based data base services. The subset for electronic commerce services consists primarily of credit information (such as TRW or Equifax), marketing and sales informa-tion that is derived directly from commercial transactions (such as Information Resources or Nielsen), and product/price data bases (including, for example, airline reservation systems). (In this report INPUT does not include financial on-line services, such as Reuters or Bloomberg, despite the fact that they maintain on-line ordering capa-bilities and therefore constitute a kind of electronic commercial transaction. INPUT doesn't include them because they are a separate market.)

- *Professional services*, including consulting, education and training, software development (performed by a third party), and applications management

- *Equipment*, which covers a wide range of equipment including processor platforms, input devices (such as bar code scanners), communications devices, handheld devices, and other kinds of equipment

The market for electronic commerce information technology is the sum total of user expenditures to third parties for these components. Expendi-tures by users using internal resources (such as software development personnel on staff) are not tallied in the EC market sizing and forecast.

Systems integration and systems operations (outsourcing) are considered alternative channels of these same basic components. In other words, these components can be offered on a standalone basis from several vendors or as an integrated solution from a single systems integration/ operations vendor. In the latter case, the SI/SO vendor takes full responsi-bility for the operation of the system, whereas in the former the vendor(s) do not.

Note that credit card processing, payroll processing, and other kinds of bill processing are not counted in the electronic commerce marketplace. These are separate industries. Furthermore, though these services are derived from business transactions, they are not directly market exchange functions.

Also note that for some of the components, particularly E-mail expenditures and equipment expenditures, only a fraction of what users spend on these items can be attributed for use in an intercompany context because these resources are shared for intra- as well as intercompany use. Thus, imputing what fraction of the expenditures should be assigned to the intercompany category is sometimes an inexact science.

Electronic commerce products and services are aimed at intercompany data processing. The intercompany aspect distinguishes the "electronic commerce" application from other information technology applications.

INPUT sizes all markets for software and information services. The relationship between INPUT's overall classification of the information software and services market and the market for electronic commerce software and services specifically is shown in Exhibit I-1.

EXHIBIT I-1

Electronic Commerce Services in Relation to Overall Information Services Industry Structure—1993

Systems Software Products
- Mainframe
- Minicomputer
- Workstation/PC

Applications Software Products
- Mainframe
- Minicomputer
- Workstation/PC

Turnkey Systems
- Equipment
- Software Products
- Professional Services

Equipment Services
- Equipment Maintenance
- Environmental Services

Professional Services
- Consulting
- Education & Training
- Software Development/Maintenance
- Application Management/Maintenance

Systems Integration
- Equipment
- Software Products
- Professional Services
- Other

Systems Operations
- Platform Operations
- Applications Operations
- Desktop Services
- Network Management

Processing Services
- Transaction
- Utility
- Other

Network Services
- Electronic Information Services
- Network Applications

Source: INPUT

EMF

2. Framework for Intercompany Exchange and Workflow

It is important to reiterate that "electronic commerce" applications distinguish themselves from all other information applications by the characteristic of being used in an intercompany function. Most information technology is confined to internal use by a single company.

Electronic commerce applications, by nature and definition, connect two or more independent parties.

Exhibit I-2 depicts the basic flow of products and payments between trading partners that constitutes a commercial exchange.

EXHIBIT I-2

Flow of Products and Payments

Products

Supplier   Customer
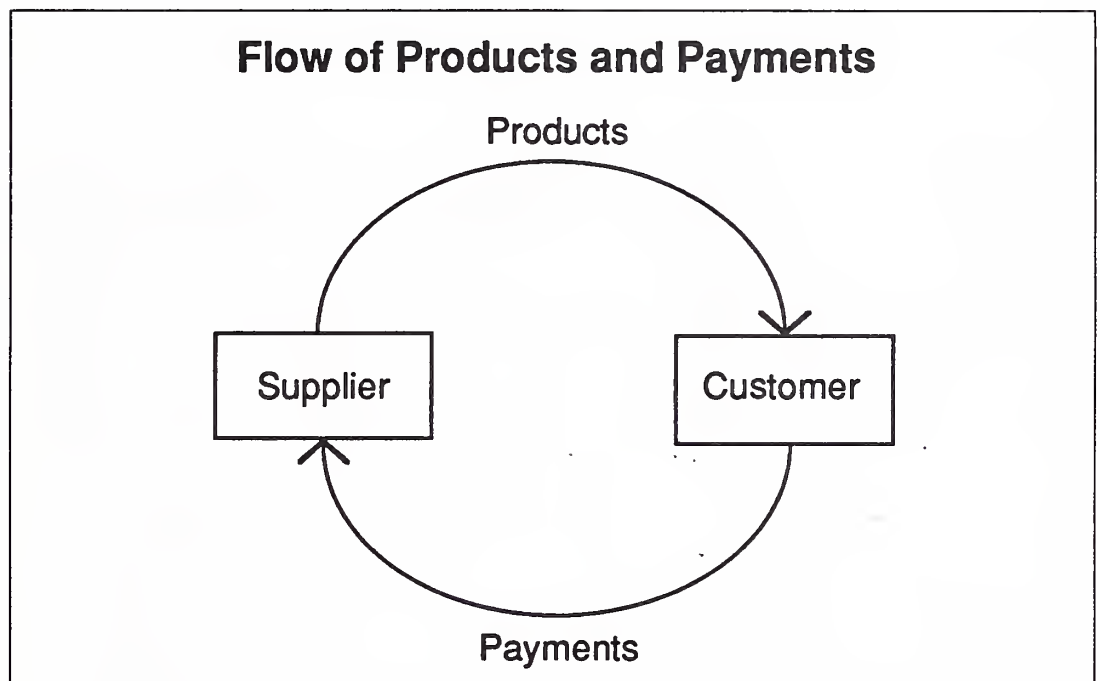
Payments

This flow of goods/payments is typically initiated when the customer requests a shipment of the supplier's product. This "requesting action" is in the form of sending a purchase order (or some similar kind of communication, such as a material release from a standing contract, etc.).

When the supplier receives the purchase order, another series of "requesting actions" are triggered in turn. For example, a sales representative may need to check the credit of the customer by asking the accounting department (or a supervisor, or an outside credit agency, etc.) if the company's credit is in good standing to accept the given order. If it is, then the sales rep must ask the production or shipping department to send the product. In the end, the supplier's accounting department must ask the customer to pay for the product, and this "requesting action" is performed by sending an invoice.

The point is that all work—internal to a company and among companies engaged in trade—is conducted simply by messages that request something to be done. Furthermore, other messages are involved that report back to the requesting person or agency that what was requested was indeed done.

Any workflow (within or among companies) can be characterized in its essence as the messaging that takes place between the two people in Exhibit I-3.

EXHIBIT I-3

The Workflow Loop

Customer
Asks for report

Could you?   *Yes, I will*

Performer
Agrees to do it

Customer
Declares
satisfaction

Thank you   *It's done*

Performer
Reports it done

Source: Action Technologies, Inc.
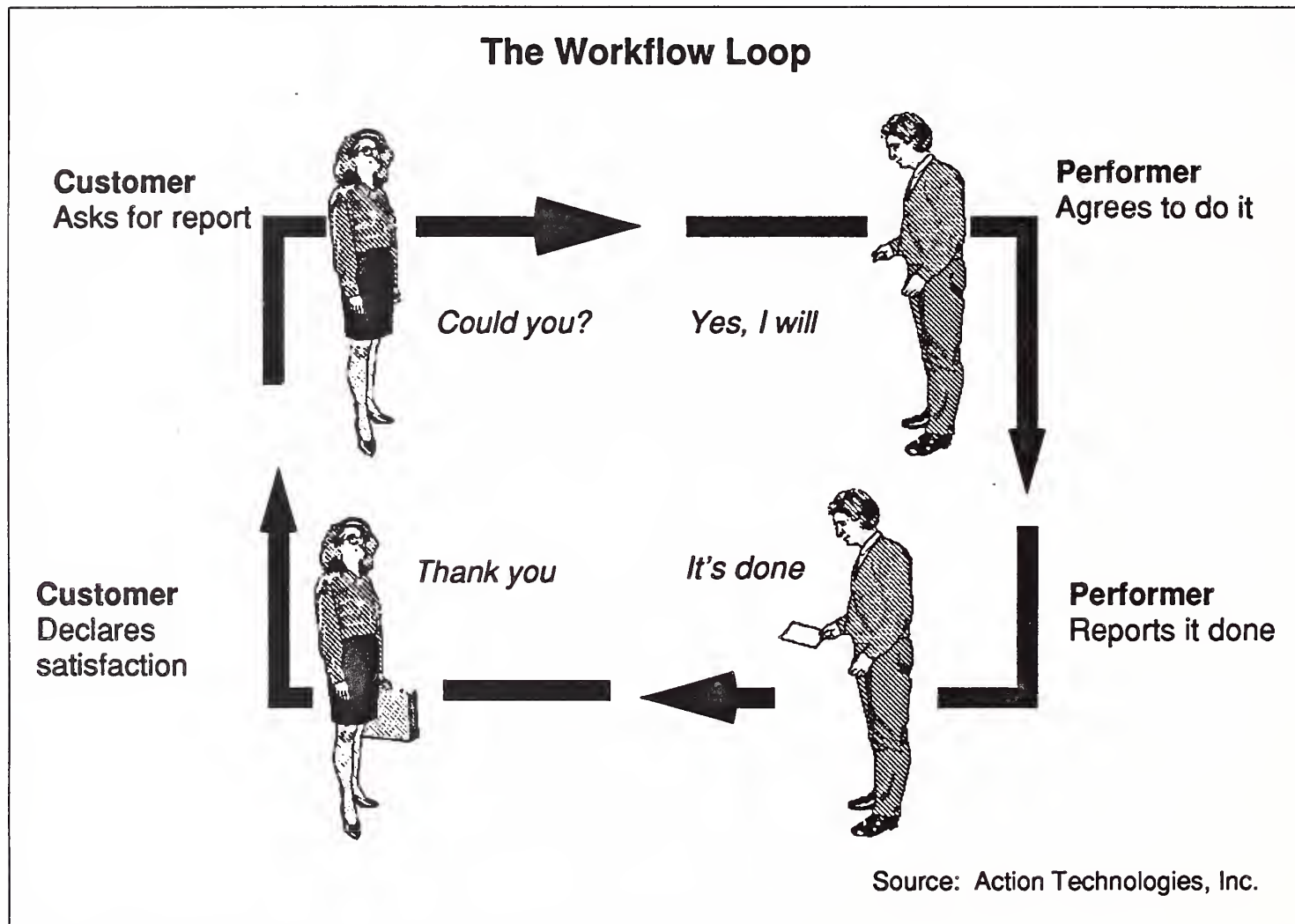
The messaging shown in the exhibit can be further classified into finite categories: requests, promises to do something, declining to do something, reporting back that what was requested is now done, reporting back that what was requested has been delayed (or did not comply with the original criteria and had to be changed, etc.).

Workflow moves are finite in number and are diagrammed in Exhibit I-4.

EXHIBIT I-4

Basic Workflow Moves

I decline

I promise

I commit to
commit later   I counteroffer

I promise   →   I revoke

I request

I decline

I counteroffer

I report
completion or
conditions of
satisfaction

I declare the
conversation
complete

Time t_1

I cancel

Time t_2

Work is completed through a finite number of conversational moves.

Source: Action Technologies, Inc.
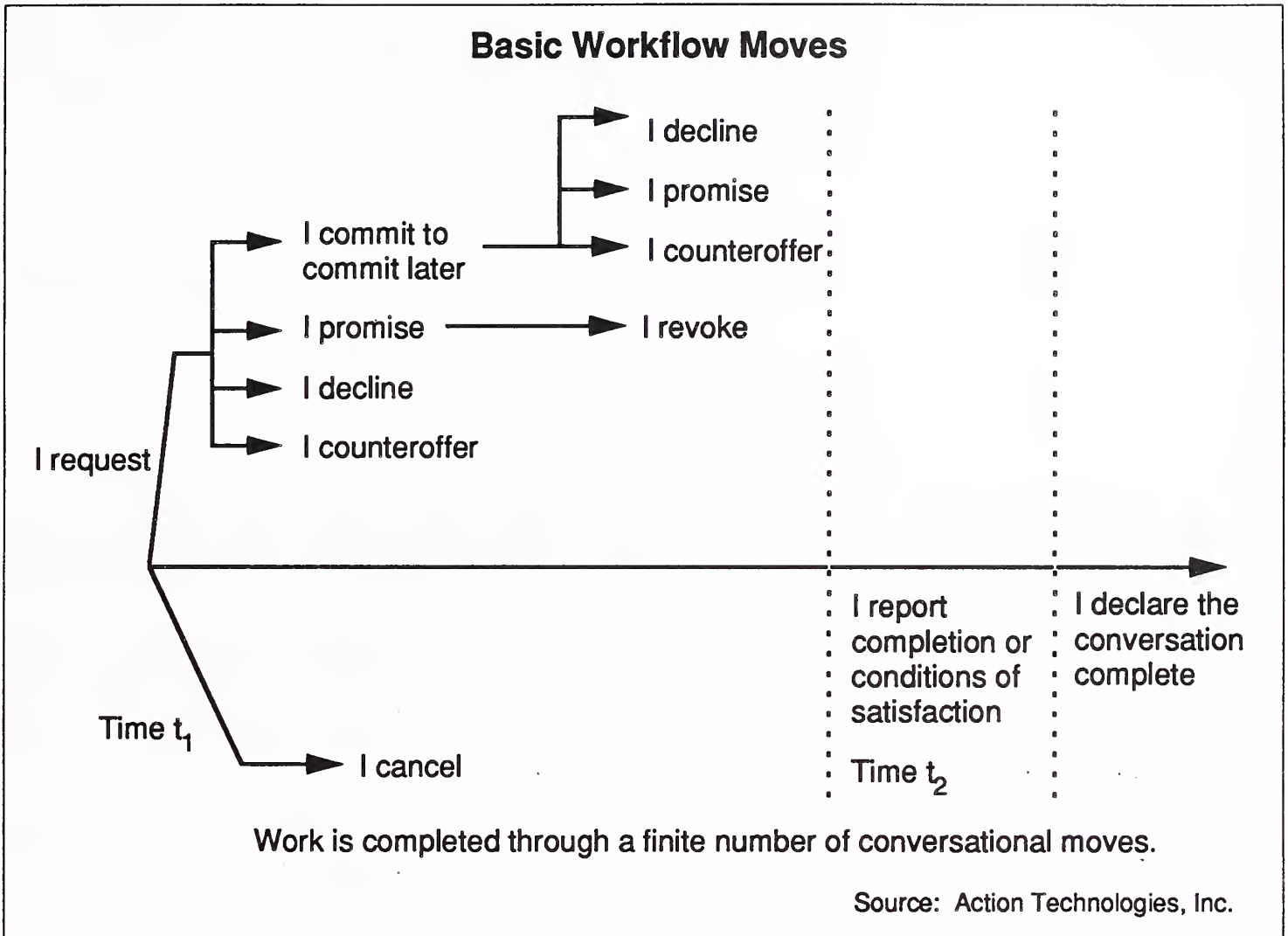
EDI messages can be organized according to this taxonomy of workflow moves. A partial classification of EDI messages is shown in Exhibit I-5.

EXHIBIT I-5

EDI Transaction Sets Can Be Designed According to Workflow Moves, Which Are Finite in Number

Workflow Move	Corresponding X12 Transaction Sets
Request	Purchase order Request for quotation Invoice Payment order
Offer	Response to request for quotation Inventory advice
Agree to request/offer } Promise	P.O. acknowledgment Contract award
Decline request/offer	No response from trading partner
Counteroffer	P.O. change
Cancel	Payment cancellation request
Report completion	Operating expense statement Payment status report
Inform	Product activity data Report of test results Trading partner profile

Source: INPUT

Given this workflow model, electronic commerce technologies and services are anything that supports the communications involved in a business transaction. This includes sending requests and reports (purchase orders, invoices, reports of test results, etc.) between companies, information regarding products and prices, credit data, on-line support and network management information, payment services (which are a sub-workflow—moving funds to make good on a prior commitment), and so on.

Electronic commerce is the application of information (more precisely, communication) technology that allows the performers of intercompany workflow to make the various kinds of communications necessary to complete an exchange of goods or services.

This framework for intercompany workflow, therefore, justifies the inclusion of the various network, software and information services that were listed in Section 1 above. At the same time, however, the companies that provide these various services (VANs, software vendors, even credit card processing companies) are joining the electronic commerce marketplace offering EDI and related services. The empirical evidence supports the theory, as it were.

B

Methodology

The data, discussion and conclusions of this report are based on:

Surveys:

- A survey of 1,597 MIS managers across all industry classifications. Many of these managers reported no activity in EDI or electronic commerce.

- A survey of 140 EDI users.

- A survey of 24 vendors of either EDI software or network services.

- A survey of the 11 leading professional services/systems integration firms in the U.S.

Other INPUT Syndicated Research

- This report drew upon the results of other INPUT reports, namely *Open Systems and Electronic Commerce, Integrated Messaging, The U.S. Network Services Markets: 1992-1997, EDI and Workflow,* and earlier EDI reports listed in Section C.

Ongoing Vendor Profiling Activity

- INPUT's Vendor Analysis Program continuously profiles information industry companies. This profiling service was used to obtain background information on companies mentioned.

Ongoing Research and Consulting Activities

- INPUT is in contact with information software and service companies around the world, in custom as well as continuous support market intelligence services. This activity gives consultants a close grasp and inside knowledge of market conditions.

Secondary Resources

- INPUT has a very large library of on-line and collateral-based information sources. One valuable resource is the files on over 4,000 information technology companies. These files contain product literature, price lists, annual reports and 10Ks, press releases, news clippings, and other collateral information on companies. Also, INPUT subscribes to several score of industry trade journals which its consultants monitor.

C

Related INPUT Reports

This study is one of a continuing series focused on EDI and electronic commerce technologies and markets. Other reports in the series include:

Open Systems and Electronic Commerce
Integrated Electronic Messaging: Trends, Issues, Opportunities
EDI Vendor Profiles and Competitive Analysis
Electronic Commerce: The New Foundation for Trade
Electronic Commerce in the Media Industry
Electronic Commerce in U.S. Health Care
Electronic Commerce in Trade and Transportation
Electronic Commerce in Travel and Tourism
Electronic Commerce in Grocery Production and Distribution
Electronic Commerce in Apparel Production and Distribution
Electronic Commerce in the U.S. Federal Government
Electronic Commerce: Comprehensive Market Assessment
Opportunities in Electronic Payments
International EDI Markets, 1992-1997
The U.S. Electronic Data Interchange Market, 1992-1997
EDI in Europe, 1990
The EDI Market in Japan, 1992-1997
Developments in Corporate Electronic Trade Payments
EDI Business Integration Issues
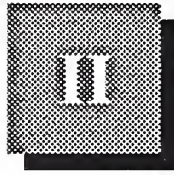
Executive Overview

Electronic commerce is the conducting of business over electronic networks. Streamlining the communications involved between two companies who are engaged in trade is the objective of electronic commerce. Electronic data interchange—the exchange of structured electronic files between independent computer systems—and electronic mail among trading partners are the core technologies of electronic commerce. Other technologies are payment software and services, facsimile software and services, electronic information services used in a transaction (such as electronic catalogs and directories), professional services, and equipment.

The market for electronic commerce software, services and related equipment was $3.6 billion in 1992 and is expected to reach $4.1 billion in 1993. Exhibit II-1 shows the entire electronic commerce marketplace.

EXHIBIT II-1

Consolidated Electronic Commerce Market for Information Technology

	1992 ($Millions)	1993 ($Millions)	1992-1993 Growth (Percent)	1998 ($Millions)	1993-1998 CAGR (Percent)
Software Products	282	362	28	1,010	23
Network Application Services	813	926	14	2,920	26
Electronic Information Services	2,132	2,297	8	3,300	8
Professional Services	40	50	25	140	23
Equipment	400	500	25	900	12
Total	3,667	4,135	13	8,270	15

A more focused market assessment of electronic commerce concentrates solely on software and services (and excludes equipment sales and sales of credit information). This more focused market reached $1.8 billion in sales in 1992 and is expected to reach $2.1 billion in 1993 for a growth of 17%. Exhibit II-2 summarizes this market.

EXHIBIT II-2

Electronic Commerce Market without Credit Services or Equipment Components

	1992 ($Millions)	1993 ($Millions)	1992-1993 Growth (Percent)	1998 ($Millions)	1993-1998 CAGR (Percent)
Software Products	282	362	28	1,010	23
Network Application Services	813	926	14	2,920	26
Electronic Information Services	708	822	16	1,700	16
Professional Services	40	50	25	140	23
Total	1,843	2,160	17	5,770	22

The fastest growing segment of the electronic commerce IT market is software, with EDI and E-mail being the leading software subsegments. One out of three information systems projects today contains an EDI component. And of those EDI implementations, order entry and accounting (typically the sending of invoices) are the two top application categories receiving EDI treatment.

Professional services and customer support are the next fastest growing segments in this market, but are moving from the smallest base. This segment will be very important in the future as it becomes the locus of greatest value to users. Overall, the highest value-adding components of the electronic commerce segment of the IT industry are rapidly changing. In the 1970s and early 1980s, the premium service was network service. In the 1980s and now into the early 1990s, it is software. In the future, it will be professional services and customer support. Fee-based customer support will also be important in years to come.

Basic transport network services are becoming a commodity business. The INTERNET, though little used for official electronic commerce communications, nevertheless is the death-knell for expensively priced data transmission services.

Even though basic transport network services are a commodity business, there are still many kinds of network services in which third-party providers can offer substantial added value. The core electronic commerce network services and respective market sizes and growth are shown in Exhibit II-3.

EXHIBIT II-3

Electronic Commerce Network Services Markets

	1992 ($Millions)	1993 ($Millions)	1992-1993 Growth (Percent)	1998 ($Millions)	1993-1998 CAGR (Percent)
Network Application Services					
EDI	209	252	21	500	15
E-mail	480	520	8	1,440	23
E-fax	100	120	20	900	50
EDI/EFT	12	17	42	40	19
Misc	12	17	42	40	19
Subtotal	813	926	14	2,920	26
Electronic Information Services					
Credit	1,424	1,475	4	1,600	2
Marketing Sales	580	647	12	1,300	15
Product Pricing	128	175	37	400	18
Subtotal	2,132	2,297	8	3,300	8
Total	2,945	3,223	9	6,220	14

One of the most dynamic areas in the network services segment is product and price electronic information services. These are primarily on-line (or CD ROM-delivered) catalogs, UPC catalogs, parts catalogs, tariff data bases, and some directories.

Another dynamic subsegment is marketing and sales data base services that use electronically captured sales transaction data (from point-of-sale machines, distribution points, and other sources).

Technology is causing explosive upheavals in electronic commerce. The chief agent of technological change is the incorporation of open systems, network operating systems and, implicitly, client/server architectures into EDI and electronic commerce applications. UNIX and Microsoft NT (the latter not yet appearing in EDI/EC applications) are the manifest IT components of this trend. This technology is putting more power in users' hands to determine their own IT systems. Network service providers, and to some extent software vendors, are pressured to reduce prices because of client/server technologies.

Areas in which client/server is having a large impact are EDI and decision support electronic information services.

Client/server architectures in software and information systems will accelerate the proliferation of electronic commerce systems in companies. This is because client/server technology fits naturally into the buyer/seller relationship that electronic commerce supports. For example, one company's order entry application is another company's server.

Client/server architectures and network operating systems (UNIX and Microsoft NT) are changing the way software and services are delivered. Customer support, software maintenance and upgrading, and some professional services for electronic commerce will increasingly be delivered through alliances, resellers, large user corporations and other industry-specific organizations. On-line delivery of services is growing.

GE Information Services, Sterling Software, Inc., and Advantis are the leading electronic commerce vendors. BT North America and AT&T are in the next tier. Other large companies entering the electronic commerce marketplace include Texas Instruments, Motorola, R.R. Donnelley & Sons and National Data Corporation.

With the improvement in price/performance for electronic commerce technology, a mass market is in the making. The critical new players in this mass market for electronic commerce at this time are Microsoft, Novell, Lotus, Delrina, General Magic, and Intuit. These companies are well positioned to capitalize on electronic commerce even though they don't yet recognize it as a distinct market opportunity.

Successful vendors of electronic commerce software and services will provide their customers with expertise and support in implementing and operating systems. Users will pay for this support.

III
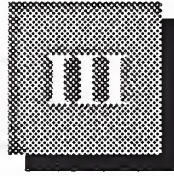
Market Size and Forecast

This chapter gives sizes and forecasts of the markets for EDI and related electronic commerce software, equipment and services. The forecasts cover the five-year period from 1993 to 1998. The specific products and services assessed are:

Software Products
- EDI software (by platform)
- Financial EDI software
- E-mail software used for intercompany communications

Network Services
- EDI network services
- Network services for intercompany E-mail
- EDI/EFT services
- Miscellaneous network services (including directory and bulletin board services)
- Electronic information services on products and prices
- Electronic information services on sales and marketing information
- Electronic information services for credit data

Other Products and Services for EDI and Electronic Commerce
- Professional (consulting) services for EDI/electronic commerce systems
- Equipment purchases for EDI/electronic commerce systems

Market sizes are based on reported and estimated vendor revenues.

A brief discussion of the market sizes is included in this chapter, and explanations on market trends and behavior are found in Chapter V.

A

Consolidated Information Technology Markets for Electronic Commerce

1. Comprehensive IT Market Size and Forecast for Electronic Commerce

Exhibit III-1 shows the market size and forecast for electronic commerce information technology, including software, network services (network application services and electronic information services), professional services and equipment.

EXHIBIT III-1

Comprehensive Information Technology Market for Electronic Commerce

	1992 ($Millions)	1993 ($Millions)	1992-1993 Growth (Percent)	1998 ($Millions)	1993-1998 CAGR (Percent)
Software Products	282	362	28	1,010	23
Network Application Services	813	926	14	2,920	26
Electronic Information Services	2,132	2,297	8	3,300	8
Professional Services	40	50	25	140	23
Equipment	400	500	25	900	12
Total	3,667	4,135	13	8,270	15

The most dynamic segment of electronic commerce is in software, which is growing at 28%.

Electronic information services is the largest single segment—$2.2 billion—but is growing the slowest, at 8%. Nevertheless, as discussed in the sections below, EIS has some exciting opportunity areas.

2. Software and Services Market Size and Forecast

This report primarily focuses on software and services for electronic commerce. Thus, sales of equipment is of less interest (and can be found in other, more detailed reports). Furthermore, one of the segments of electronic information services, credit services, is uninteresting to the emerging electronic commerce information system vendor. Credit services is an uninteresting segment because it is a very mature market with little possibility for new entrants to compete.

A more focused market sizing for electronic commerce results from removing the equipment and credit services segments of the overall information technology market for electronic commerce. This narrower focus highlights the growth opportunities and relative sizes of segments.

Exhibit III-2 shows the electronic commerce market with this specific focus.

EXHIBIT III-2

Electronic Commerce Market without
Credit Services or Equipment Components

	1992 ($Millions)	1993 ($Millions)	1992-1993 Growth (Percent)	1998 ($Millions)	1993-1998 CAGR (Percent)
Software Products	282	362	28	1,010	23
Network Application Services	813	926	14	2,920	26
Electronic Information Services	708	822	16	1,700	16
Professional Services	40	50	25	140	23
Total	1,843	2,160	17	5,770	22

B

Software for EDI and Electronic Commerce

Electronic commerce software (EDI, E-mail, payment, and others) is used to prepare and send computer files to corporate trading partners. (The consumer market for electronic commerce software is not included here.)

Revenues for EC software have grown robustly over the 1992-1993 period (28%) and will continue to grow rapidly throughout the 1990s (23% compound annual growth for the next five years at least). Exhibit III-1 gives these details.

By the year 1998, the market for electronic commerce software will exceed one billion dollars.

EXHIBIT III-3

Electronic Commerce Software Markets

Software Type	1992 ($Millions)	1993 ($Millions)	1992-1993 Growth (Percent)	1998 ($Millions)	1993-1998 CAGR (Percent)
EDI	116	149	28	400	22
EFT	26	28	8	60	16
E-mail	120	160	33	500	26
Other	20	25	25	50	15
Total	282	362	28	1,010	23

- EDI translation software continues to hold the 20-28% growth rate that it has held for the past ten years. Within this subsegment, UNIX-based translation software is exploding on the scene, with a 70% jump in sales over last year.

- E-mail software used for intercompany communications is the other main component of the electronic commerce software market (along with EDI software). Dollar amounts for this market are imputed based on what proportion of intercompany messaging uses standard E-mail and workflow software packages (such as LotusNotes/cc:Mail, SoftSwitch, PROFS, etc.). Also included in this market are software packages that are aimed directly at intercompany E-mail, such as Commerce Connection from Sterling Software and Business Talk from GE Information Services.

- EDI/EFT payment software is the smallest and slowest growing segment of the EC software category. Chapter V gives details on this segment. The dollar amounts here reflect vendor revenues for EDI/EFT software installed by corporations (the payers and payees) as well as banks (which install EDI/EFT software in order to offer a payment service to corporations).

- The "other" category reflects revenues from software products that are used for specialized electronic commerce services. Examples of such software are Information Resources' software packages that allow users to manipulate market data or user interfaces to electronic information sources.

1. EDI Software

At this time, the most dynamic EC software category is EDI translation software.

EDI software performs at least the first if not all of the following kinds of functions:

- File translation: converting data that is arranged in a given file format into an arrangement of another file format.

- Mapping: a development tool with which the user maps data fields of one format to the desired data fields of a target data format.

- Communication: the control of telecommunication transmission sessions via a modem.

- Application program interface: software that integrates EDI translation software with specific application software. It is sometimes given as a preformatted map or template along with translation software.

- Store and forward ("mailboxing" or "switching") of messages: only the large EDI software packages (in the $40,000 to $400,000 price range) provide this clearinghouse function.

EDI software sales are growing at approximately 28%. They should reach $400 million by 1998, at a five-year CAGR of 22%.

UNIX-based translation software is enjoying tremendous acceptance. Sales of UNIX software for EDI grew 70% in the 1992-1993 time period. This is almost three times the growth rate of each of the other subsegments: PC, midrange and mainframe EDI software.

PC and mainframe software constitute 80% of the EDI software market.

PC and mainframe EDI software are inversely symmetrical in terms of installed base and share of total market sales. PC EDI software is used by 80% of all EDI users, whereas in terms of sales, PC EDI software is only 47% of the total market. Mainframe software, while only being used by 5% of the total EDI user base, represents almost a third of the market in terms of sales. The difference is due to the extremes in price. The average PC price is $2,550 and the average mainframe price is $60,000.

a. PC Translation Software

Sales of PC EDI software are growing at a strong 25% rate. Exhibit III-4 shows the breakout of this market segment by vendor revenue.

EXHIBIT III-4

PC EDI Software Market

Vendor	1992 Sales ($ Millions)	1993 Sales ($ Millions)	Growth (Percent)
Supply Tech	9	11	22
EDI, Inc.	5	5	0
TSI	5	7	40
ABC	3.5	4	14
The APL Group	3.2	4	25
EDS	3	4	33
GEIS	1	2	100
SSW	1.3	2	54
Harbinger	2	4	100
St. Paul	1	1	0
Datacom	1	1	0
Trinary	1	1	0
IBM	2	3	50
DNS	2	3	50
IBM	2	2	0
RMS	2	2	0
Other	11	13	18
Total	55	69	25

b. UNIX Translation Software

UNIX-based EDI software is exploding in growth and is outperforming all other EDI software segments. This is due to the fact that it is almost brand new, having been introduced for the first time in 1992. Exhibit III-5 shows the breakout of this market segment by vendor revenue.

EXHIBIT III-5

UNIX-Based EDI Software Market

Vendor	1992 Sales ($ Millions)	1993 Sales ($ Millions)	Growth (Percent)
ABC	3	4	–
Blue Rainbow	0	0.5	–
EDS	1	2	–
GEIS	–	1	–
Premenos	2	2.5	–
St. Paul	0.5	1	–
Sterling	0	1	–
Trinary	0.5	0.5	–
Unisys	1	1	–
Radley	0.5	0.5	–
Birmingham	0.5	0.5	–
Perwill	0.5	0.5	–
Texas Instruments	–	2	–
Other	–	–	–
Total	10	17	70

UNIX-based EDI software should continue to grow at above 50% for the next couple of years. Users report huge success with it (see Chapter IV) and every major software vendor is now offering a UNIX-based product (see Chapter V). Growth in UNIX-based translation software is siphoning off growth from the other platform categories (PC, midrange, mainframe).

c. Midrange Translation Software

Midrange software is defined as strictly software that runs on IBM AS/400 and System 3X platforms (DEC VAXs, Tandems, Stratus Computers, etc., are considered mainframes). Exhibit III-6 shows the breakout of this segment by vendor revenue.

EXHIBIT III-6

Midrange EDI Software Market
(AS/400, System3X)

Vendor	1992 Sales ($ Millions)	1993 Sales ($ Millions)	Growth (Percent)
Premenos	11	13	—
Sterling	4	5	—
Blue Rainbow	1	1	—
SSA	0.7	1	—
EDS	—	—	—
Extol	—	.1	—
Other	1	1	—
Total	18	22	22

The midrange platform segment continues to be a strong segment, but is not growing as rapidly as in the 1991-1992 timeframe. Midrange computers are popular platforms for EDI for two reasons. (1) Midrange platforms are widely used in the core EDI-using industries of transportation, manufacturing and distribution. (2) Midrange platforms are also the target platforms of a downsizing initiative in a company.

d. Mainframe Translation Software

The mainframe segment of the EDI software market consists of all software that runs on any computing device larger than a PC or midrange platform and that is not a UNIX operating system. DEC VAXs, Tandem and Stratus computers, IBM 3090s, etc., are considered mainframes. Note that HP9000s or NCR 3500 series computers or any other large computer that runs EDI software under a UNIX operating system is not considered a mainframe but a UNIX platform (and is counted in the UNIX subsegment).

Exhibit III-7 shows the breakout of the mainframe EDI software market by vendor revenue.

EXHIBIT III-7

Mainframe EDI Software Market
(All Systems except for PC, Midrange or UNIX)

Vendor	1992 Sales ($ Millions)	1993 Sales ($ Millions)	Growth (Percent)
Sterling	12	13	—
DEC	6	8	—
IBM	4	5	—
EDI Solution	3	4	—
GEIS	1	1	—
TSI	3.5	5	—
Mpact	2	3	—
Texas Instruments	0.6	1.5	—
Supply Tech	0.4	0.6	—
Other	—	—	—
Total	33	41	24

Sales of mainframe EDI software continue to grow at a strong pace. Large hub companies with huge EDI volumes need this kind of power.

2. E-mail, EDI/EFT and Other Electronic Commerce Software

Sales of these other categories of EC software have been generally estimated as shown in Exhibit III-1. The key details of these segments are also noted in Section A.

Exhibit III-8 shows the sales breakout of EDI/EFT software by vendor.

EXHIBIT III-8

Financial EDI Software Market

Vendor	1992 Sales ($ Millions)	1993 Sales ($ Millions)
Sterling	2	3
SSI	9	10
Advantage	3	3
GEIS	1	1
Maxxus	3	3
Harbinger	2	2
Fed	1	1
Other	5	5
Total	26	28

C
Network Services for EDI and Electronic Commerce

Network services for electronic commerce represent a three billion dollar market and 77% of total electronic commerce information technology sales.

The most dynamic subsegments of the electronic commerce network services market are:

• EDI network services
• Enhanced facsimile network services
• Electronic delivery of information regarding products and product prices

The least dynamic portion of the EC network services market (a substantial portion but one with very little growth) is credit information.

Exhibit III-9 lists the market and subsegments for electronic commerce network services.

EXHIBIT III-9

Electronic Commerce Network Services Markets

	1992 ($Millions)	1993 ($Millions)	1992-1993 Growth (Percent)	1998 ($Millions)	1993-1998 CAGR (Percent)
Network Application Services					
EDI	209	252	21	500	15
E-mail	480	520	8	1,440	23
E-fax	100	120	20	900	50
EDI/EFT	12	17	42	40	19
Misc.	12	17	42	40	19
Subtotal	813	926	14	2,920	26
Electronic Information Services					
Credit	1,424	1,475	4	1,600	2
Marketing/Sales	580	647	12	1,300	15
Product Pricing	128	175	37	400	18
Subtotal	2,132	2,297	8	3,300	8
Total	2,945	3,223	9	6,220	14

1. Network Application Services for Electronic Commerce

Electronic commerce network application services, though almost half the size of the other major segment of EC network services, EC electronic information services, is growing almost twice as fast.

At $920 million, the network application services segment is growing at 14%, while electronic information services, at $2.2 billion, are growing at 8%. The incremental increase in both markets is roughly equal at this time ($100-150 million).

a. EDI Network Application Services

This is the most dynamic segment of the electronic commerce network services market. It is also the easiest to size because vendor revenues for EDI network services are the clearest, most unambiguous to identify (compared to the other segments of network application services).

Exhibit III-10 shows the EDI network services market by vendor and associated growth rates.

EXHIBIT III-10

EDI Network Services Market

Vendor	1992 Revenues ($ Millions)	1993 Revenues ($ Millions)	1992-1993 Growth (Percent)
GEIS	52	72	38
SSW	32	39	22
Advantis	32	37	16
RAILINC	13	15	15
Kleinschmidt	12	13	8
Harbinger	10	11	10
Transnet	10	11	10
MCI/BTNA	8	9	13
AT&T	4	4	0
EDS	4	5	25
Stentor	4	5	25
TranSettlements	4	5	25
EDI Able	2	2	0
Ameritech	1	1	0
Maersk	3	3	0
US Sprint	1	1	0
ARI Net	1	1	0
Immedia	2	2	0
NDC	3	4	33
DunsNet	1	1	0
Other	10	11	10
Total	209	252	21

GE Information Services shows tremendous growth. Only 3% of its 38% was for internal GE EDI needs. GE's number also includes revenues from Pubnet and its UPC catalog product, which are itemized elsewhere in this electronic commerce market sizing.

b. Other Electronic Commerce Network Application Services

The following points should be made about the other network services:

- Enhanced facsimile is based on general estimates.

- EDI/EFT is based on the estimated number of EDI/EFT transactions flowing through the ACH and then multiplying this number by $0.75, the average fee a bank will charge a corporation for an EDI/EFT payment.

- E-mail is an educated guess resulting from discussions and estimates from GE Information Services, Sterling Software, Advantis, America Online, BT North America and other network services vendors.

- The "miscellaneous" category largely reflects service fees collected for the use of directory services and bulletin boards. Vendors of these services include Novell, PSI, NACHA, and other industry-specific groups such as the INGAA. Directories and bulletin boards are closely related to product catalogs, which are classified under electronic information services in the next section. Directories and bulletin boards are included here because they directly relate to the resources/subscribers to a given network. They are intrinsic and cannot be disassociated from network applications, as can product catalogs.

2. Electronic Information Services for Electronic Commerce

In this segment, credit information is the biggest subsegment, but also the least dynamic.

Electronic information related to marketing/sales (namely, the collection and distribution of raw sales data) and product and price information are more dynamic than credit information for two reasons:

- Greater growth in service revenues
- More technological and competitive changes

a. Credit Services

The market for electronic credit information is dominated by three vendors, as is shown in Exhibit III-11.

EXHIBIT III-11

Electronic Credit Information Market

Vendor	1992 Revenues ($ Millions)	1993 Revenues ($ Millions)
TRW	754	760
Equifax	430	450
TransUnion	200	220
Other	40	45
Total	1,424	1,475

Credit information is considered an electronic commerce service because it is an information service that directly supports a business transaction. It is a relatively old business. Its low growth rate reflects this.

b. Marketing and Sales Information

One of the more dynamic electronic commerce network services, marketing and sales information, will likely experience great change over the remainder of the decade.

About ten years ago, A.C. Nielsen and Information Resources, Inc. began gathering sales data from grocery store scanners and selling this data to consumer goods manufacturers.

Today, as many more of the transactions between companies are captured electronically (with EDI and related methods), similar services are emerging. Furthermore, with advances in decision support data base technology, client/server point-of-sale technology, data base machines, and other technology developments, marketing and sales decision makers now have inexpensive tools to capture and process transaction data on their own.

Information that is derived from transaction data (at this time largely consumer point-of-sale and warehouse transactions in consumer goods, auto parts, books, movie theater tickets, pharmaceutical products, electrical products, and agricultural products) is a growing business. Exhibit III-12 shows the market size for this kind of electronic information service.

Sales and Marketing Information
(Based on Transaction Data)

Vendor	1992 Revenues ($ Millions)	1993 Revenues ($ Millions)	1992-1993 Growth (Percent)
Sterling	1	1	0
IRI/LogicNet	190	230	21
Nielsen	330	350	6
EDI (Hollywood)	2	2	0
Knight Ridder	3	3	0
EMS	4	6	50
Other	50	55	10
Total	580	647	12

c. Product and Price Information

Product and price information is available on-line or on CD ROM data bases that allow buyers to identify purchasable merchandise. This is a rapidly growing segment of electronic commerce network services and grew at a rate of 37% in the last year.

The growth represents the sudden availability of new product/price information service offerings, especially from Motorola Information Enterprises and R.R. Donnelley & Sons, both of which are offering on-line catalogs for electronic and semiconductor components. Triad continues to shine in its sales of electronic auto parts catalogs. QRS and GE Information Services are showing strong business returns and growth in their respective competing UPC catalogs (used by retailers and apparel manufacturers). GEIS' revenue shown here (for its UPC and Pubnet catalogs) is included in its EDI network services revenue, but is not double counted in the consolidated electronic commerce market totals.

Also included in the electronic product/price catalog niche are tariff data bases (transportation industry), book catalogs, airline parts data bases, natural gas pipeline transfer point data bases, and others.

Exhibit III-13 shows the market for electronic product/price catalogs.

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EXHIBIT III-13

Product and Price Information

Vendor	1992 Revenues ($ Millions)	1993 Revenues ($ Millions)	1992-1993 Growth (Percent)
QRS	10	19	90
GEIS UPC	8	12	50
Triad	11	16	45
Pubnet	0.5	1	100
AutoInfo	13	15	15
Motorola	–	0.5	–
R. R. Donnelly	15	19	26
IBM GasNet	–	0.5	–
Bowker	–	0.5	–
Baker & Taylor	0.5	1	100
INGAA	0.5	1	100
Tariff DB	2	2.5	25
Spec2000	2	2.5	25
Other	65	85	30
Total	128	175	37

D

Professional Services and Equipment Markets for EDI and Electronic Commerce

1. Professional Services

Professional services for electronic commerce are third-party consulting and systems integration services performed to build electronic trading systems.

Key providers here are the Big Six companies, smaller consulting firms and value-added resellers (VARs).

The market for professional services for electronic commerce is shown in Exhibit III-14.

EXHIBIT III-14

Electronic Commerce Professional Services Market

1992 ($ Millions)	1993 ($ Millions)	1992-1993 Growth (Percent)	1998 ($ Millions)	1993-1998 CAGR (Percent)
40	50	25	140	23

2. Equipment

Equipment purchases related to electronic commerce systems include computer platforms, modems, routers, and related telecommunication equipment. Most often, equipment is used for both internal corporate functions and intercorporate (electronic commerce) functions. Thus, the equipment market is an approximation.

Exhibit III-15 shows the sales of equipment for electronic commerce systems.

EXHIBIT III-15

Electronic Commerce Equipment Market

1992 ($ Millions)	1993 ($ Millions)	1992-1993 Growth (Percent)	1998 ($ Millions)	1993-1998 CAGR (Percent)
400	500	25	900	12

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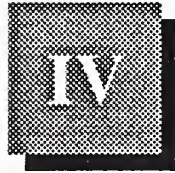
User Trends and Issues

This chapter reviews the results of two user surveys conducted by INPUT in the second and third quarters of 1993. One survey consisted of 1,597 interviews of information services managers and executives concerning their overall IS spending plans, specifically plans for EDI.

Another survey consisted of interviews of 134 users of EDI concerning specifics of their EDI implementation. Both surveys canvassed companies of all sizes (less than $20 million to more than $1 billion in annual revenues) in all industries. For more information about the samples of each survey, see Chapter I.

In some instances, the results of the surveys are supplemented with other surveys, case studies, and related research conducted by INPUT.

A
Key Points

- One of three information system implementations today maintain an EDI component.

- Most EDI users plan to spend more money this year than they did last year on EDI software and services.

- There is a tremendous move to adopt client/server architectures for applications that involve EDI.

- EDI translation software is the most frequently replaced EDI item (over VAN providers) by EDI users as they upgrade their systems or convert to a new operating environment.

- Order entry and accounting are the two application areas that receive the greatest amount of EDI interface.

- Use of electronic payments (EDI/EFT) shows no upsurge over the last two years.

- E-mail used with trading partners is low but increasing, especially with large hub companies.

- The use of the INTERNET for sending EDI messages is practically nonexistent in the manufacturing, transportation, and distribution sectors. Government agencies and educational institutions, however, are launching EDI projects that specify the INTERNET as a transport medium. Furthermore, most large EDI-using companies are connected to the INTERNET.

- PC-based facsimiles and facsimile servers are little used for EDI and other intercompany file transfer, but have huge potential.

B

Spending

1. EDI Penetration

- One out of three applications being implemented today involve EDI. In the survey of 1,597 IS managers, 525 (33%) reported that they are developing corporate information systems that have an EDI component. Exhibit IV-1 depicts these findings.

EXHIBIT IV-1

EDI Penetration

	Survey Respondents	Applications Cited*
Total Number	1,597	2,024
Number indicating that they are implementing EDI	525	743
Percent indicating EDI	33%	36%

*Respondents could cite more than one application

2. Spending by Industry

- The greatest concentration of EDI applications is found in the manufacturing sectors (process and discrete manufacturing). Of a total of 768 applications mentioned that contain an EDI component, 233 (30%) are in the manufacturing sector.

- However, the industries most exclusively focused on implementing EDI are transportation and health care. Sixty-one percent of all applications identified by transportation IS executives reportedly have an EDI component, whereas 52% of all health care applications have an EDI component. Of IS executives in all industries, those in transportation and health care are the most prone to consider EDI a mission-critical application. Exhibit IV-2 shows the proportion of applications using EDI, by industry.

EXHIBIT IV-2

Proportion of Applications Using EDI

Industry	Number of Applications	Number EDI	Percent EDI
Transportation	93	57	61
Health Services	140	73	52
State and Local Government	104	50	48
Insurance	170	81	48
Retail Distribution	110	52	47
Business Services	92	35	38
Banking and Finance	216	81	38
Process Manufacturing	386	132	34
Miscellaneous Industries	61	20	33
Telecommunications	121	37	31
Utilities	192	49	26
Discrete Manufacturing	435	101	23
Total	2,120	768	36

3. Spending Trends

- Current EDI users plan to spend at least the same and probably more this year than they did last year. Of the sample of 134 EDI users, more than 70% reported that they will spend more or at least the same amount of money this year than last year for EDI software, services and related systems development.

- Slightly more than half reported that they will spend more this year than last year.

Exhibit IV-3 shows the results of the survey.

EXHIBIT IV-3

User Spending Plans for EDI

Description	Number Respondents	Percent of Sample
Spending more this year than last	51	40
Spending the same as last year	42	33
Spending less this year than last	19	15
Not spending at all this year	11	9
Spending for the first time	5	4
Don't know	1	<1
Total	129	100*

*May not total to 100% due to rounding

- More than half of the expenditures for an EDI program are spent on external products and services. The average expenditures for the various EDI components break out as shown in Exhibit IV-4.

EXHIBIT IV-4

Average Spending by Component

Component	Annual Spending ($1,000)
EDI Software	13
EDI Network Services	36
Internal Development	48
Outside Consultants	26
Total	123

4. Impact of Downsizing

Slightly more than a quarter of the EDI systems being implemented are part of an effort to downsize IS resources. In addition, 41% of the EDI applications are being implemented in a client/server mode.

Utilities appear to be re-engineering information systems to the greatest extent of all industry categories surveyed. Utilities are the most aggressively combining their EDI projects with downsizing initiatives. Utilities also are the most aggressively adopting client/server architectures.

Hospitals, on the other hand, reflect an opposite trend to utilities. EDI projects in hospitals and other health care provider companies are generally not part of a downsizing effort at all and typically (66% of applications surveyed) are implemented on a mainframe.

Exhibit IV-5 shows the proportion of EDI applications downsizing.

EXHIBIT IV-5

Proportion of EDI Applications Downsizing

Industry	Number EDI	Number Downsizing	Percent Downsizing
Utilities	49	22	45
Process Manufacturing	132	46	35
Telecommunications	37	11	30
Discrete Manufacturing	101	29	29
Business Services	35	10	29
Insurance	81	21	26
State and Local Government	50	12	24
Banking and Finance	81	18	22
Transportation	57	12	21
Retail Distribution	52	10	19
Health Services	73	12	16
Miscellaneous Industries	20	1	5
Total	768	204	27

Exhibit IV-9 shows statistics on platform utilization that were mentioned in this section.

C

Target Applications

1. Applications Cited by Users

Order entry and billing continue to be the core applications for which EDI is implemented. Indeed, of all respondents claiming to implement an order entry application, 72% claimed that EDI was being implemented as part of the order entry application. Users were asked what kind of application they were implementing, then whether the application included an EDI component. A total of 220 distinct applications—e.g., order entry, patient scheduling, point of sale, etc.—were identified in this survey.

In some of the applications that users reported they were implementing, EDI was considered an integral part of the application. Eighty-six percent of the cargo and package tracking applications being implemented by transportation companies included EDI. Seventy-five percent of the policy processing applications being implemented by insurance companies contained an EDI component. Also, 62% of medical billing applications being implemented by health care providers included an EDI component.

Exhibit IV-6 lists the key applications in which EDI is being used.

EXHIBIT IV-6

Key EDI Applications

Application	Total	Number EDI	Percent EDI
Order Entry/Tracking	61	44	72
General Ledger	120	35	29
Accounts Payable/Receivable	68	26	38
Billing/Invoicing	36	22	61
Electronic Information Distribution	45	21	47
Operating System Upgrade/ Conversion	88	20	23
Payroll	83	20	24
Policy Processing (insurance)	20	15	75
Medical Billing	13	8	62
Cargo and Package Tracking	7	6	86
Other	1,483	526	35
Total	2,024*	743	36

*Note: Applications outnumber respondents to the survey because respondents were allowed to list more than one application.

In this question, an operating system upgrade or conversion was considered an application development project. Here, one out of four said that they were changing operating systems where EDI was used. (Operating systems were not specified and could include UNIX, AS/400 and others.)

2. Data Sharing Among Trading Partners

The original premise of EDI back in the 1960s was to facilitate the exchange of the tedious paperwork involved in a commercial transaction. The direct exchange of data from one company's computer system into another company's system greatly expedited the transaction process.

Today, advanced users of EDI and electronic commerce technologies are going beyond the simple electronic exchange of purchase order and invoice data. They are sending "raw" data to their trading partners and letting the trading partner process and act upon the data.

- Retailers are sending point-of-sale data back to apparel and other vendors. The vendors, in some cases, are given authority to determine replenishment quantities of the merchandise to be shipped to the retailer. Special "Quick Response" data formats (in the X12 syntax) have been developed for this purpose.

- Some contract manufacturers are receiving design specifications electronically from their customers, which they load directly into their design and manufacturing systems. Semiconductor and electronics manufacturers are some of the most advanced users in this area.

Sharing data among companies involved in trade is done most frequently in the functional area of shipping (as in ship notices) and slightly less frequently in the sales and inventory areas. This is shown in Exhibit IV-7.

EXHIBIT IV-7

Applications in Which Companies Share Data

Description	Number of "Yes" Respondents	Percent of Sample
Shipping data	63	47
Sales data	49	37
Inventory data	31	23
Design data	12	9

Sample size: 133; more than one application could be chosen

3. Electronic Payments (EDI/EFT)

The percentage of companies electronically paying (or being paid by) trading partners using EDI/EFT has remained fairly constant in the last few years: only 25% of respondents claimed to be conducting electronic payments. For three years straight, the percentage of EDI users interviewed who claimed to be using an EDI/EFT mechanism (either to pay or be paid) has been approximately 25%. This lack of growth in the survey samples is corroborated by the banking industry's poor results in signing up corporate customers for their electronic payment programs. Also, the absence in growth of EDI/EFT is shown in the very small number of payment software packages that are sold.

Exhibit IV-8 shows the survey results for the past three years regarding the use of electronic payments.

EMF

EXHIBIT IV-8

EDI/EFT Usage Remains Flat

[Bar chart titled "EDI/EFT Usage Remains Flat". Y-axis labeled "Percent of Users" ranging from 0 to 100. Three bars for 1991, 1992, and 1993, each at approximately 24-25 percent.]
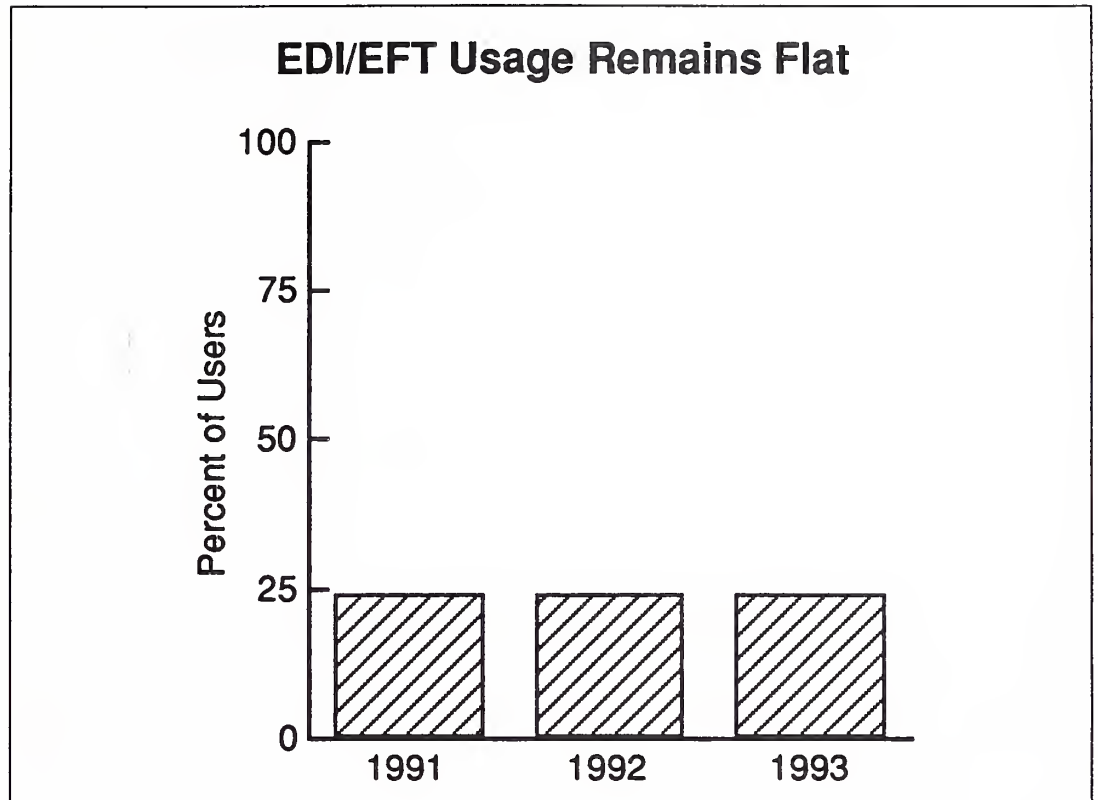
D

IT Tools and Platforms Used for Electronic Commerce

This section reviews the findings of the surveys regarding the kinds of software and services users are deploying for EDI and other electronic connections with trading partners. Further discussion of these technologies along with other related issues is in Chapter V.

1. Platform Utilization for EDI Applications

The survey of 1,597 IS executives revealed the kinds of computing environments that EDI-enabled applications are running on. Respondents were asked on which platform applications that used EDI are running. They had the choice of mainframe, minicomputer and/or client/server. They were allowed to choose client/server even if they had chosen mainframe or mini. Note that these application platforms are not necessarily the same environments (although they could be) on which EDI translation software runs.

Exhibit IV-9 shows the platform utilization for EDI applications by industry.

EXHIBIT IV-9

Platform Utilization for EDI Applications

Industry	Number EDI	Number Main-frame	Percent Main-frame	Number Mini-computer	Percent Mini-computer	Number of Client/ Servers	Percent of Client/ Servers
Banking and Finance	81	29	36	5	6	40	49
Business Services	35	7	20	6	17	19	54
Discrete Manufacturing	101	30	30	46	46	43	43
Health Services	73	48	66	13	18	19	26
Insurance	81	41	51	8	10	34	42
Miscellaneous Industries	20	6	30	3	15	4	20
Process Manufacturing	132	39	30	27	20	58	44
Retail Distribution	52	27	52	5	10	18	35
State and Local Government	50	30	60	8	16	25	50
Telecommunications	37	12	32	6	16	15	41
Transportation	57	26	46	9	16	11	19
Utilities	49	26	53	4	8	32	65
Total	768	321	42	140	18	318	41

The data reveals a tremendous move toward client/server architectures, which is occurring across all industries. Of the EDI-related applications noted, 41% are being implemented in a client/server architecture.

Utilities show the greatest propensity to move toward client/server (yet still maintain mainframe-based applications). Utilities also led the other industries in downsizing their EDI applications. (See Exhibit IV-9 above). Transportation companies showed the least propensity to adopt client/ server.

The UNIX operating system strongly supports client/server architectures. Sales of UNIX-based EDI translation software since mid-1992 have been huge—an annual rate of 60% increase. Respondents to the above question did not specify if they used UNIX or not. However, the strong growth in UNIX EDI software and the ground swell of adoption of client/server architectures are intertwined events.

Hospitals and agencies of state and local governments showed the greatest propensity to base their EDI applications on mainframes.

Manufacturers in the discrete industries are the biggest users of minicomputers. Minicomputers (AS/400s, System 3X) have a larger installed base in manufacturing than in any other vertical segment. This high preponderance of minicomputer usage for EDI applications is not surprising. Sales of mini-based EDI translation software are robust at 24% (see Chapter III).

Also, as mentioned above, one out of four companies are converting or upgrading their operating system software. For more details, see INPUT's report, *Open Systems and Electronic Commerce*.

2. Facsimile, Electronic Mail and EDI

Technological developments and new vendor offerings are allowing facsimile, electronic mail (E-mail) and EDI to be incorporated into a single integrated server/platform. Such a platform allows all three types of messages to be sent and received via a single package of software. (Further discussion of the technical developments and the corresponding technology vendors is found in Chapter V.)

This section reveals the degree to which companies are using these various modes of electronic communication with their trading partners.

- Facsimile is ubiquitous; all companies use facsimile.

- The use of E-mail with trading partners is not so common. The most noteworthy user trends in using E-mail as an intercompany communication mode are:

  - In the aerospace industry, where subcontracting makes for a great need for intercommunication. Design files and administrative communications are exchanged among companies. The Aerospace Industry Association has spearheaded an E-mail interconnect and directory services initiative to support the use of E-mail among companies involved in business.

  - In the retail sector, some large companies (including Levi Strauss, Mervyn's, Nordstrom, Wal-Mart, and others) are using E-mail with trading partners. Often the E-mail is used to coordinate EDI support services—for example, notifying trading partners of a change in EDI standard, product identification code, etc.

  - In the transportation industry, particularly forwarders and carriers who provide global or international services, E-mail (as well as telex, teletype, and telegraph) is a necessary mode of communication with trading partners and is used in place of EDI.

In the above industries and others, the use and administration of E-mail services with trading partners is distinct from the use and administration of EDI. E-mail is often set up on a departmental level and in an ad hoc manner. EDI is centrally controlled (or controlled at the division level) by a formal MIS department. Also, separate software and services are used for E-mail and EDI.

E-mail will always be different from EDI because it is deployed for a single individual, whereas EDI is deployed as a server for an unlimited number of applications.

The survey of 134 EDI users found that facsimile is held to be extremely critical for communicating with trading partners. E-mail is not considered that important. Respondents were asked to rank the three media on a scale of one to five (one being of low importance). Numbers in the exhibit represent numbers of mentions received for each category. Not all respondents ranked each category.

Exhibit IV-10 summarizes the results of the survey question on the relative importance of each of the three communication modes.

EXHIBIT IV-10

Relative Importance of Facsimile, E-mail and EDI

Mode	Low	Medium	High
Facsimile	7	23	37
EDI	4	18	45
E-mail	46	11	10

E-mail with trading partners is not that important (yet). However, more and more companies are implementing E-mail networks for their own employees. Extending E-mail usage with trading partners is not difficult.

3. UNIX

UNIX environments have definite advantages for intercompany file transfer applications such as EDI. These are listed in Chapter VI, Section B. Further details, along with extensive user case studies, are discussed in INPUT's report, *Open Systems and Electronic Commerce*. UNIX EDI translation software is the fastest growing EDI software segment. User acceptance is growing rapidly. Microsoft NT will also provide an excellent environment for EDI and electronic commerce. User acceptance of NT will be rapid.

4. The INTERNET

At this time, only universities and government agencies are using the INTERNET to send EDI messages, and these current transmissions are trial uses. INPUT found no instances in which EDI users in the core EDI sectors of manufacturing, distribution and transportation were sending EDI messages via the INTERNET. However, many companies conducting EDI are also connected to the INTERNET and use it for file transfers with other companies, but not for official commercial purposes. Lack of security and customer support are the two deficiencies of the INTERNET compared with commercial network services.

5. Software Replacement and Vendor Churn

EDI translation software packages are the single most frequently replaced component of an EDI system. This replacement creates opportunities for different vendors to step in as suppliers of translation software.

Blank

V
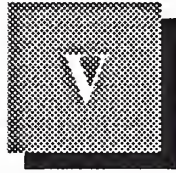
Technology Developments

This chapter reviews the major developments in EDI and electronic commerce technologies since early 1992. A general theme of product development has been the move to client/server. As will be demonstrated, client/server in an intercompany environment amounts to a redistribution of electronic commerce information processing from network service providers to customer-premise software.

The main developments described in this chapter can be summarized as follows:

- EDI translation software migrates into network operating systems (first UNIX, soon Microsoft NT).

- Leading value-added networks revamp their networks to adopt distributed, open architectures.

- Network services offer integrated messaging (EDI and E-mail).

- EDI software vendors offer integrated messaging software.

- Vendors offer services and software in the decision support arena for point-of-sale transaction data.

A

Client/Server Architectures and Electronic Commerce

As an information technology design philosophy, client/server architectures are having and will continue to have a profound impact on electronic commerce applications. Events of the last 12-18 months are demonstrating that customer-premise systems and third-party services are being remade in the image of the client/server design concept. This is because electronic commerce and client/server are perfectly suited for each other, are complementary and mutually reinforcing.

There are two results of having client/server applied to electronic commerce applications:

- Reduction of costs (to users) of electronic commerce system components so that even small companies (less than $20 million in annual sales) will be able to inexpensively implement EDI and other electronic commerce systems (a mass market is opening up).

- Redistribution of processing functions away from third-party network and information service providers and into customer-premise software.

Electronic commerce and client/server are mutually complementary and reinforcing because:

- A company is simultaneously a client of its suppliers and a server to its customers.

- A company's information systems for trade must reflect this dual role.

Electronic commerce systems will perform most effectively when the constitutive components of the systems mirror the business functions they support.

In other words, commerce (with or without information technology) has always adhered to a "client/server" pattern. Or, conversely, today's client/server philosophy is the adoption of an ancient commercial metaphor for computing tasks.

Client/server, furthermore, implies networked processors that jointly fulfill computing tasks. Thus, client/server will impact how computing tasks will be done over networks. More specifically, client/server redistributes a computing task between the user's software and the user's network service.

This trend has long been understood in the EDI industry, where originally file translation was performed primarily by the VAN. Now it is rarely performed by the VAN. User software translates files almost universally.

Today, store-and-forward and other communication functions are available in inexpensive software packages. Users can establish EDI linkages that directly dial into the systems of their trading partners. VANs can be bypassed altogether.

Client/server is accelerating this trend and displacing many of the value-added services that had traditionally been performed by third-party network services.

Client/server describes how the industry of electronic commerce vendors is evolving. A "macro" client/server architecture is taking shape where commercial networks provide server functions (such as directories, data bases, trading community network management) to their corporate clients. In addition, these clients purchase information technology from specific software and equipment vendors.

Given this new kind of structure, there are two general markets for electronic commerce products: the trading community and the mass market.

At bottom, electronic commerce systems consist of data bases and networks. Technology is driving down the costs associated with both.

B

The Impact of UNIX and Microsoft NT on EDI and Electronic Commerce

Key points:

- Open systems and network operating systems (of which only two really matter, UNIX and Microsoft NT) are causing electronic commerce software and services to be wholly redesigned.

- Inexpensive but powerful software is displacing many of the traditional services of the value-added network and the information service provider.

- Open systems thinking and EDI fit naturally. Both aim to interconnect and provide interoperability in heterogeneous environments. EDI provides interoperability on an application-to-application level. Open systems provide interoperability on a systems software-to-hardware level. (See Exhibit V-1.)

- Potentially, in the future EDI file translation capability, instead of being sold as a separate software product, may be incorporated into the leading network operating systems, such as UNIX and Microsoft NT.

EXHIBIT V-1

**EDI and Open Systems Deliver
Comprehensive Interoperability**

Application-to-application
interoperability supported
by EDI

Application
A

Application
B

Equipment
Platform

Application-to-system
interoperability supported
by open systems
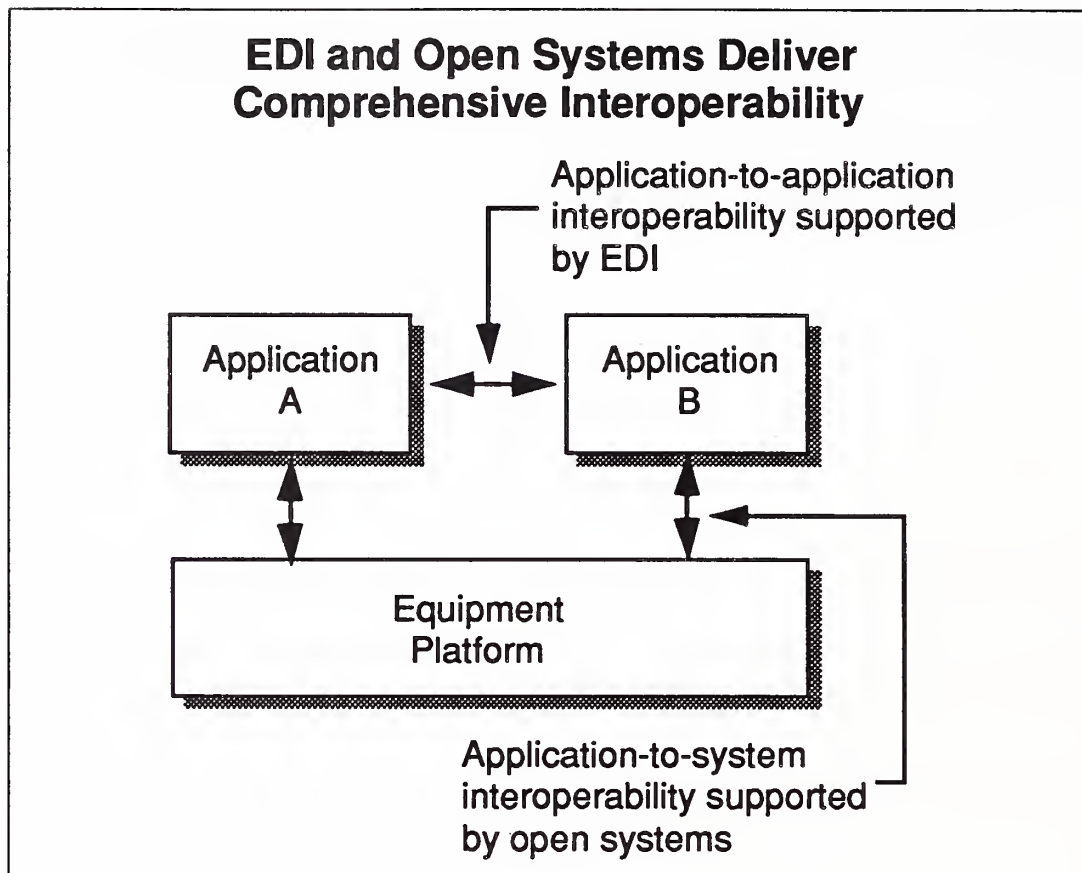
1. UNIX EDI Translation Software

This year there has been rapid adoption of UNIX-based EDI software.
The first UNIX translation software packages were launched in 1990 and
1991 by Premenos (EDI/e), American Business Computer (EDI/Server)
and St. Paul Software (Datatran). In the same timeframe, Unisys intro-
duced a mapping tool that was UNIX based.

Beginning in the third quarter of 1992 and continuing to the present, many
vendors are jumping onto the UNIX EDI bandwagon. Sterling Software
launched its own internally developed package for the HP9000 and the
IBM RS/6000 platforms. GE Information Services contracted with
American Business Computer to resell ABC's UNIX software under
GEIS' own label. Blue Rainbow introduced a UNIX package as did
Perwill, EDS, Birmingham Computer Group Inc., Radley Corp. and Texas
Instruments.

Novell is doing nothing at this time about EDI. It has become essentially
the figurehead of UNIX.

A list of the vendors of UNIX EDI software packages is shown in Exhibit
V-2.

EMF

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EXHIBIT V-2

EDI UNIX Software Vendors

Vendor	UNIX Product Name	Price Range (Dollars)	Systems/OS Supported	Telephone No.
ABC	EDI-Server	50,000 - 300,000 (includes PCs)	Pyramid, Sequoia, Tandem, Unisys, Altos, IBM RS/6000, Amdahl, NCR Tower, AT&T 3B Systems, HP 9000, Gould, Sequent, Sun Microsystems, DG Aviion	313 930-7840
Blue Rainbow Software Int'l. Corporation	Multinet/UNIX	(Contact vendor)	IBM AIX	800 258-3433
EDS Canada	EDI*Expert	4,000 - 15,000	PC to mainframe	416 290-2700
GEIS	EDI*Transit	9,000 - 41,500	ATT UNIX, Amdahl, Gould, Altos, Data General, Hewlett-Packard, NCR, Pyramid, Sequoia, Unisys, Sequent, Tandem	301 340-4000
Premenos	EDI/e	10,000 - 60,000	IBM RS/6000, HP 9000	510 602-2000
St. Paul Software	Datatran	4,500 - 18,000	-386, NCR, HP 3000, 9000, Sequent, Pyramid, Sequoia	612 641-0963
Sterling Software, Inc.	Gentran for UNIX	7,500 - 42,500	IBM RS/6000, HP/9000 (avail. Dec)	614 793-7000
Trinary Systems	EDI Windows	9,000 - 35,000	DEC Vax, HP 3000, 9000	313 442-8540
Unisys	EaDIplus	14,000 - 35,000	Unisys 6000, AT&T UNIX System V	215 986-2000
Radley Corp.	Computerized Automotive Release Accounting	1,995	AIX, DG/UX, HP-UX, SCO, UNIX SVR3X	313 559-6858
Birmingham Computer Group, Inc.	Doc-U-Map	11,200	UNIX System V MIPS RISC	313 333-7300
Perwill	Perwill EDI UNIX	N/A	AIX, HP-UX, Interactive UNIX, SCO UNIX System, Sun OS	216 642-7565
Texas Instruments	UNIX EDI Software	N/A	HP 9000 HP UX 7.0.2	214 575-4714

A survey of companies that used UNIX as the underlying operating system on which to run EDI systems found that UNIX provided features for conducting EDI that were superior to EDI software designed for other operating environments.

These superior features are:

- Time responsiveness to trading partners (due to UNIX's extensive multitasking capabilities)
- Excellent internal-to-external IS integration
- Scalable processing power that supports EDI volume expansion
- Broad trading partner communication alternatives (including direct point-to-point connections that bypass value-added networks)
- Equitable distribution of systems costs among trading partners (proprietary systems were expensive to maintain)

For more information on this subject, please refer to INPUT's report, *Open Systems and Electronic Commerce.*

2. Microsoft Windows and NT

TSI International was the first vendor to offer a PC EDI translation software package that ran under Microsoft's Windows interface. (TSI had purchased this package from Foretell.) Now Blue Rainbow, Texas Instruments, and Digit Software, Inc. have introduced packages.

No one has yet developed an EDI translation software product for NT. However, there may be a big shake-up if Microsoft were to incorporate EDI functionality into a future version of NT.

3. Software Pricing

The trend in EDI software pricing is generally downward. Leading the price lowering is TSI International, which in the autumn of 1992 rolled out its translation kit software. Kits are preconfigured software packages that meet the needs of specific large "hub" EDI users (such as Wal-Mart, Chrysler, the U.S. Air Force, etc.). TSI is selling its basic translator package for $495 and each kit for $249 to $395.

Contrary to this trend, however, Supply Tech raised its price. TSI itself also introduced a new general purpose translator, Mercator. Mercator will probably be priced in the $2,000 to $3,000 range.

4. Impacts on EDI and EC Network Services

Network service providers GE Information Services and Sterling Software embarked this year on initiatives to revamp their network and processing facilities. UNIX and open system architectures are being deployed to replace older, mainframe processing centers.

Decision support software and services have also begun using UNIX. This trend is displacing the traditional order, in which companies such as Information Resources and A.C. Nielsen had the most clout. Now the user is given the clout with inexpensive, relatively easy to use software and equipment.

Companies such as Efficient Market Services (Deerfield, IL) and Red Brick Software (Los Gatos, CA) are providing, respectively, services and software that generate reports derived from point-of-sale transactions. Consumer goods manufacturers use this information for marketing decisions.

In response to these new companies and new technologies, Information Resources (IRI) and Nielsen have initiated their own subsidiaries to provide similar services using newer technologies. IRI began LogicNet in 1992.

5. The INTERNET and Network Pricing

In the last 18 months, the INTERNET has emerged as a major data communications highway. Many observers wonder if it will become fully endorsed by commercial users.

Key points about the INTERNET are:

- As indicated in Chapter IV, INPUT's survey showed little use of the INTERNET by corporations, other than unofficial E-mail. Many users do not anticipate using the INTERNET for EDI and official commercial communications.

- Lack of security and inadequate customer support functions are the most often cited objections to using the INTERNET for commercial purposes.

- The INTERNET will probably not be used (in the sense of an alternative to commercial VANs) for EDI and electronic commerce.

- Though not used, the INTERNET should be considered a role model for how electronic commerce will evolve in the future.

At the time of this writing, the INTERNET serves approximately 15 million users in more than 90 countries, with a core of 16,000 networks, based on 1.8 million host computers. Thirty percent of INTERNET sites are registered as commercial; this percentage is expected to grow to 50% by the end of 1993.

There is no central administration of the INTERNET. It is self governing, with on-line groups that determine technical standards and governance rules.

The INTERNET represents what happens when users and groups of users gain control of interchangeable—"open"—systems components: they autonomously build computer networks to meet their particular needs.

There is no reason why EDI users will not follow the example of the INTERNET. With tools that allow them to easily, directly connect their applications, they will set up their own community-oriented hosts.

The INTERNET also represents a revolution in packet network pricing. The price of the INTERNET is paid typically by institutions, not individual users, and it is generally a flat fee. The expense of leased lines and host computers are fixed sunk costs. Institutions, not interested in profiting from the INTERNET's traffic, do not charge by usage.

Commercial value-added networks can no longer maintain high, traffic-based prices for their networks. Furthermore, these networks should (and many have, for example CompuServe, Sprint, and MCI) have gateways into the INTERNET.

C

Integrated Messaging

A new composite marketplace is emerging, best described as the market for extended corporate networks and electronic commerce services.

This single market has emerged because companies have built departmental local-area networks inside their companies and are moving on to build networks that are enterprisewide and beyond; networks that interconnect the company with its trading partners. Thus EDI, E-mail and inexpensive PC software, with network operating systems, represent the bedrock software and services that customers are asking for.

Many EDI vendors have seen the convergence of these formerly distinct areas and have taken action to introduce new services and products. Advantis, Premenos, AT&T EasyLink Services, Sterling and GE Information Services all offer E-mail and EDI products and services.

Integrated messaging environments are composed of many components:

- Network operating system software
- Host-based and LAN-based E-mail software
- Gateway software (such as SoftSwitch's or Mpact's)
- Facsimile hardware
- Facsimile software
- Third-party network services
- Voice processing and equipment (typically sold as a turnkey system)
- Other components

The integration of different message types is occurring, for the most part in pairs:

- EDI and E-mail
- Facsimile and voice
- Facsimile and E-mail

Users are not attempting to combine all message types at once.

LANs and fax-capable PCs are the fastest growing areas of user adaptation due to price/performance mix.

Facsimile messaging may impact electronic commerce more than any other single technology. Advanced facsimile messaging is no longer sending bit-mapped images. It is sending binary files between points that can be re-inserted into applications and other systems for further processing and user manipulation. With the adoption of the TR.29 binary file transfer standard, facsimile servers (in a network of PCs) will be used to send E-mail and possibly EDI, video and other digital files.

Standalone facsimile sales are growing 26% annually. Facsimile cards (which are inserted into a PC) are growing at 129% per year.

Delrina Corporation, one of its value-added resellers (Green Tree Software) and MCI are offering an application-to-application file transfer service using Delrina's facsimile and forms software. A user in one company can create a purchase order using Delrina's forms/workflow software. He or she sends it via MCI to the supplier. The supplier, using Delrina's software as well, downloads the file into its order entry application.

The use of X.400 is still implemented by large corporations. The messaging envelope for EDI, X.435, has been little used.

GEIS and Sterling Software are aggressively selling E-mail messaging, EDI services and software and related network-based information services in a single package.

GE Information Services has begun selling its Business Talk service with its EDI*Express offering.

Sterling Software launched a workstation software package called Commerce Connection that is specifically aimed at intercompany E-mail and EDI services.

Both GEIS's and Sterling's integrated messaging offers also provide network-based directory services (for addresses of trading partners).

Also indicating a convergence of messaging media is Paul Allen's acquisitions of Harbinger and America Online (see Chapter VI). These acquisitions are the first, however, to group an E-mail/information services provider (America Online), an EDI network service provider (Harbinger), and a major PC software vendor (Microsoft). These three companies hail from three marketplaces that were originally distinct but, just in the last 12 months, have rapidly come together.

For more information on integrated messaging trends, see INPUT's report, *Integrated Electronic Messaging: Trends, Issues, Opportunities*.

D

Decision-Support Software and Services for Electronic Commerce

The best sources of sales data are the raw records of individual commercial transactions, whether they occur at retail outlets or at distribution points further upstream. The services of Nielsen and Information Resources have provided packaged goods manufacturers with marketplace intelligence based on supermarket sales data for years. IMI has provided the same service in the pharmaceuticals industry.

As more and more commercial transaction data is captured electronically, including by EDI, point-of-sale systems, automated field sales staff, on-line purchasing systems and in-house systems, very precise market intelligence is available and affordable to all kinds of companies.

It is no coincidence that the most sophisticated EDI users have now also implemented information systems that process vast amounts of transaction data for decision-support purposes. American President Lines, Playtex, K mart, Wal-Mart, J.C. Penney, and others are electronically "warehousing" transaction data. Data warehousing is the process of extracting and transforming operational data into an informational data base for access by decision makers using query and analysis tools.

These companies use these systems for the purpose of responding better to changing market circumstances. These data warehouses typically run on specialized multiprocessor computers that run specialized retrieval software.

The trend of using data warehouses is rapidly increasing, especially now with the advent of inexpensive software and equipment. Furthermore, warehousing data for later query will not be confined strictly to sales data. Distributor product shipments, import records, mortgage foreclosures, and many other kinds of trade indicators are captured electronically. Once captured and evaluated, action can be taken.

A kind of event-driven economy emerges from this trend, in which much of the cybernetic linkage is electronic in nature, using structured, machine-processable records. INPUT expects that a whole new category of service provider will emerge whose business is tapping the electronic trade networks to reveal market trends.

The following are some of the developments to watch:

- Services that process and distribute transaction data are becoming an important electronic commerce business opportunity.

- Nielsen and IRI have pioneered this kind of service, and new companies are following in their wake in a number of vertical markets. Entertainment Data Inc. (ironically abbreviated EDI) captures ticket sales from movie theaters. It has begun doing this via electronic data interchange.

- Efficient Market Services is a service/turnkey vendor that captures supermarket sales data and helps manufacturers understand their marketplaces. LogicNet, a spin-off and wholly owned subsidiary of IRI, is doing the same. (see *The EDI Reporter*, Jan. 1993)

- EDI network and software provider Sterling Software has a service called MarketQuest, which compiles market share information from EDI traffic flowing through its network (only at the request/permission of all parties involved; typically a focused niche group of distributors such as those for electrical components or veterinary products).

Besides companies that offer services, other companies offering software and equipment are enabling users to build their own decision support capabilities.

- Red Brick Systems, a tiny Silicon Valley software start-up, has a sophisticated data warehousing/retrieval product that is getting rave reviews by large manufacturers, distributors and retailers. Red Brick has alliances with Hewlett-Packard and Sequent.

- NCR continues to improve its line of UNIX-based multiprocessor computer systems. It now has merged the DBC/1012 multiprocessor data base machine into its 3600 line of multiprocessor computers. The DBC/1012 was the first parallel computer to be used commercially in 1984. NCR acquired it when it purchased Teradata in 1992.

- Competing against NCR with less expensive multiprocessor UNIX computers is Sequent. It has an alliance with Red Brick systems for massive data warehousing/query solutions.

- Intel and Unisys recently announced a development agreement to build multi- and parallel processor computers based on Intel's new Pentium chip and UNIX architecture.

These and other developments are bringing parallel processing to commercial users. And the foremost application of parallel processing commercially at this time appears to be the warehousing of sales and other transaction data for later query and analysis.

The area of decision-support information related to commercial sales parallels other electronic commerce segments in terms of technology evolution. Relatively inexpensive software and equipment is allowing users and/or new service vendors to displace the information services of the older providers, namely Information Resources and A.C. Nielsen.

E

The Importance of Professional Services and Customer Support

As pointed out in the above sections of this chapter, technology is driving down the price and complexity of software, equipment and basic network and information services. The days when information technology vendors find lucrative, repeat business in the development and servicing of user systems are over.

- Inexpensive powerful tools are flooding the market. Sales through indirect channels are necessary.

- There is now mass literacy in computer usage. Users have the ability now to build powerful systems on their own.

Nevertheless, expertise in how electronic commerce technologies can make a business more competitive is at a premium. Indeed, today the greatest "value add" contribution comes from the professional service and customer support functions of the vendor. Technology is trivial.

The following evidence shows that people are the true asset:

- The rise and absolutely critical role of the value-added reseller for today's software powerhouses (Microsoft, Novell)

- The rise of industry-specific organizations as reseller points (such as NACHA, NWDA, ATA)

- The shift at leading equipment manufacturers (such as Digital Equipment Corporation, Texas Instruments, and Motorola) to build businesses in services

VI

Competitive Environment

An array of information technology and service companies provide corporate users with electronic commerce solutions. EDI software vendors, banks, telephone companies, value-added networks, processing service companies, professional service firms and others are examples of the kinds of companies offering the tools and technologies of electronic commerce.

Exhibit VI-1 lists the various types of electronic commerce solution vendors or enablers.

EXHIBIT VI-1

Electronic Commerce Enablers

- Telcos
- Banks
- Prof. Svcs.
- Proc. Svcs.
- EDI
- **EC Solutions**
- Appl. SW
- Wireless FAX handheld
- Equipment
- Data base SW
- Media
- UNIX
- PC SW
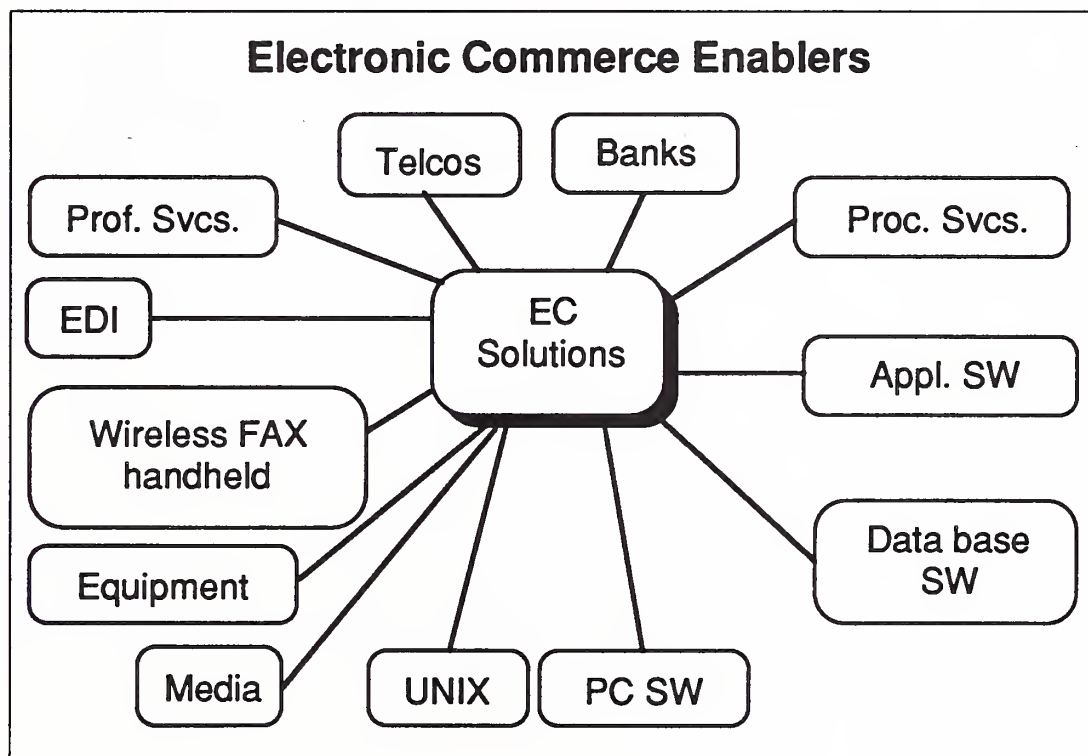
This chapter identifies the major EDI and electronic commerce software and service vendors. It also discusses events of the past 12 months in the vendor community and the reaction of that community to market developments.

A
Core Electronic Commerce Vendors

1. Overview

At this time, the core providers of electronic commerce systems are the EDI software and service companies. These companies are a collection of both small, single-product companies and billion-dollar, diversified information technology companies.

Exhibit VI-2 lists the main EDI software and service vendors. It shows their relative positions according to two measures: the size of the company (in terms of resources it has at its disposal) and the breadth of its electronic commerce product line (including software, network services, processing services, professional services, and other related offerings).

EXHIBIT VI-2

Relative Positions of EDI Software and Service Vendors
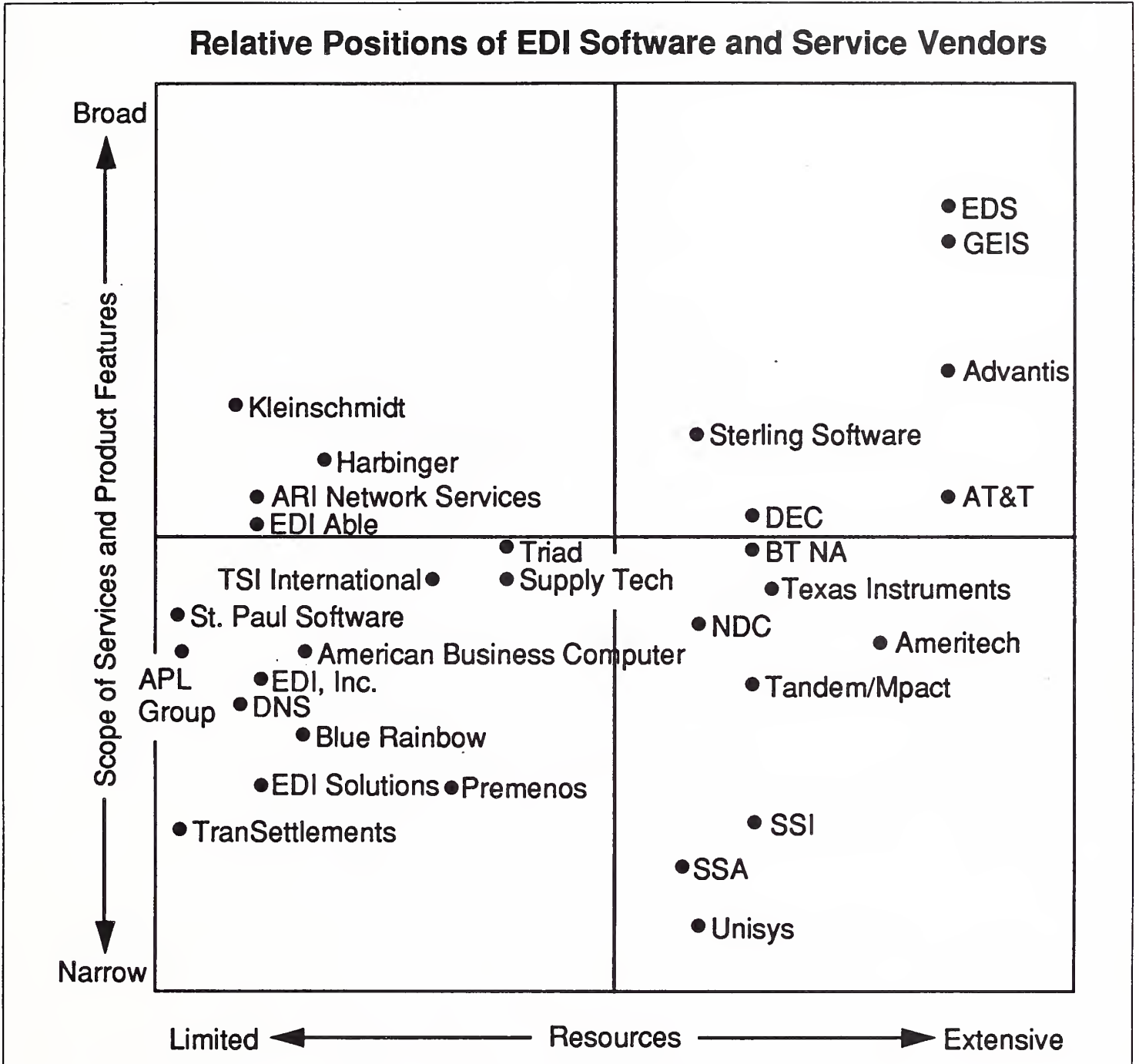
Market leaders in software and network services are shown in Exhibits VI-3 and VI-4.

EXHIBIT VI-3

**Market Shares of Leading
EDI Software Vendors—1993**

Advantis/IBM 5%
Digital Equipment Corp. 5%
Supply Tech 8%
TSI International 8%
Premenos 10%
Sterling Software 14%
Other 50%

Total Market Size: $250 Million

EXHIBIT VI-4

**Market Shares of Leading
Network Service Providers—1993**

Harbinger 4%
Transnet 4%
Kleinschmidt 5%
RAILINC 6%
Advantis 15%
Sterling Software 16%
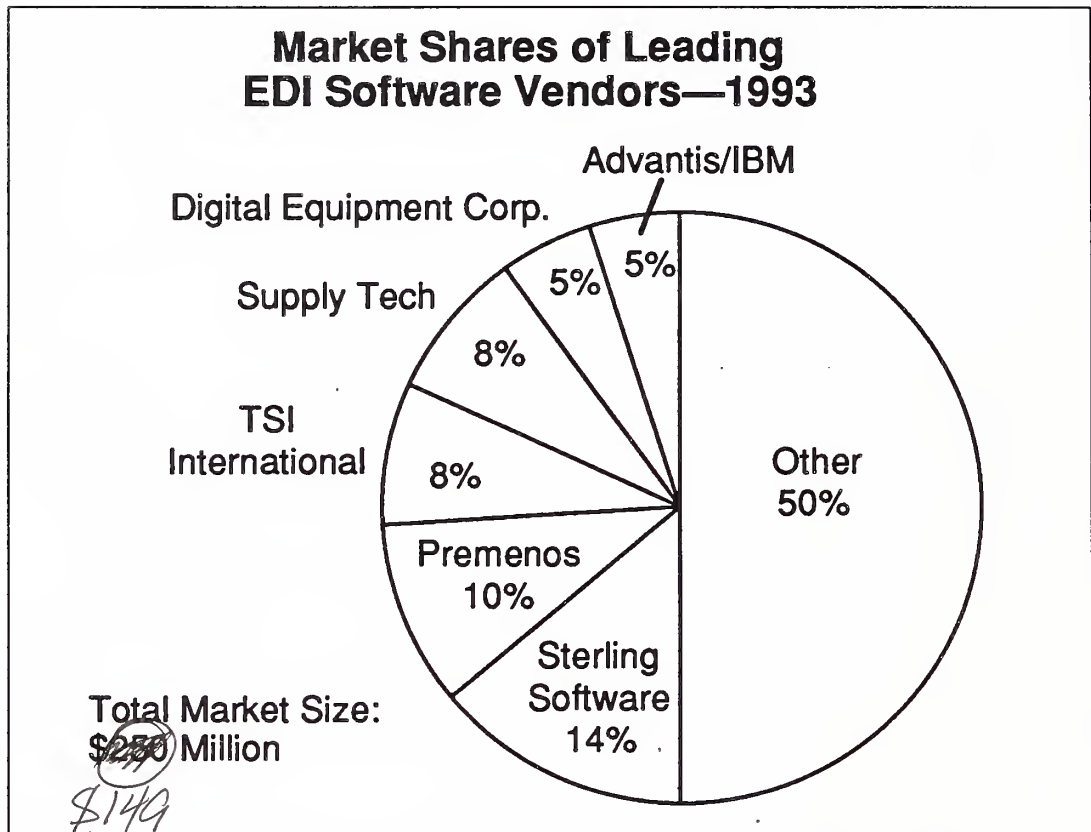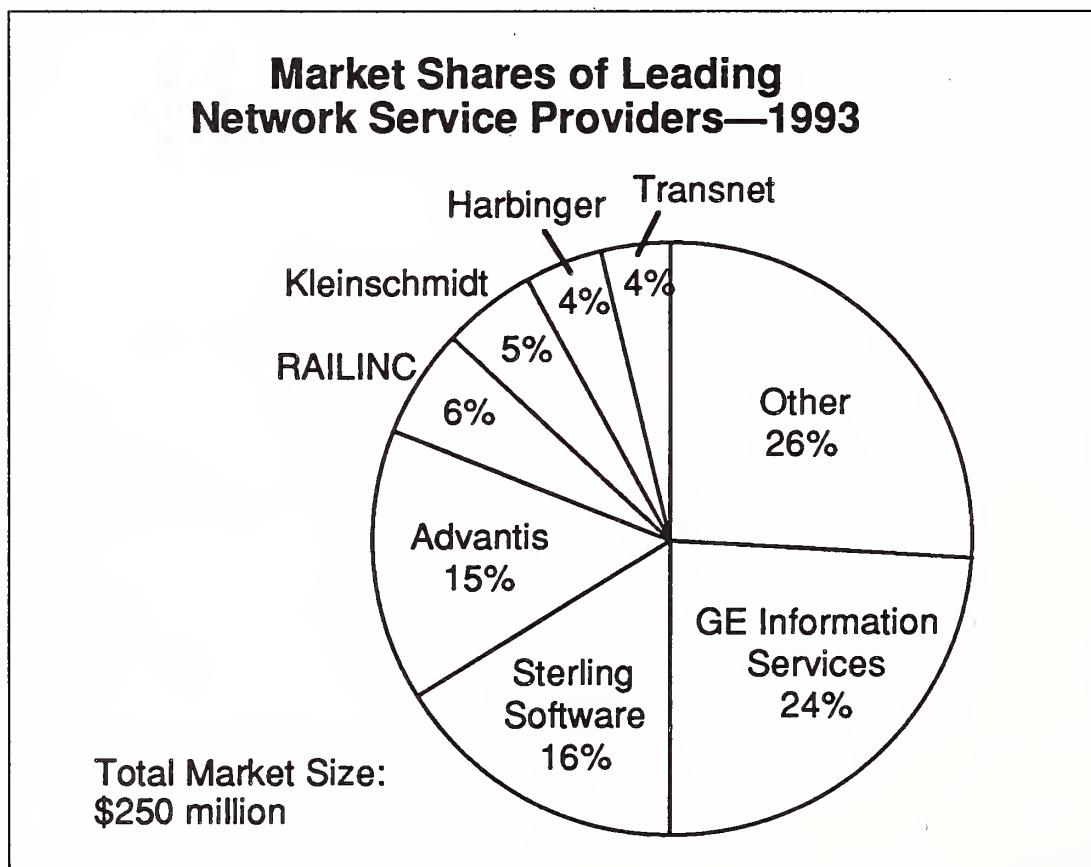GE Information Services 24%
Other 26%

Total Market Size: $250 million

2. Vendor Profiles

a. GE Information Services (GEIS), Rockville, MD

GEIS is the IT vendor with the largest revenues from electronic commerce services: $80 million in worldwide EDI network revenue ($52 million in North America alone), $103 million in intercompany messaging world-wide ($73 million in North America) and another $2 million in EDI software sales (these figures represent 1992 revenues). GEIS, a $650 million company, also has other electronic commerce-related businesses as part of its processing services activities.

GEIS's electronic commerce services and products often have been developed first to serve the 12 other divisions of General Electric. GEIS is not strong, however, in software. Of the EDI software it sells (it has offerings for PC, UNIX and mainframe platforms), its greatest sales come from packages developed by other vendors—namely American Business Computers—that it resells.

GEIS has its own packet-switched network and extensive processing facilities; some of this equipment dates back to the 1970s. It is embarking on a multiyear strategy to revamp its network infrastructure with open/ UNIX-based equipment and software. GEIS anticipates greater acceptance of open/UNIX systems in general. With its own network regarded as highly open, it expects customers to tie more easily into its services and to offer services with greater value added as a result.

GEIS has been merging its Business Talk service (primarily an E-mail service aimed at the corporate user) with its EDI services to deliver an integrated electronic commerce solution to companies. Its chief competitors are Sterling Software, Advantis, BT North America and AT&T EasyLink.

b. Sterling Software, Inc. (EDI Group), Dublin, OH

Sterling Software, Inc. (corporate headquarters, Dallas, TX) is a $400 million software vendor with worldwide distribution and customer base. It has grown largely through acquisition, its most recent and largest being Systems Center, Inc., a $130 million vendor of systems software modules for IBM mainframe computers. With the Systems Center acquisition, Sterling reorganized into four divisions: Federal Systems, Systems Software, International and the EDI Group.

The EDI Group, based in Dublin, OH, is the focus of Sterling's EDI and electronic commerce business. The group's 1992 revenues were approximately $57 million, with $32 million coming from network services, $23 million from software (EDI translation and EDI/EFT software) and $2 million from education and training services.

Although Sterling may be smaller in revenues than GEIS, its chief competitor, it has always been profitable in the EDI business (an accomplishment that GEIS has so far not achieved). Sterling doesn't own its network lines, but it has extensive mainframe and processing facilities which it is upgrading to UNIX platforms.

With the acquisition of Systems Center (and its extensive international distribution network) by corporate Sterling and the acquisition of a small U.K. EDI software vendor, Sterling's EDI Group is now moving quickly to build a global EDI/electronic commerce service. The former president of Sterling's EDI business, Bill Plumb, has been advanced to the position of Executive Vice President of Sterling's International Division. It is expected that he will be key in building the international EDI business.

Sterling is strong in both networks and software for electronic commerce. In late 1992 it broadened its strategic focus to concentrate on "electronic commerce" (not just EDI), and in 1993 it launched one of its first products in its expanded product line, Commerce Connection, a software package that has associated network services. Commerce Connection primarily provides EDI users with E-mail, directory and library capabilities so that EDI coordinators of different companies can communicate/coordinate their EDI systems with each other.

c. Advantis, Tampa, FL (Marketing headquarters)

Advantis is the combination of the IBM Information Network and the Sears Communication Company network that was created in the second half of 1992. Advantis, though a separate service entity, is owned by IBM's ISSC, IBM's outsourcing service business. The past year has been a period of consolidation and reorganization for what was formerly the IBM Information Network.

In terms of network services, Advantis sells EDI, E-mail, basic file transfer, electronic information, and virtual private network services. In terms of software it sells a complete line of EDI translation software, communication software, and through other IBM divisions, other software (including E-mail). The Advantis network primarily uses SNA and X.25 protocols. Advantis provides extensive customer support, documentation, and third-party IBM software support through the network. There has been steady, if not spectacular, growth.

Nevertheless, Advantis is uniquely positioned relative to the other major EDI networks, in that it is used for outsourcing jobs from ISSC. Also, Advantis is now freer than it formerly was (as IBM's official network) to recommend non-IBM products to customers. Advantis has made alliances with Texas Instruments and others to resell its network in EDI and EC solutions.

d. BT North America, San Jose, CA

BT North America, originally founded as Tymshare, Inc. in 1966, provides a range of network application services, many of them supportive of electronic commerce, including EDI, E-mail, and electronic transaction services (such as credit card processing). BT has been a wholly owned subsidiary of British Telecom since 1989. At the time of this publication, its business is being transferred to MCI as part of an acquisition/merger of BT and MCI. British Telecom spent $4.3 billion for a 20% stake in MCI. Simultaneously, BT and MCI are putting about $1 billion into a joint venture to provide a global telecommunications service, of which BT will own approximately 75%. As part of the deal, MCI will inherit most of BT North America's value-added network business.

BT North America has focused more on basic transport services for EDI and electronic commerce than has Sterling, Advantis, and GEIS (the other leading EDI/electronic commerce network services providers). It does not sell software as do its competitors. BT North America was the first major EDI VAN and now is poised to offer extensive worldwide EDI network services. MCI has offered messaging services, including the ability to transport EDI messages. It also has enhanced facsimile services, including a service using preformatted facsimile/forms transmissions from Delrina Software, a modified EDI service.

e. Harbinger*EDI Services, Atlanta, GA

Harbinger was founded by a consortium of banks and Westinghouse in 1983 to explore home computer shopping/banking opportunities. The company's focus shifted to concentrate on cash management for the small corporate market. In 1986 it brought InTouch Cash Manager to the marketplace, along with value-added network services. Cash Manager is licensed to banks, which in turn sell the product to their small to medium-sized corporate clients. The product allows customers to retrieve account information and transfer funds. In 1987, Harbinger brought out InTouch*EDI PC software to perform EDI. The EDI software is sold primarily through seminars endorsed by major hub companies. Harbinger has approximately 4,100 corporate users of its cash management and EDI network services.

f. AT&T/NCR, Parsippany, NJ

AT&T, with its computer manufacturer subsidiary, is probably the most solidly positioned company to offer a complete electronic commerce solution to a company. It has the potential to be an EC juggernaut. It has complete and worldwide network services (for data, facsimile, video and

voice), its NCR subsidiary offers open software and equipment products, and it has a specialty in data base machines and applications (its 3500 multiprocessor series includes the former Teradata data base machines). Data base machine applications will gain importance in electronic commerce as more and more transaction data is captured electronically. Such data has tremendous business/tactical value if analyzed properly and quickly. NCR is also the market leader in bank ATM machines and retail point-of-sale systems. AT&T's credit card is one of the world's leading cards. AT&T owns GO Corporation, a maker of handheld computers. AT&T is also exploring business opportunities in media and interactive television.

In short, AT&T has the potential to be the premier supplier of the paperless/electronic economy. AT&T is pushing hard to provide EDI and EC services in health care. It is the official network of the Healthcare EDI Corporation, a nonprofit consortium of insurance companies and health care providers. Despite having the broadest offering of communication products and services, AT&T has yet to capture a significant share of the EDI/electronic commerce marketplace. Its single most glaring weakness is that it has no real professional service offering to make all of its technology offerings hang together in a single, coherent customer solution. Professional services is increasingly a key element for all electronic commerce providers.

g. Digital Equipment Corporation (DEC), Nashua, NH

DEC has a comprehensive integrated messaging software product suite. Its TeamLinks groupware product is aimed at workflow automation. DEC/EDI translation software is one of the most sophisticated translation packages on the market, especially for DEC platforms. It has real time, X.435, store-and-forward and extensive program interface capabilities. With HostBridge, DEC's EDI software can tie into IBM MVS mainframes and thereby provide an EDI server in an IBM environment. DEC has made many alliances with applications software vendors in several key application areas (manufacturing, accounting, and others). It also is growing its systems integration service business and has a strong alliance with Price Waterhouse. Digital's extensive use of EDI internally enables it to continuously improve its EDI and workflow products and consulting expertise. DEC is the leading EDI translation software vendor for DEC environments. Its chief competitor is Sterling Software, which also offers EDI software for DEC platforms.

h. TSI International, Wilton, CT

TSI is small ($16 million in sales) but has burst on the EDI scene in the last few years. It purchased PC as well as mainframe translation software in the early 1990s. Then it built its own mainframe package. Its software is noted for its high performance, and TSI is the most aggressive EDI software vendor after Sterling. It has made several innovations in technology and marketing. It was first to have a Windows-based EDI translation software package. It now has an object-oriented, menu-driven general-purpose PC translation package (Mercator). It also pioneered using hub accounts to resell or otherwise help it market its software products to the hub's suppliers. In the last 12 months, it completely revamped its pricing and packaging of PC software. It is offering "kits" which are preformatted/configured EDI software that is ready for use for a given hub account. Kits sell for $300 to $500—a tremendous price drop from the average $2,500 starting range for PC translation software.

i. Supply Tech, Livonia, MI

Supply Tech remains the leader in PC EDI software sales. It has built extensive distribution channels around the world and perhaps is the premier PC EDI software provider worldwide. Supply Tech has foreign language support and customization of its products. It has prepared hundreds of preformatted translation packages for the many key hub companies using EDI today. Buyers of these preformatted packages can simply install them and begin sending and receiving transmissions from the hub company.

j. Premenos, Concord, CA

Premenos is the leading supplier of EDI translation software for the AS/400 and IBM System 3/X platforms. Its chief competitors are Sterling Software, Blue Rainbow, Extol and SSA. Premenos has a close relationship with IBM. It had been the OEM supplier of EDI software to IBM.

k. St. Paul Software, St. Paul, MN

St. Paul is very small, but it is distinguishing itself from the several other small EDI software vendors with its UNIX-based EDI software.

l. American Business Computer, Ann Arbor, MI

ABC was one of the first EDI software vendors to release a UNIX-based translation software package. Now, EDI*Server is the leading UNIX translator in the market.

Other EDI software vendors that are doing well are The APL Group, DNS Associates and EDI, Inc.

B

New Entrants to the Electronic Commerce Vendor Community

In the past 12 months, new players have entered or announced intentions of entering the electronic commerce industry. These companies are:

1. Texas Instruments (TI), Plano, TX

TI offers a full line of EDI software, and moreover, TI's Information Engineering Facility (applications software, CASE development tools, and UNIX-based products) allows it to re-engineer a client company's operations from top to bottom. TI is positioning itself as a full solutions provider (not just a vendor of individual technology products). It is targeting the largest companies and offering them a complete makeover of information systems that is intended to give competitive superiority in the client's industry. TI views EDI and electronic commerce as just one facet of a company's information system.

2. R. R. Donnelley & Sons, Chicago, IL

The largest printer in the U.S., R. R. Donnelley has acquired a number of software companies, launched an on-line catalog service (with ordering capabilities) in the electronics industry, and continues to explore new business opportunities in the electronic publishing area.

3. Motorola INFO Enterprises, Phoenix, AZ

Motorola INFO Enterprises is a subsidiary of Motorola, Inc. It launched an on-line catalog of electronic and semiconductor components. Technical and pricing information is offered in a dial-up mode. Engineers in manufacturing companies can download the information. There is access to the catalog service via the INTERNET. Electronic ordering capabilities will be offered in the future. This service is in direct competition with R. R. Donnelley's offering mentioned above. Motorola is funding the start-up of electronic information services such as INFO Enterprises. It wants

to build a portfolio of businesses that will reinforce its core businesses in electronic and communications equipment. Motorola Inc. established Motorola New Enterprise, a separate business unit, for the sole purpose of seeking out and funding businesses such as INFO Enterprises.

4. Information Resources, Inc. (IRI), Chicago, IL

IRI is one of two leaders in the consumer goods information industry (with A.C. Nielsen, a D&B company). IRI gathers point-of-sale data at grocery stores, produces reports on product movement, and sells the data to consumer goods manufacturers. IRI created a subsidiary called LogicNet to offer a similar kind of information service using EDI and network transmission of data, and to establish the practice of vendor-managed inventories at grocery and other retail outlets. Vendor-managed inventories is an advanced logistics pipeline management strategy by which suppliers determine the replenishment shipments for their retail customers. Such a strategy requires advanced digital network systems such as EDI, point-of-sale data capture, and related electronic commerce systems. LogicNet began operations with a few large consumer goods manufacturers.

5. McKesson Corp./PCS Health Systems, Inc., Phoenix, AZ

McKesson is one of the largest pharmaceutical distributors in the world. PCS, its subsidiary, is the largest third-party processor of pharmacy insurance claims in the U.S. PCS is helping NEIC, a consortium-owned insurance claims processor, build a national real-time health care information network. The network is to be used by health care providers and insurance payers.

6. Efficient Market Services (EMS), Deerfield, IL

This company was founded in 1990 by some former executives of Information Resources and Nielsen. It provides a clearinghouse function for point-of-sale (product sales) data. Consumer goods manufacturers buy the data. Grocery stores are considered partners to EMS and share in the profits (and give the data to EMS in return). EMS installs UNIX PCs in a grocery store which gather sales data from the cash register, analyze the data and make it accessible in an electronic mailbox 12 hours after the register closes. Food manufacturers use the data to keep themselves informed on products that are selling or not, results from promotions, exceptions to projected sales, and other events at the point of sale. The 60-person company appears to be growing. It expects to have 10,000 store PCs installed by the end of 1993.

7. National Data Corporation, Atlanta, GA

National Data Corporation is not really a new entrant, but recently has
pushed hard in developing specific EDI services, particularly those related
to financial EDI (corporate payments, tax collection, etc.). It has its bank
customers resell its service.

8. DunsNet, Wilton, CT

The internal network/backbone of the Dun & Bradstreet companies,
DunsNet is offering EDI services in limited form to its largest customers.
It wants to combine conventional EDI with D&B's extensive information
services.

9. Maersk Data U.S.A., Madison, NJ

Maersk Data U.S.A. (Madison, NJ), a subsidiary of the privately-held
Danish shipping and oil conglomerate A.P. Moeller Group, is now a
majority shareholder of EDI translation software manufacturer, EDI
Solutions, Inc. (Minneapolis, MN). Maersk purchased a minority position
in EDI Solutions in 1992. Maersk has data centers in the U.S., Japan and
Europe. It operates a global communications network that links clients in
more than 60 countries and 160 cities throughout the world. With EDI
Solutions, it wants to "explore new frontiers in EDI," according to a
prepared statement. Maersk Data U.S.A. sells data processing and backup
services, consulting and development assistance, value-added network
services and computer software.

10. Extol, Frackville, PA

This small company makes EDI translation software that runs on IBM AS/
400 platforms. It was founded in 1990, but is just now rolling out final
product. Apparently the product is getting good reviews from customers;
they judge it to be very fast in processing. It is also the most expensive
EDI translation product for the midrange platform. Extol's founders,
Anthony and Joe Baran, come from a family that has been in the apparel
manufacturing trade. The brothers have developed other software prod-
ucts related to apparel manufacturing.

C

Exited Vendors of the Electronic Commerce Vendor Community .

1. Bell Atlantic, Philadelphia, PA

This RBOC had entered the EDI network services business in 1991, as part of an multi-area thrust into information services. It used EDI clearinghouse software and customer-premise software from Harbinger*EDI Services. For the two-year duration of its EDI service offering, it brought on four or five major accounts and their several hundred trading partners. For unannounced reasons, Bell Atlantic discontinued its EDI service in 1993. Its customers were turned over to Harbinger*EDI Services. It is believed that the RBOC's territorial restriction of operations hindered its ability to offer corporate customers national and international EDI services.

D

Consolidations/Asset Plays

1. Vulcan Ventures, Inc., Redmond, WA

In the third quarter of 1993, Paul Allen, co-founder of Microsoft, purchased interests in two network service providers: America Online Incorporated (Vienna, VA), a major E-mail and information service provider, and Harbinger*EDI Services (Atlanta, GA), a major EDI service VAN. Mr. Allen's purchases raise the speculation that he is assembling the components of a commercial information utility that would allow companies to conduct business electronically. Mr. Allen's close connection with William Gates and Microsoft also suggests that there could be huge implications for the computer industry.

Mr. Allen has accumulated a 24.9% share of America Online. In August 1993, he acquired close to a 20% share in Harbinger. The exact amount was not disclosed. His holdings of Harbinger, however, entitle him to appoint a director to Harbinger's Board. William Savoy, an officer of Mr. Allen's Vulcan Ventures, Inc. holding company, will become one of the seven members of Harbinger's Board of Directors.

America Online, with sales of $26 million in 1992, has won key contracts for extended E-mail services for corporations. For example, Apple Computer switched its AppleTalk service (by which it connects with 20,000 third-party developers, value-added resellers and distributors) away from GEIS and gave the contract to America Online. More than 100 software and computer vendors, including Microsoft, use America Online's E-mail service to provide support to customers and third parties.

Many personal software packages, including Microsoft's Works and LotusWorks, contain built-in interfaces for users to connect with the America Online service. America Online has over 200,000 subscribers to its on-line service.

Harbinger's background is highlighted elsewhere in this chapter.

With Mr. Allen's tremendous financial resources (holdings estimated to be in the billions of dollars) and his close affiliation with Microsoft's Bill Gates, he could create a leading electronic commerce utility. The utility could offer everything from PC/LAN-based applications software (from Microsoft), to EDI and E-mail software (Harbinger, Microsoft, and others), to wide-area, intra- and intercompany network connectivity and information services (Harbinger and America Online).

2. MCI/BT North America, San Jose, CA

The U.S. long-distance carrier has acquired the business of BT North America, a subsidiary of U.K.-based British Telecom. The details of this merger are explained in Section A.

3. Advantis, Tampa, FL

IBM Information Network and Sears Communication Company merged to create Advantis. Details of this merger are also given above in Section A.

4. Immedia Infomatic Inc., Montreal, Canada

Immedia was incorporated in 1988 to provide value-added network services, particularly EDI and E-mail. Its INTERCONNEXIONS software allows Macintosh and IBM PC users to send E-mail. The software is also used by the Canadian foreign service around the world, some major pharmaceutical manufacturers and Canada's leading tax preparation service for the EDI-like processing of claims. One of Immedia's largest shareholders is Tandem Computers (Cupertino, CA). In 1993, Immedia acquired a subsidiary of Tandem, Mpact EDI Systems, a vendor of high-performance clearinghouse software. Some of the officers from Mpact became officers of Immedia. The acquisition of Mpact will approximately triple Immedia's revenue base, according to official company disclosures. This should place Immedia's 1993 consolidated revenue at approximately $6 million. Terms of the acquisition were not disclosed. Immedia already had local-call access to its network in some 500 cities in 30 countries. The acquisition of Mpact brings it expanded distribution channels for the Immedia products, a strong management team, leading-edge messaging technology, a strengthened and expanded position in the electronic commerce market, and a solid relationship with Tandem Computers.

5. Stentor, Ottawa, Ontario, Canada

Stentor is a consortium of the regional telephone companies of Canada and MCI, the U.S. long-distance carrier. It was formed in 1992. Through alliances and cooperative initiatives with telephone companies throughout the world, Stentor offers global telecommunications (intelligent network) services.

Over the next five years, Stentor and MCI will each invest between $150 million and $200 million in new equipment. Stentor is also part of the FNA alliance, an organization controlled by twelve telecommunications companies including France Telecom, Mercury, and Deutsche Bundespost.

The nine Stentor partners are Bell Canada, BC Telephone, AGT Limited of Alberta, Sasktel of Saskatchewan, Manitoba Telephone System, New Brunswick Tel, Maritime Telephone and Telegraph, Island Telephone and Newfoundland Telephone.

6. QRS QuickResponse Services, Inc. (QRS), Richmond, CA

QRS provides a centralized product information data base (the QRS catalog) to retailers and merchandise suppliers to automate their merchandise management. The QRS data base uses the Uniform Product Code (UPC). In August 1993, QRS publicly offered 3.5 million shares at $15 per share. QRS joins ARI Network Services (Milwaukee, WI) and Sterling Software, Inc. as the only EDI companies that have EDI business revenues explicitly disclosed to the public.

E
# Potential Entrants

The following six software companies are potential electronic commerce software vendors. Depending on how they develop their existing product set and customer base, these companies could wield great power in how electronic commerce technology evolves because they would have such large installed bases.

- Microsoft
- Novell
- Lotus
- Delrina
- General Magic
- Intuit

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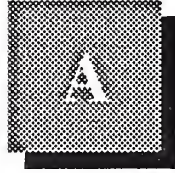
Forecast Reconciliation

EXHIBIT A-1

Forecast Reconciliation

Delivery Modes	1992 Market				1997 Market				92-97 CAGR per data '92 Rpt (%)	92-97 CAGR per data '93 Rpt (%)
	1992 Report (Fcst) ($M)	1993 Report (Actual) ($M)	Variance from 1992 Report		1992 Report (Fcst) ($M)	1993 Report (Fcst) ($M)	Variance from 1992 Report			
			($M)	(%)			($M)	(%)		
Total	316	365	49	16	1,050	874	-176	-17	27	19
EDI Software	102	116	14	14	350	327	-23	-7	28	23
EDI Network Services	187	209	22	12	600	434	-166	-28	26	16
Professional Services	27	40	13	48	100	113	13	13	30	23

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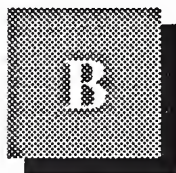
Questionnaire

This survey seeks to determine the current usage of EDI systems and the anticipated future requirements of such systems by organizations such as yours.

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.

QUALIFYING QUESTION:

Are you a
      vendor of EDI products and services?
      user of EDI products and services?
      both?
      another kind of organization trade association, etc..?

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

1.   Which of the following best describes your status in relation to an EDI system?
      _____ we are spending money on an EDI program for the first time this year
      _____ we are spending more money this year than last on our EDI program
         (what % more: _____)
      _____ we are spending less money this year than last on our EDI program
         (what % less: _____)
      _____ we are not spending any money on EDI this year

2.   If you are spending, please estimate how much are you spending on the following categories
for the year 1993:

          _____ EDI software
          _____ network/telecommunications services
          _____ equipment
          _____ internal development
          _____ outside consultants/integrators
          _____ others
          _____ don't know

          _____ TOTAL (to be calculated by interviewer)

3.   If you have been doing EDI for some time, have you ever switched any vendor brands (such
as replaced EDI software or value-added network)?

        thing replaced _____
        new vendor   _____
        old vendor   _____
        why replaced _____

        thing replaced _____
        new vendor   _____
        old vendor   _____
        why replaced _____

4. The INTERNET is a quickly growing informal yet worldwide network based primarily in univer-
sities and research institutions that more and more companies are tying into, even for some commer-
cial purposes. Please check the item that best describes your situation in relation to the INTERNET
today:

     ____ I use the INTERNET for E-mail with colleagues in my own and other organizations
     ____ other people in my company use the INTERNET, but I don't
     ____ my company is connected to the INTERNET
     ____ we use the INTERNET for official communications

5.   What has been the biggest problem that is keeping you from having a better functioning EDI
program?

6.   To what extent has adopting EDI led you to re-engineer your company?

                                         EMF

7.   Are there information technology products (such as UNIX platforms, easy-to-use EDI
      translation software, special data base servers, etc.) that have allowed you to better utilize
      EDI? Please explain:

8.   Please rank the following communication modes as to their importance in communicating
      with trading partners (1-5; 5 being critical):

      fax
      E-mail
      EDI
      other file transfer between computers

9.   What kinds of the following data do you share with trading partners? (mark all that apply).

      sales data
      inventory data
      shipping/logistics data
      design/manufacturing data
      other (please explain).

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

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

      under 100
      100-499
      500-999
      1,000 and over

12.   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

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