U.S. EDI SOFTWARE MARKETS

1987 - 1992

INPUT

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Electronic Data Interchange Planning Service (EDI)

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1987 - 1992

Abstract

Electronic Data Interchange (EDI) software forms the core of successful EDI implementations. For users, chosing the right solution is not easy given the fragmented nature of the market and the range of options available. Compounding decision making is the fact that until very recently, large software firms which can provide reliable product and after-sale support have not addressed the market.

Regardless of these and other market inhibitors, the EDI market as a whole is expected to grow substantially primarily because EDI addresses business fundamentals: the need to reduce costs and improve services in the buying and selling relationship.

This study examines the EDI software market, describing its functions and relationships to other applications, the variety of EDI software available, issues affecting how users approach EDI software, and market forecasts.

The study contains 92 pages and 36 exhibits.

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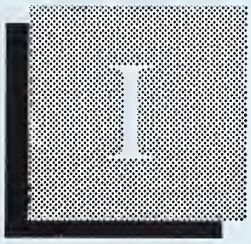
Exhibits (Continued)



Introduction

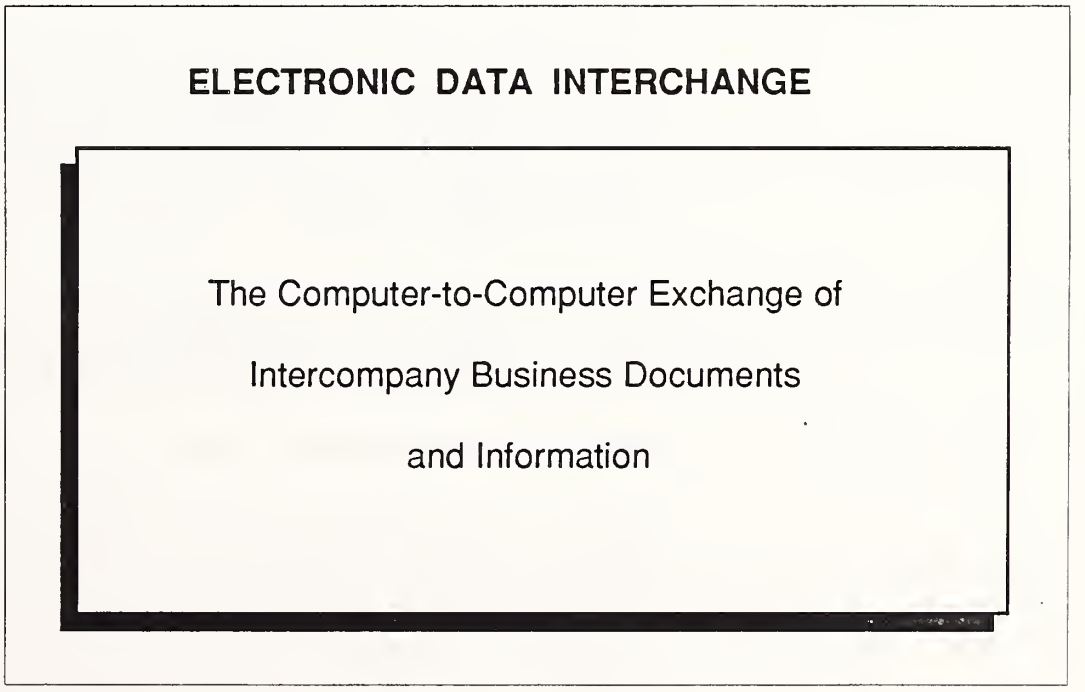
Introduction

A Background

This report, produced by INPUT's Electronic Data Interchange Planning Service (EDIPS), examines Electronic Data Interchange (EDI) software, with an emphasis on trends in the generic translator market.

INPUT defines EDI as the electronic transfer of business information between organizations in a structured application (see Exhibit I-1). The organizations involved may have different computers, terminal types, protocols, and data formats.

EXHIBIT I-1



The techniques of electronically transferring data representing standard business documents such as purchase orders and invoices between trading partners have been used for approximately 15 years. A simple automated order-entry system, for example, is considered an intermediate step toward EDI.

EDI goes beyond these first steps to involve a large variety of document types being transmitted to a number of trading partners in diverse industries with a differing computer hardware and communications environments.

In the past, EDI efforts have been implemented based on private standards.

As the number of electronic trading partners increases, agreement on machine-readable standards becomes more important.

Data must often be translated between a company-specific format and either a trading partner's format or a commonly accepted one.

Commonly agreed upon standards, such as American National Standards Institute (ANSI) X12, an evolving universal EDI standard, can be used across disparate industries.

The largest current users of EDI are discrete manufacturing, distribution (retail and wholesale), and transportation. Many niches are developing in these and other markets.

Although purchase orders and invoices continue to be the most dominant documents transmitted electronically, many other transaction sets (document specifications) have been standardized and incorporated into ANSI X12.

Software and service vendors alike are aggressively pursuing EDI accounts and promoting EDI within industry segments. Users ultimately benefit from this competitive environment through a variety of product choices, competitive pricing, and improved services often designed for specific industry segments.

The reasons for using EDI include the time value of information, cost avoidance, better inventory control, and benefits realized through the integration of EDI data and corporate information processing.

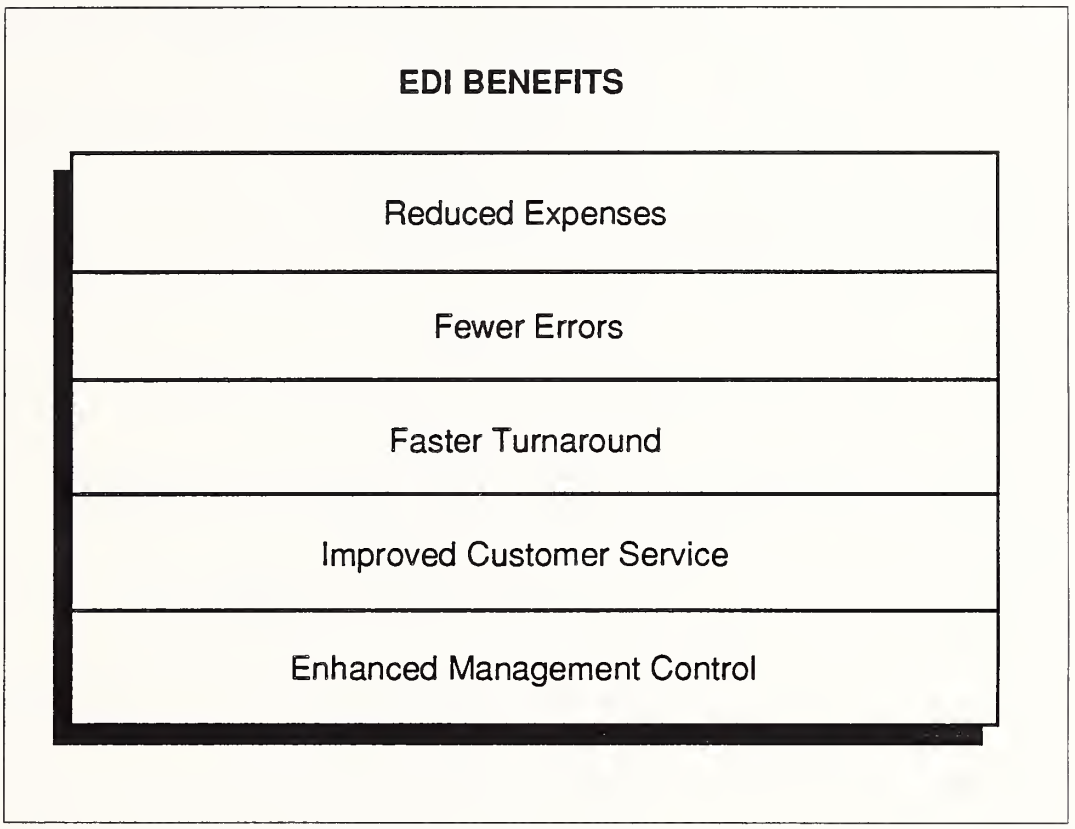
Exhibit I-2 summarizes EDI's benefits.

However, there are many technical and business issues involved in EDI: standards, compatibility, security, data communications, economic responsibilities, and the effects on current business practices.

Nevertheless, within the next five years, thousands of companies will abandon paper purchase orders, invoices, and other routine transactions to adopt EDI standards, assuming the industry successfully educates would-be users to the benefits of EDI.

Properly functioning EDI software is at the center of successful system implementations.

EXHIBIT I-2



B

Scope

EDI software is a concept that actually covers two rather distinct product groupings:

- Full featured, standalone generic translator products that support a variety of document types and can translate between a number of industry standards.

- Specific applications sold either as a turnkey system or as an enhancement to an integrated automated system. These are designed to send or receive only one or two document types in one standard.

For market analysis purposes, this study focuses on the former group of products.

- These are all packaged software that can be sold as standalone products; custom-designed systems, which INPUT classifies as professional services, are not included.

- Turnkey systems and EDI modules attached to specific applications are discussed where relevant, but they are not included in the market sizing. This group of EDI software merits its own report, which INPUT will undertake at a later date.

EDI translations can be handled three ways: prior to transmission; by the receiving party; and by a third-party intermediary.

- This report includes packaged software to be installed on the sender's and/or receiver's computer, whether it is sold by a software developer or by a network/processing service.
- It excludes, however, translation and other software that runs on a third party's computer.

Terms used in this report are defined in Appendix A.

In addition to this Introduction and an Executive Overview (Chapter II), this study addresses the following topics:

- Classification of EDI software - its functions and its relationship to other software systems (Chapter III).
- EDI software issues - the pros and cons of buying versus developing one's own software; trends in pricing, distribution, and support; as well as other issues (Chapter IV).
- Market forecasts for generic EDI translators (Chapter V).
- Conclusions, recommendations, and opportunities for users and software vendors (Chapter VI).

Profiles of EDI software vendors - their products, targeted markets, and distribution strategies - are covered in a companion report, *EDI Software Provider Profiles*.

C Methodology

The research for this report consisted of:

- Vendor interviews. Interviews were conducted with vendors of generic EDI software; software developers specializing in micro, mini and mainframe applications; turnkey vendors; VANs; and RCS firms. The questionnaire guide is in Appendix B.
- Corporate interviews. Structured interviews were conducted with Information Systems (IS) personnel in 15 industries between February and March, 1987. The questionnaire used is in Appendix C.
- Product analysis. INPUT collected and analyzed information on EDI software vendors, companies planning to offer an EDI product, and reviewed secondary research sources relating to markets and technology.

- Custom research projects. INPUT has conducted several consulting studies bearing on EDI. While no proprietary information is revealed, the knowledge gained is represented in this report.

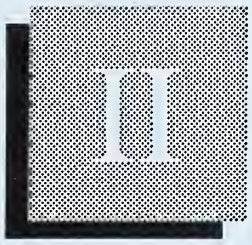
D Related INPUT Reports

This study is one of a series focused on EDI. Other published or planned reports in the series include:

- EDI Software Provider Profiles
- U.S. Electronic Data Interchange Services 1987-1992
- Electronic Data Interchange Service Provider Profiles
- Western European EDI Market Opportunities
- International EDI
- A Guide to EDI Implementation

Other reports that focus on related areas are:

- Software Productivity
- Commercial Systems Integration



Executive Overview

II

Executive Overview

A

EDI Software Is the Core of The System

Electronic Data Interchange is the electronic transfer of business information between organizations in a structured application. It is process-to-process communication in machine-readable formats, overcoming organizational differences in computer, terminals, protocols, and data formats.

EDI is typically used to transfer electronic purchase orders, invoices, bills of lading, and other documents. EDI is also used in association with electronic funds transfers, health care insurance claims, property/casualty insurance, and in other applications.

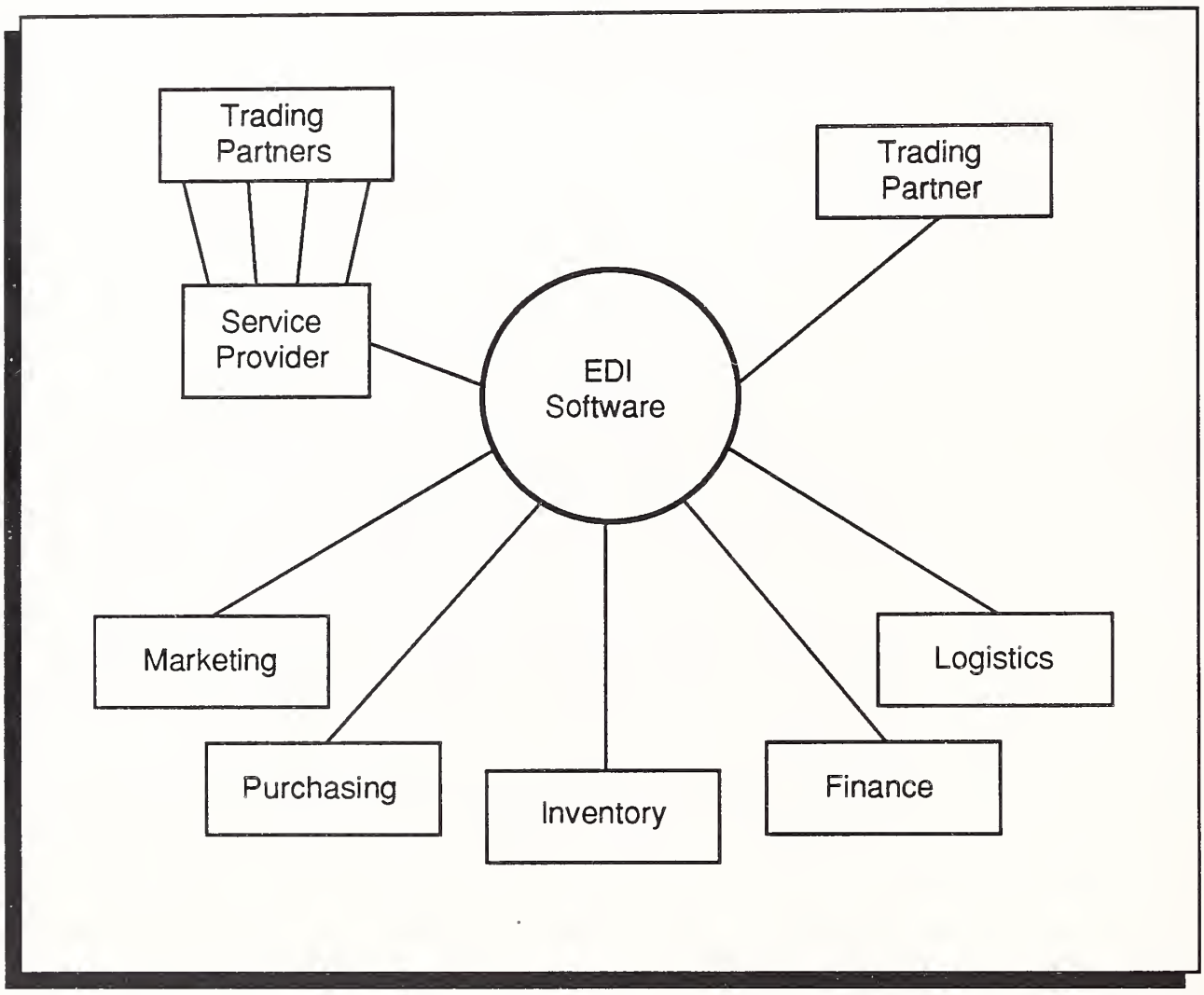
Optimally, EDI software integrates with corporate systems such as marketing, purchasing, inventory, financial management, and logistics.

EDI software converts data between internally used formats and those required by a trading partner, or between internal formats and commonly agreed standards.

Associated with EDI software are document processing and communications functions which facilitate data input/output and which handle network links for EDI data transmission and mailbox access, as provided on either private or third-party networks.

EXHIBIT II-1

EDI SOFTWARE IS THE CORE OF THE SYSTEM



B

The EDI Software Market Is Fragmented

The EDI software market consists of generally small, independent firms; EDI network service providers which either distribute software from others or sell their own packages; applications software vendors who have added EDI functionality to their existing software; and distributors.

Some independent firms were formed from professional service vendors who have focused on specific markets. Now they are seeking to apply their EDI product development to broader markets.

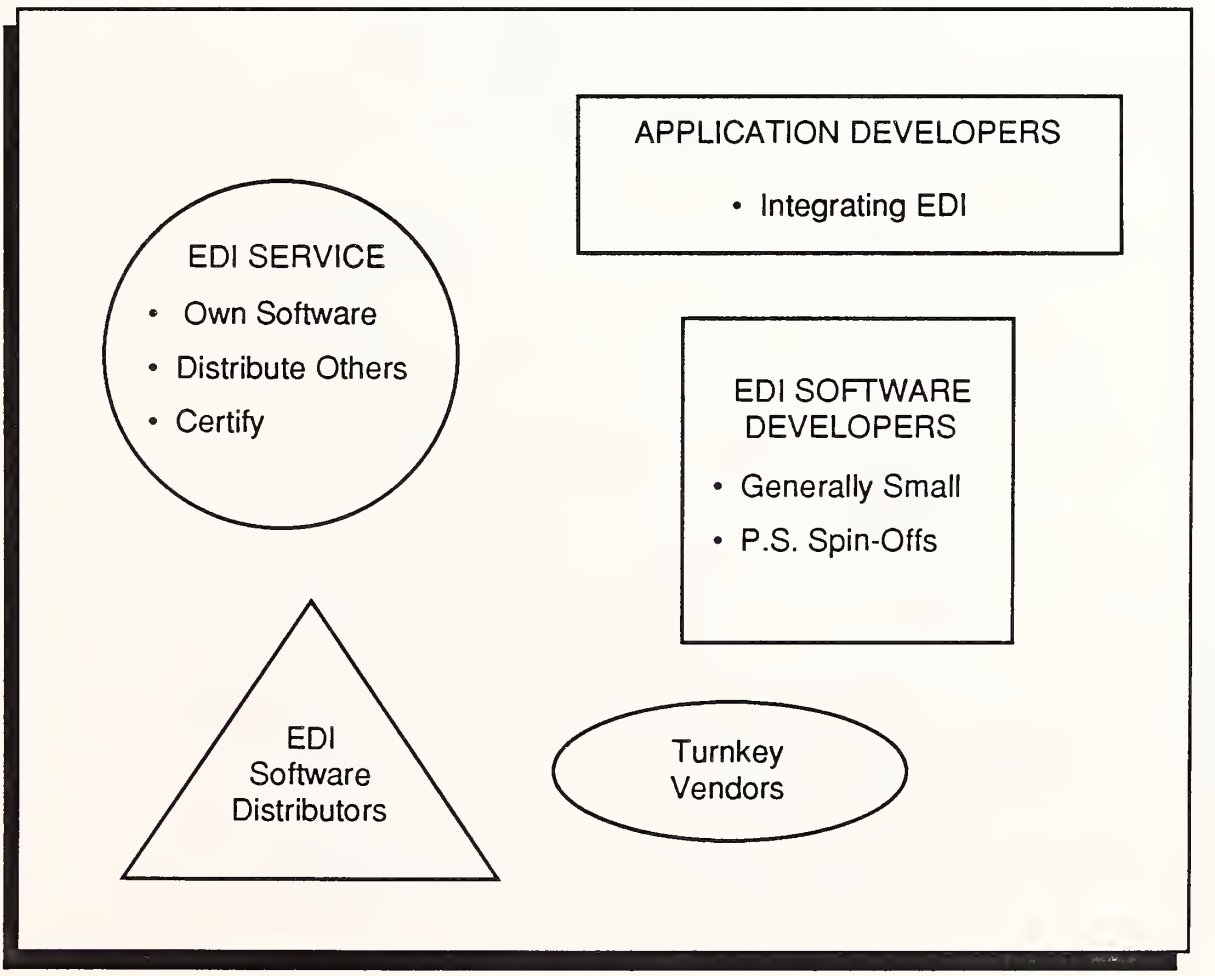
To date, only one major applications vendor (MSA) is offering EDI software, and that package is being licensed from another supplier for integration with MSA's Expert series.

With the exception of IBM, which is distributing software from other vendors in association with its EDI network service, and Control Data, which is offering its own microcomputer software through its EDI service, none of the major computer manufacturers is currently offering EDI software.

One of the third-party service providers (McDonnell Douglas) has abandoned selling software and now certifies other vendors' products for use on the network.

EXHIBIT II-2

THE EDI SOFTWARE MARKET IS FRAGMENTED



Only a few specialized turnkey systems vendors have EDI software offerings.

This fragmentation and the early state of the market mean there are no clear market leaders. It also means an opportunity for vendors to gain market share.

C

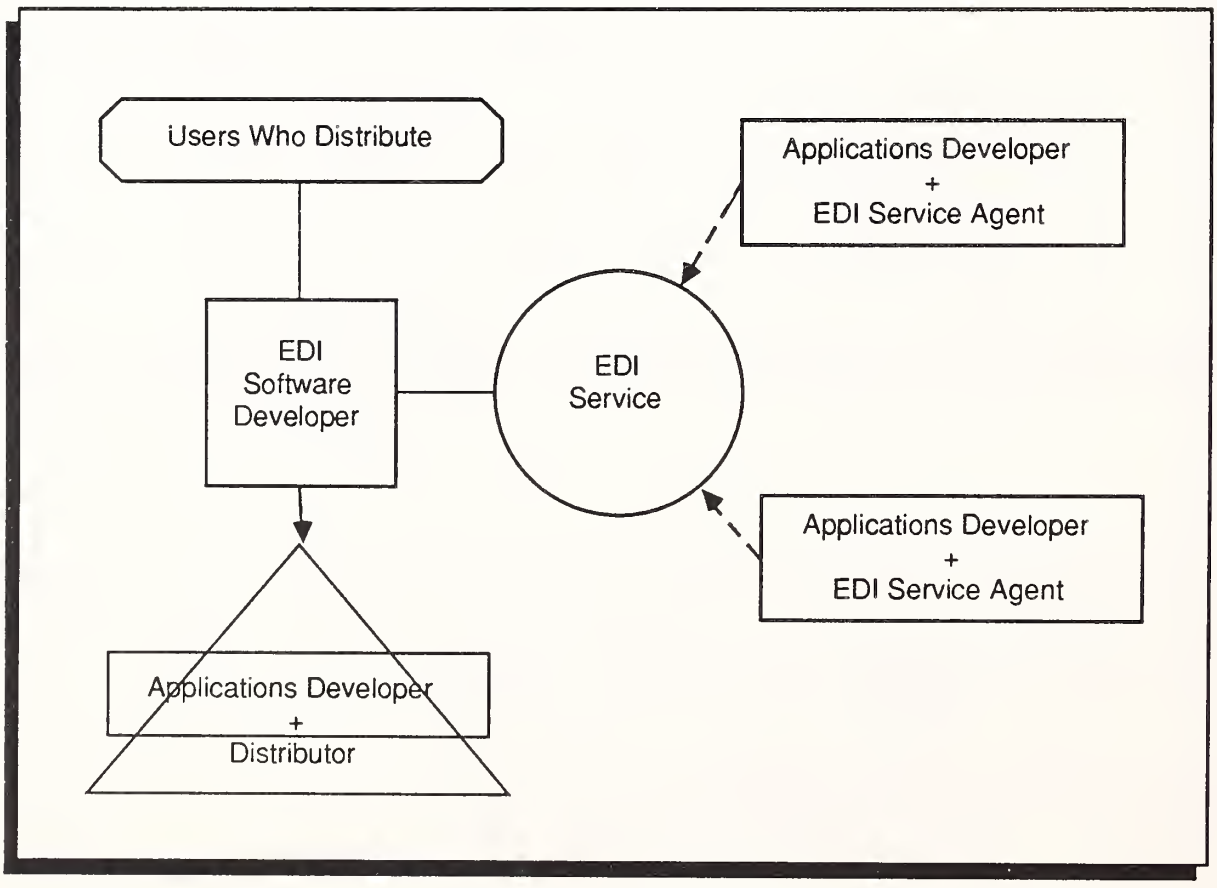
Participants Are Forming Alliances

EDI market participants are forming experimental alliances to share the risks associated with an early market.

- General Electric Information Services has agreements with several software vendors as exclusive EDI service agents in their target markets. Agreements have been signed in the automotive and apparel industries, with the agents sharing network revenues generated by their accounts.

EXHIBIT II-3

PARTICIPANTS ARE FORMING ALLIANCES



- INPUT believes McDonnell Douglas' certification software program has created informal service agent relationships, bringing new customers to the network.

- Although TranSettlements has agreed with Management Sciences of America (MSA) for its mainframe product to be integrated with MSA's Expert series, the company also distributes through other vendors who do not have mainframe software EDI solutions. TranSettlements also provides EDI services.

- Two EDI software vendors hope to recruit their larger users as distributors. Discounts are offered on volume purchases with the user distributing to customers and clients who are encouraged, sometimes with pricing incentives, to migrate from paper to electronic systems.

Future alliances, and possibly mergers, are projected as the missing players seek to add EDI capabilities to existing software and turnkey solutions and as service providers broaden their offerings to encourage network use.

D

EDI Software - An $88 Million Market by 1992

The total 1986 EDI market, including network/processing services, software, and professional services, was $46 million, growing at an average annual growth rate of 88% to become a $1.9 billion market by 1992.

The EDI 1986 software market was $4.6 million, growing at an average annual growth rate of 55% to become an $88.2 million market by 1992.

The forecast covers only software supporting the X12 standard.

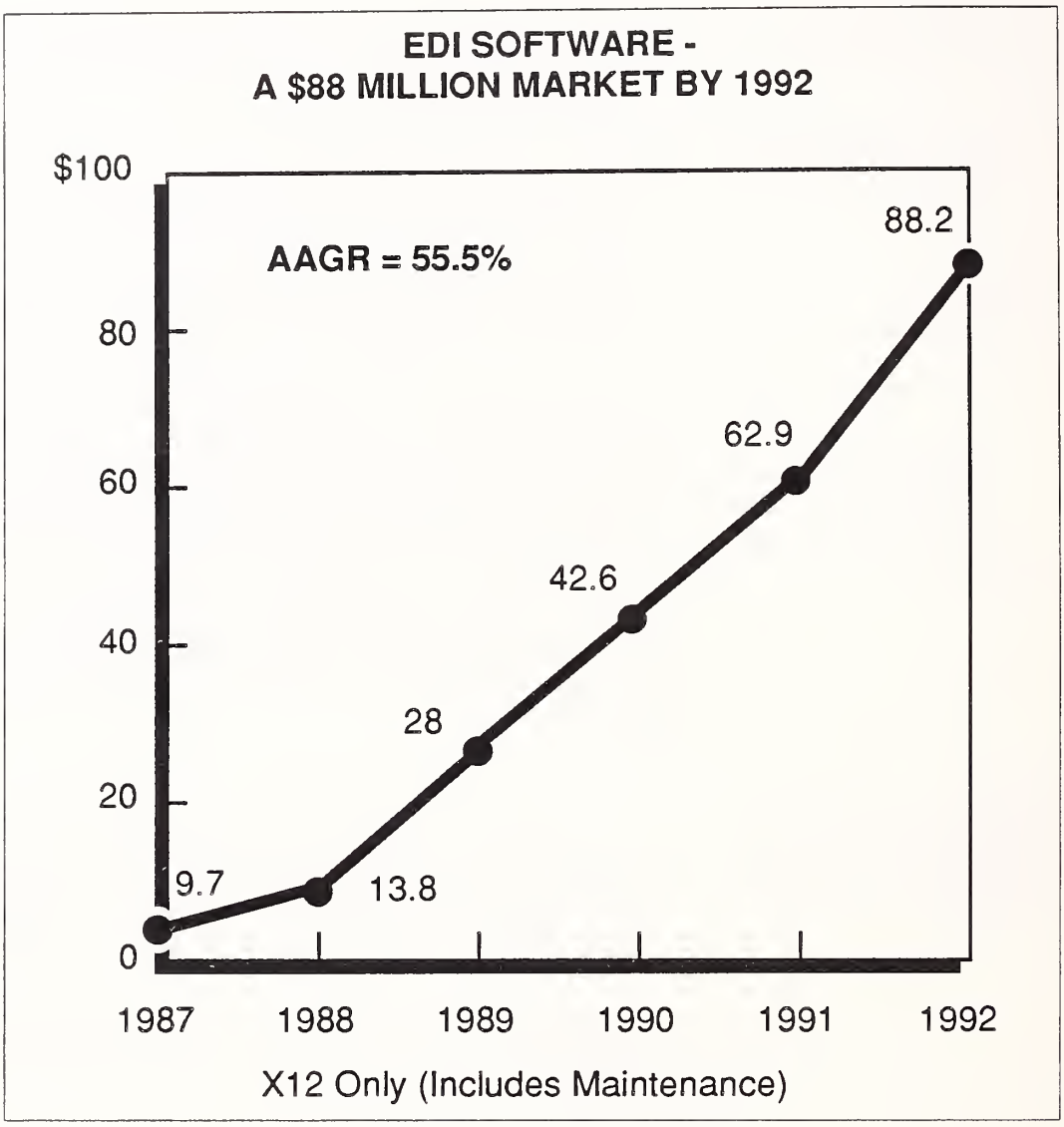
- INPUT believes new EDI users will predominantly use the X12 standard while those requiring and using earlier formats have already purchased software or developed it themselves.

- Replacement software will likely support the X12 format (as well as others), permitting a migration to X12 allowing inter-industry trading.

Software only supporting private standards, industry specific standards, and applications outside of X12 (such as health care, property, casualty and other insurance, and other forms of EDI) will add incrementally to the market.

Included in the software forecast is an annual 10% maintenance charge and communications software when sold with the EDI package.

EXHIBIT II-4



E

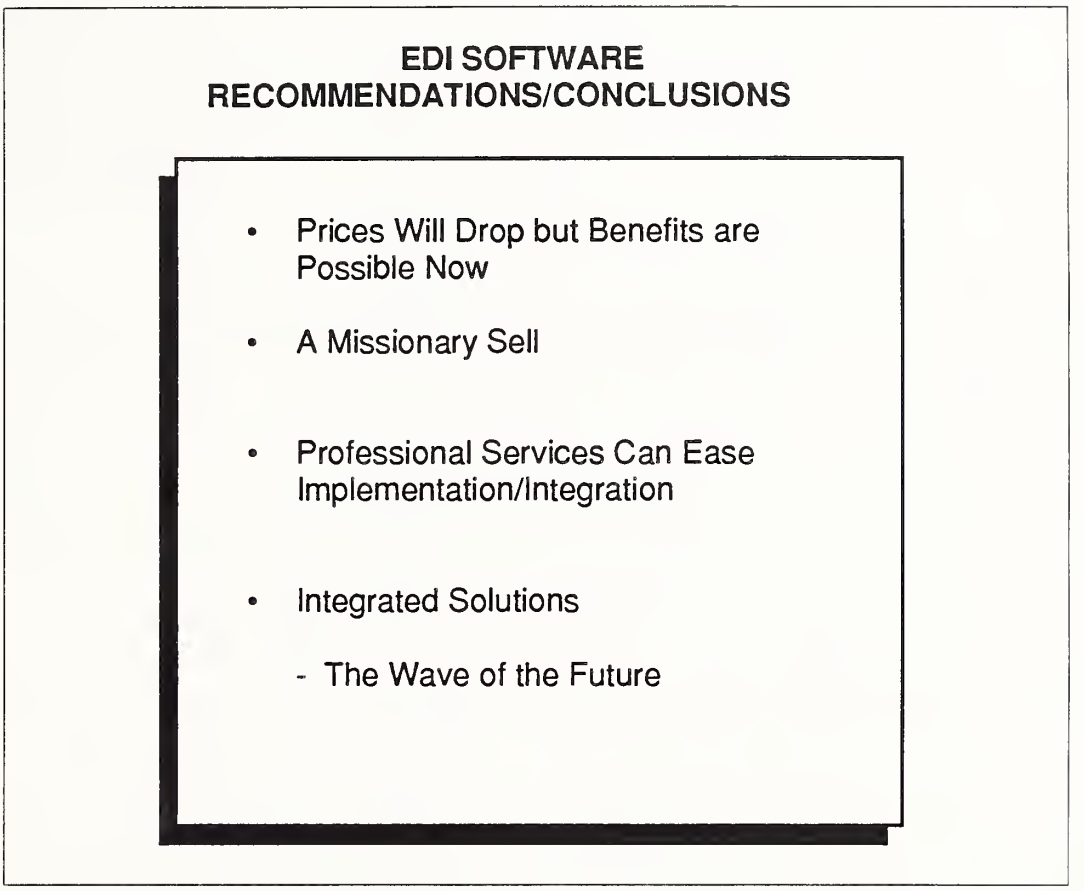
EDI Software Recommendations/ Conclusions

While Information Services (IS) managers are becoming more aware of EDI, they currently rate their knowledge only moderately. Accordingly, both users and vendors need to educate not only IS, but corporate management to the benefits offered by EDI: cost savings, improved customer service, enhanced management control, and others.

INPUT's recommendations and conclusions are summarized in Exhibit II-5.

While users may tend to wait for EDI software prices to come down, INPUT recommends early implementation to realize the benefits possible. Savings gained will likely be greater than the cost differential

EXHIBIT II-5



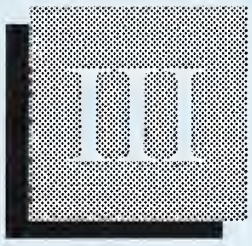
involved in waiting for less expensive products.

Vendors need to recognize that at this early stage of the market, EDI requires a missionary selling approach.

- Users need to be educated to EDI's benefits and provided with assistance in implementation.

- Not only is technical assistance required, but professional services are needed to help integrate EDI with related user applications and to overcome internal politics since, optimally, EDI should be implemented in several functional areas. Accordingly, vendors should develop these skills or build alliances bringing these capabilities to bear on the market.

EDI software vendors should ease the integration of EDI with other applications and plan for integrated products which can be used throughout the corporation. These may encompass electronic funds transfer, electronic forms processing, and others.



EDI Software Overview

EDI Software Overview

This chapter defines and classifies EDI software first by placing EDI within the greater context of other communications and information systems and then by describing EDI software's function within an EDI system. Topics include:

- The relationship of EDI to electronic mail (E-mail).
- The relationship of EDI to corporate data bases and their specific applications.
- Evolution of EDI software.
- Functions of EDI software.
- Standards and EDI software.

A

EDI's Relationships With Other Applications

1. RELATIONSHIP OF EDI TO ELECTRONIC MAIL (E-MAIL)

EDI is a messaging system often confused with electronic mail. In the short term, E-mail represents an entry-level technology from which users can migrate to EDI for certain applications. In the long term, EDI could be replaced by a comprehensive E-mail system.

As commonly defined, E-mail refers to electronic person-to-person communications, usually using freeform text.

- Like routine paper-based mail, E-mail is used for transferring both business documents and personal messages.
- Facsimile and telex technologies are older forms of E-mail. Systems can also be computer-based; they can be anything from micro-based

software packages to programs residing of large mainframes or on public and private networks.

- In recent years, the E-mail concept has expanded beyond text-based systems to include voice store and forward (VSF) systems, also called voice mail.

- The CCITT, an international body that establishes telecommunications standards, is working on an E-mail standard called X.400 that will eventually apply to all forms of messaging: text, graphics, video, and voice.

EDI is computer-to-computer communications, in machine-readable, not human-readable (or hearable), form.

- EDI typically refers to inter-company communications, whereas E-mail can also refer to intra-company messaging systems.

- EDI adheres to a document formatting convention and translates (when required) between one standard and another. While X.400 defines the means of transmitting a message through a network without looking at the message content, the EDI standards deal with message formats, layouts, and representations.

E-mail can be used for low volume EDI-like applications by using form creation options which support "fill-in-the-blanks" usage for order entry, inquiries and other documents. These documents are not generally in machine-readable form, but they provide users with a starting point for future systems as volume grows, and create a migration path opportunity for E-mail service providers.

The E-mail X.400 standards may even ultimately overcome EDI X12 and other EDI document standards. Some industry watchers expect this electronic mail standard to eventually encompass the various document interchange standards, but others do not subscribe to this view.

- Because of its complexity, X.400 is not expected to be fully developed for approximately 10 years.

- Nevertheless, the first stages of X.400 are being accepted and implemented by E-ail software and service vendors.

2. RELATIONSHIP OF EDI TO CORPORATE DATA BASES AND THEIR SPECIFIC APPLICATIONS

A corporation's business creates records stored in a corporate data base or data bases.

- This data base preserves a record of transactions.

- EDI creates corporate data base entries from incoming messages, and items retrieved from the data base are often used to issue outgoing messages.

There are several data bases within a typical corporation that are most likely to interface with EDI. Within these systems, certain applications lend themselves to integration with EDI software. These are:

- Factory management systems.

- Order processing systems.

- Accounts payable and receivables.

3. RELATIONSHIP OF EDI TO JUST-IN-TIME (JIT) INVENTORY MANAGEMENT AND MATERIALS REQUIREMENTS PLANNING (MRP)

JIT is a factory management concept that seeks to keep inventory levels to a minimum.

- In a JIT environment, production is order-driven; only enough finished product is kept on hand to meet the needs of actual orders received.

- The JIT system is linked to the outside world by the order entry system, and an EDI module attached to that system serves to speed the processing of purchase orders received from customers.

On the supplier side of the manufacturing facility, a materials management system assures that only enough parts and materials are purchased to produce the specific number of finished products already ordered.

- MRP is linked to the outside world via the purchasing department, and the EDI purchase order becomes the key document in such a system.

A so-called MRP II (Manufacturing Resource Planning) system is a broader concept that links factory-based management systems to other corporate systems such as shipping, accounting, or financial planning. Wherever these systems interface with other trading partners is an opportunity to introduce an EDI module, be it a shipping notice or an invoice.

4. RELATIONSHIP BETWEEN EDI AND ON-LINE ORDER ENTRY SYSTEMS

An on-line order entry system automates a company's internal sales or order taking functions. Such systems enable telephone sales personnel to query the corporate data base regarding product availability, shipping status, special discounts, and so forth, as well as to key in orders.

Companies are opening existing on-line entry systems to their customers, but unlike EDI, these systems are typically terminal-to-computer applications rather than computer-to computer.

Open order entry systems shift the burden of data entry from supplier to customer, who issues purchase orders directly to the supplier's order entry system via a terminal that is often provided by the supplier.

- Although a personal computer may be used by the customer or supplier to access the trading partner's computer, it is often used in a terminal emulation mode.

- Some suppliers provide software or turnkey systems to facilitate this activity.

INPUT views this type of system as an intermediate step to true EDI transactions, i.e. when a customer can issue purchase orders to a variety of suppliers who use different document formats, all from one computer. Furthermore, the purchase order could be either keyed in by the customer or automatically generated from his own purchasing system.

The relationship of EDI to E-mail and on-line order entry systems is shown in Exhibit III-1.

5. RELATIONSHIP BETWEEN EDI AND ELECTRONIC FUNDS TRANSFER (EFT)

Buying and selling relationships involve inquiring, ordering, bidding, shipping, and similar communications. The buying and selling process is usually culminated with a financial or other form of value exchange, preceded by an invoice and a remittance advice. This information becomes the responsibility of either the accounts payable or accounts receivable systems, depending on whether one is a buyer or seller.

While EDI is the transfer of data representing documents, EFT is the actual transfer of monetary value; it is a payment. Financial institutions have several mechanisms for transferring value.

Today's EDI systems only go as far as receiving a bill or invoice and

EXHIBIT III-1

COMPARING THREE SYSTEMS

	EDI	E-MAIL	ON-LINE ORDER ENTRY
Communications Characteristics	Computer-to-Computer between Applications	Person-to-Person	Terminal-to-Computer
Documents	Purchase Orders, Invoices, Bills of Lading, Shipping Notices, etc.	Textual Messages	Orders and Inquiries
Public Standards	ANSI X12	CCITT X.400	Typically Terminal Emulation and TTY
Providers	Third Parties to Trading Clusters for Intra- and Inter-Industry Use: Corporate IS to Trading Partners (Large Companies)	Third Parties (Inter-Corporate): Corporate IS (Intra-Corporate)	IS and Marketing Departments

issuing authorization for payment. Banks actually transfer the funds among themselves, clearing them first through a clearinghouse which is a member of NACHA (the National Automated Clearinghouse Association).

- One NACHA payment standard is called CTX, and it is closely aligned with ANSI X12. Recently, CTX was standardized so that it might be integrated with the dominant EDI standards and carry information about a payment as well as the value exchange.

- However, there is experimentation with other private standards for payment transfer, most notably by General Motors, which has signed with a group of eight banks who will issue payments directly to GM suppliers, thus bypassing NACHA clearinghouses.

B

Evolution of EDI Software

The original source of EDI software was an industry association, the Transportation Data Coordinating Committee (TDCC), which offers source code to in-house programmers and consultants who develop private EDI networks and to software developers who market EDI software products.

EDI software was first developed by communications software engineers who designed translators to convert data between two or more structured formats. This software is now being refined by applications designers who are integrating it into their systems.

Interest in EDI has increased partially because the amount of software available to handle transactions has increased more that fourfold in the past two years, and has become more sophisticated.

Three main categories of vendors have an interest in developing and distributing EDI software.

- Start-up companies whose main line of business is a generic translator product. This group includes some consulting firms who have spun off a new EDI software business.

- Value-added networks (VANs) and remote computing services (RCS), whose principal goal is to increase revenues from EDI transactions through their networks.

- Established business and manufacturing applications vendors who have added an EDI translation capability to their existing software systems.

While third-party services and application developers tend to design products that integrate easily into their own networks or applications, some are marketing generic translators that compete with products from the first group.

The categories of EDI software providers are shown on Exhibit III-2.

C

EDI Software Functions

EDI software is only one element of an EDI system. Essential to its definition is that it performs a translation function: English, or any other natural language, to machine-readable language and back again, and/or between format standards.

1. TRANSLATOR SOFTWARE IS TABLE-DRIVEN

The software developed by the TDCC, and which has subsequently been licensed to several of the major EDI software developers, is table-driven.

- A table is an organized collection of data items. Each data item in a table is referenced by its position relative to all other items.

EXHIBIT III-2

SOFTWARE VENDOR CATEGORIES

CATEGORY	COMMENTS
Start-Ups	Entrepreneural, Some Spin-Offs of Consulting Firms
VAN/RCS	Goal Is to Increase Network Traffic
Established Application Vendors	Adding EDI Functions to Existing Software

- A table may be a simple list of items. A table with both rows and columns is a two-dimensional table (often called a "flat file"). In actual practice, a table may have many more "dimensions," determined by what the specific programming language permits.

- However, a general rule for a table is that each data item must have identical "characteristics" with every other item. For example, if the table contains numeric data, each data item must be limited to a maximum number of digits and have the radix point (separating integral and fractional part of number) in the same relative position.

Tables are frequently used in programs as a convenient way of storing and accessing data. An internal table is stored ("hard-coded") within a program, while an external table is stored outside the program.

The use of tables, sometimes called arrays, is known as parametric programming because the data items within these files and tables act as arguments (parameters), and are accessed by the program when needed.

- A primary advantage in parametric programming is the relative ease with which the program can be maintained.

- It is not necessary to revise a program when the values of these "parameters" change. It is usually much simpler just to change values in the file or table.

2. THE TABLES DEFINE TRANSACTION SETS (DOCUMENTS)

Transaction sets define data formats representing electronic equivalents of business documents.

These transaction sets originated in industry-specific fixed formats, such as those developed for the automobile industry.

In the mid-1970s, standards committees began to form more flexible standards, allowing users to use not only a grocery purchase order (for example), but also a standard generic purchase order or, if desired, a customized purchase order that could be easily translated and transmitted to a user of any other format.

The most important EDI standards organization is the American National Standards Institute (ANSI) X12 Committee. This body defines the "generic" and dominant EDI standards which have evolved into the acceptance and approval of 150 transaction sets; it is expected that 250 transaction sets will be approved by 1988.

Exhibit III-3 lists several commonly used EDI transaction sets.

Exhibits III-4 and III-5 show how EDI data represents a paper document.

X12 transaction sets can have variable length fields.

- One vendor who offers both fixed and variable length formats states that variable communications are 40 to 70 percent more efficient than fixed, resulting in significantly lower communications costs.

Much of the difficulty in describing the EDI software market derives from this distinction between fixed and flexible format packages.

- In common practice, most people are referring to X12 when they say "EDI software."

- We have included in our analysis some of the older fixed format packages to the extent that they have been used for intercompany exchange of machine-readable business documents.

- Translator product options provide everything from sophisticated generic translation, which can potentially translate between all standards, to simpler turnkey solutions that format only to one industry's specifications.

3. EDI TRANSLATORS USUALLY INCLUDE A DOCUMENT PROCESSOR

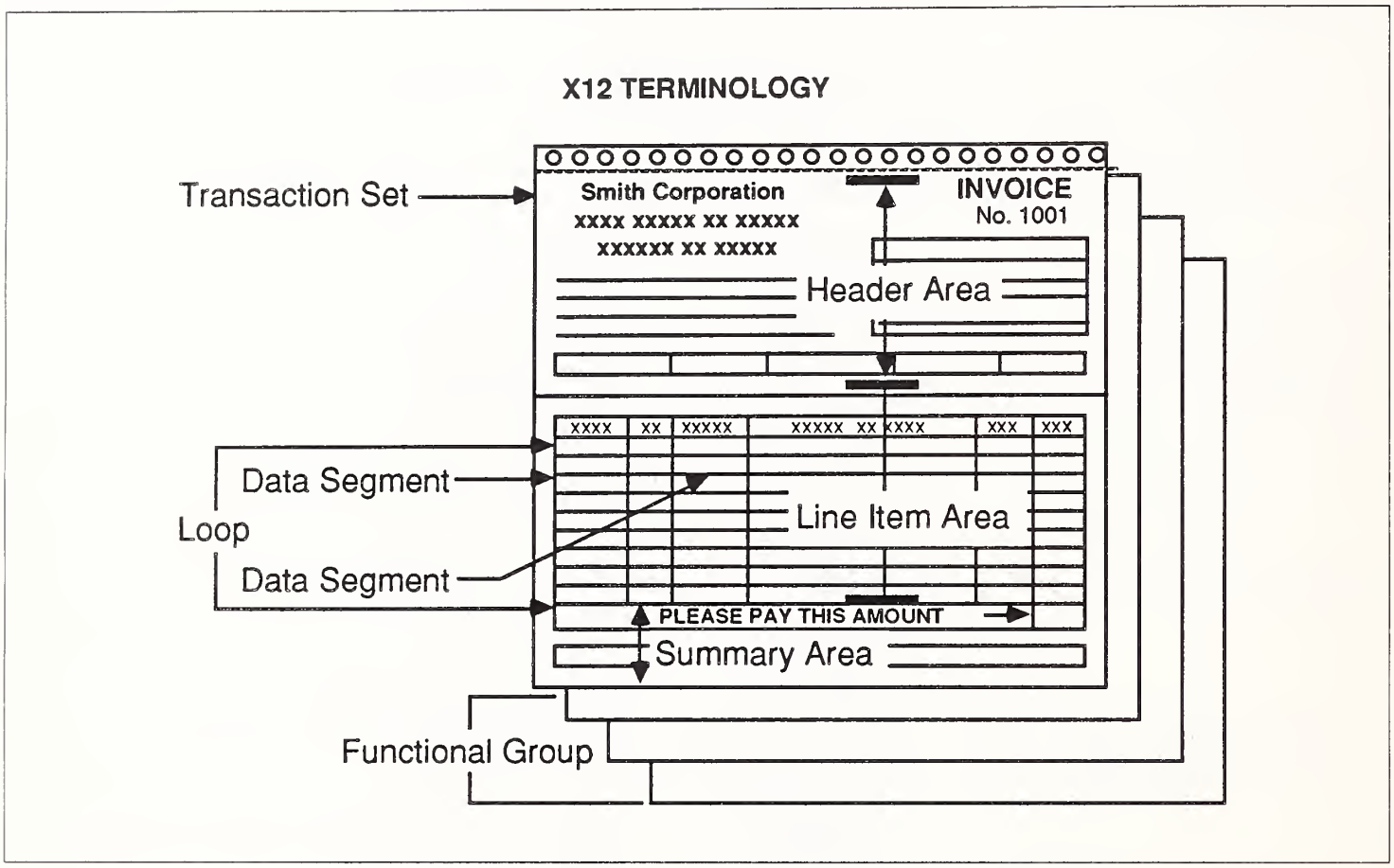
Most translator packages also have an associated document processor, the editor that allows a data entry person to fill in the blanks and to print documents.

EXHIBIT III-3

EDI TRANSACTION SETS

110 TDCC	-	Air Invoice
203 TDCC	-	Bill of Lading
210 TDCC	-	Motor Freight Bill
214 TDCC	-	Shipment Status Message
404 TDCC	-	Shipment Information (Rail)
410 TDCC	-	Rail Freight Bill
810 ANSI	-	Invoice
820 ANSI	-	Payment/Remittance Advice
830 ANSI	-	Material Release
832 ANSI	-	Price/Sales Catalog
840 ANSI	-	Request for Quote
843 ANSI	-	Response for Request for Quote
850 ANSI	-	Purchase Order
855 ANSI	-	Purchase Order Acknowledgement
856 ANSI	-	Advance Skip Notice
860 ANSI	-	Purchase Order Change Request
861 ANSI	-	Receiving Advice
862 ANSI	-	Shipping Schedule
865 ANSI	-	Purchase Order Change Acknowledgement
870 ANSI	-	Order Status Report
875 UCS	-	Purchase Order
876 UCS	-	Purchase Order Change
877 UCS	-	Purchase Order Adjustment
880 UCS	-	Invoice
882 UCS	-	Statement
884 UCS	-	Shipment Advice
888 UCS	-	Item Maintenance
889 UCS	-	Promotion Announcement
890 UCS	-	Prepayment Adjust Adv
891 UCS	-	Promotion Announ Chg
905 UCS	-	Remittance Advice
940 WINS	-	Warehouse Shipping Order
941 WINS	-	Warehouse Inventory Stats
942 WINS	-	Warehouse Activity Report
943 WINS	-	STK Transfer Shipment Adv
944 WINS	-	STK Transfer Receipt Adv
945 WINS	-	Warehouse Shipping Advice
980 TDCC	-	Functional Group Totals
994 UCS	-	Administrative Message
997 ANSI	-	Functional Acknowledgement
999 TDCC	-	Acceptance/Rejection Advice

EXHIBIT III-4



- Some software supports a limited number of documents types. For example, it may only support a specific industry purchase order and invoice.

- Others support generic purchase orders, invoices, and other documents but cannot be modified for specific users.

- Yet others will provide the option of creating customized documents, using the standardized translation tables.

Most vendors sell a limited set of documents for a base price, but offer a wider range for an additional fee.

4. EDI SOFTWARE MAY BE INTEGRATED WITH COMMUNICATIONS FEATURES

While INPUT is defining EDI software as essentially a translator, some products do include communications modules.

- Software for a dial-up communications interface is integrated into most packages and is included in the base price.

EXHIBIT III-5

EDI FORMAT VERSUS PAPER FORMAT (INVOICE)

ST*810*0001 N/L	TRANSACTION SET HEADER				
BIG*810713*1001*810625*P989320 N/L	Date 7/13/81 Order Date 6/25/81			Invoice No. - 1001 Cust. Order No. - P989320	
LS*100 N/L	LOOP HEADER				
N1*BT*ACME DISTRIBUTING COMPANY N/L N3* P.O. BOX 33327 N/L N4* ANYTOWN*NJ*44509 N/L	CHARGE TO ACME Distributing Company P.O. Box 33327 Anytown, NJ 44509				
N1*ST*THE CORNER STORE N/L N3* ^)! FIRST STREET N/L N4*CROSSROADS*MI*48106 N/L	SHIP TO The Corner Store 601 First Street Crossroads, MI 48106				
N1*SE*SMITH*CORPORATION N/L N3*900 EASY STREET N/L 48BIG CITY*NJ*15455 N/L	REMIT TO Smith Corporation 900 Easy Street Big City, NJ 15455				
LE*100 N/L	LOOP TRAILER				
IT9*01*03*2**10 N/L	TERMS OF SALE. . . 2% 10 days				
PER*DU*C.D. JONES*TE618/555-8230 N/L	CORRESPONDENCE TO C.D. Jones 618/555-8230				
LS*200 N/L	LOOP HEADER				
	QUANTITY	UNIT	NO.	DESCRIPTION	PRICE
IT1*3*CA*127500*VC*6900 N/L	3	Cse	6900	Cellulose Sponges	12.75
IT1*12*EA*4750*VC*P450 N/L	12	Ea	P450	Plastic Pails	4.75
IT1*4*EA*9400*VC*1640Y N/L	4	Ea	1640Y	Yellow Dish Drainer	.94
IT1*1*DZ*34000*VC*1507 N/L	1	Dz	1507	6" Plastic Flower Pots	3.40
LE*200 N/L	LOOP TRAILER				
CAD*N****CONSOLIDATED N/L	Via Consolidated Truck				
TDS*5111 N/L	INVOICE TOTAL PLEASE PAY THIS AMOUNT $51.11				
SE*24 N/L	TRANSACTION SET TRAILER				

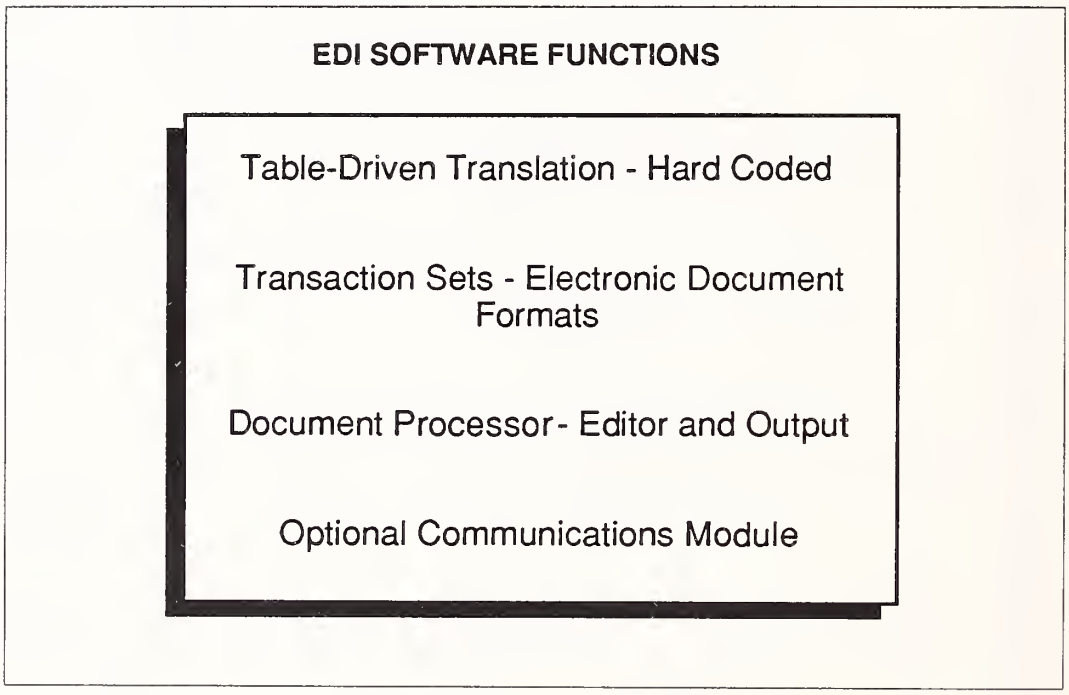
- Some network service providers have enhanced their software with a transparent interface which links automatically into their network.

- Many vendors also offer bisynchronous 2780/3780 terminal emulation boards and software for users needing to communicate higher volumes of data. This option usually adds about $1500 to the base price.

The ANSI X12 standards committee has a communications subcommittee, but it is making less progress than those defining transaction sets. As a result, the communications software offered with EDI software is not specifically defined by EDI standards, but rather conforms to general communications standards.

These EDI software functions are shown in Exhibit III-6.

EXHIBIT III-6



5. NOT ALL COMMUNICATIONS SOFTWARE IS AN EDI TRANSLATOR

Some developers of communications software products are calling their data management products EDI software. The store-and-forward capability of some packages could be used to implement a private mailboxing system that bypasses third-party service providers. These products, if they have no translation capability, fall outside INPUT's definition of EDI software.

6. NOT ALL TRANSLATORS ARE USED FOR EDI TRANSACTIONS

A spokesman for a mainframe translator admitted that no more than 25 percent of their installed systems were actually being used for intercompany communications. Rather, they were simply being used to translate from one computer to another within the same company.

D

Standards and EDI Software

One of the problems facing those involved with establishing standards is that often, multiple parties have needs which must be accommodated, with decisions being made in a committee environment. This leads to lowest common denominator standards and duplicate transaction sets covering the same type of electronic documents, but with different formats.

1. ANSI X12 AND THE INDUSTRY-SPECIFIC STANDARDS

X12 has been adapted by several industry groups, such as the automotive (AIAG), chemical (CIDX), electronics (EDX), office products (ICOPS), and transportation/distribution industries (TDCC). The TDCC family of standards includes grocery (UCS), warehousing (WINS), and standards known as Ocean, Air, Rail, and Motor.

- Each industry often has unique nuances which must be considered. Accordingly, there are subtle variations in the basic standard.
- These variations take into account various measurements, and special billing requirements and/or shipping instructions.
- Certain industries, such as drug wholesaling, maintain industry-specific standards. Health care insurance claims submissions use standards established by an agency of the U.S. government. In general, insurance documents contain more textual information than the average purchase order or invoice.
- Furthermore, so-called "private" EDI standards have been established by dominant companies in several industries which may, but more often do not, have elements in common with the other standards. These formats carry the names of the company authoring them, GM, Ford, Chrysler, K-Mart, among others.

2. INTERNATIONAL STANDARDS

International standards have been called GTDI and, newly, EDIFACT.

- General Trade Document Interchange (GTDI) evolved from the United Kingdom trade facilitation agency called SITPRO (Simplification of International Trade Procedures), which lobbied for United Nations acceptance of the earlier Trade Document Interchange (TDI) standard.
- All facilitation bodies agreed on the compromise GTDI standard for international trade.
- Work is progressing toward combining GTDI and ANSI X12 standards for use in international business transactions.
- Of those software vendors interviewed, only GEISCO currently supports GTDI.

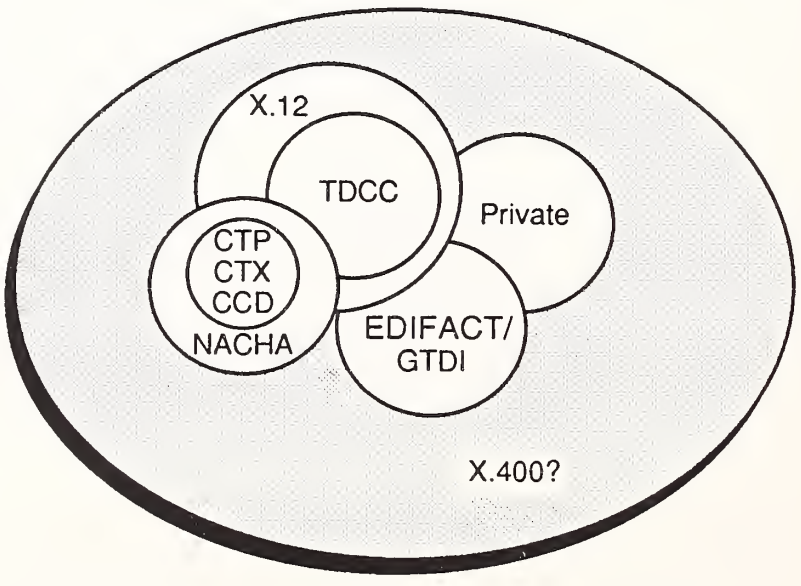
Coordinating various industry and international groups and publishing a common data dictionary is the Joint Electronic Data Interchange Committee, known as JEDI.

- JEDI hopes to avoid duplication and redundancy.
- The JEDI standard is officially known as EDIFACT (EDI for Administration, Commerce, and Trade).

Exhibit III-7 shows these standards and their relationships, with the overlapping intersections implying a degree of compatibility.

EXHIBIT III-7

EDI STANDARDS RELATIONSHIPS



- The standards in the NACHA grouping refer to National Automated Clearinghouse Association standards for Electronic Funds Transfer (EFT).

  - Cash Concentration and Dispersment (CCD), and Corporate Trade Payment (CTP) are used to exchange value (rather than information) in a transaction between trading partners through the banking system.

  - The CTX format is closest to X12 as it can carry information about a payment as well as the payment itself.

Each of these standards generally has at least some elements in common with the others, and many are migrating towards compatibility with X12.

The overshadowing X.400 standard shown in the Exhibit represents an evolving E-mail standard which may eventually "envelope" all currently used EDI standards.

Exhibit III-8 provides the names and addresses of agencies involved in setting EDI standards.

The next chapter examines EDI software issues and reports the findings of INPUT's user survey.

EXHIBIT III-8

AGENCIES AND ASSOCIATIONS INVOLVED IN EDI STANDARDS

American National Standards Inst.
1430 Broadway
New York, NY 10018
(212) 354-3300

American Trucking Association
2200 Mill Road
Alexandria, VA 22314
(703) 352-2710

Data Interchange Standards Association
1800 Diagonal Road
Alexandria, VA 22314
(703) 548-7005

Electronic Data Interchange Association
1101 17th Street, NW
Washington, DC 20036-4775
(202) 293-5514

EDI Council of Canada
5401 Eglinton Avenue W.
Suite 103
Etabicoke, Ontario MAC 5K6
(416) 621-7160

National Association of Refrigerated Warehouses
7315 Wisconsin Avenue
Bethesda, MD 20814

National Office Products Association
3166 Des Plaines Ave., Suite 223
Des Plaines, IL 60018
(312) 297-6882

Steel Service Center Institute
1600 Terminal Tower
Cleveland, OH 44113
(216) 694-3630

American Paper Institute
260 Madison Avenue
New York, NY 10016
(212) 340-0600

Automotive Industry Action Group
North Park Plaza, Suite 830
17117 West Nine Mile Road
South, MI 48075
(313) 569-6262

Graphics Communications and Computers Associations
1730 North Lynn Street, Suite 604
Arlington, VA 22209
(703) 841-8160

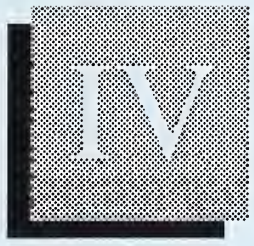
National Commission on International Trade Documentation
30 E. 42nd Street, Suite 1406
New York, NY 10017

National Wholesale Druggists' Association
P.O. Box 238
Alexandria, VA 22313
(703) 684-6400

Paper Trade Associations
420 Lexington Avenue
New York, NY 10017
(212) 682-2570

Technical Association of the Pulp and Paper Industry
One Durwoody Park
Atlanta, GA 30338
(404) 446-1400

Uniform Code Council
7051 Corporate Way, Suite 201
Dayton, OH 45459
(513) 435-3870



EDI Software Issues

IV

EDI Software Issues

This chapter addresses some issues related to EDI software for both users and vendors to consider.

A

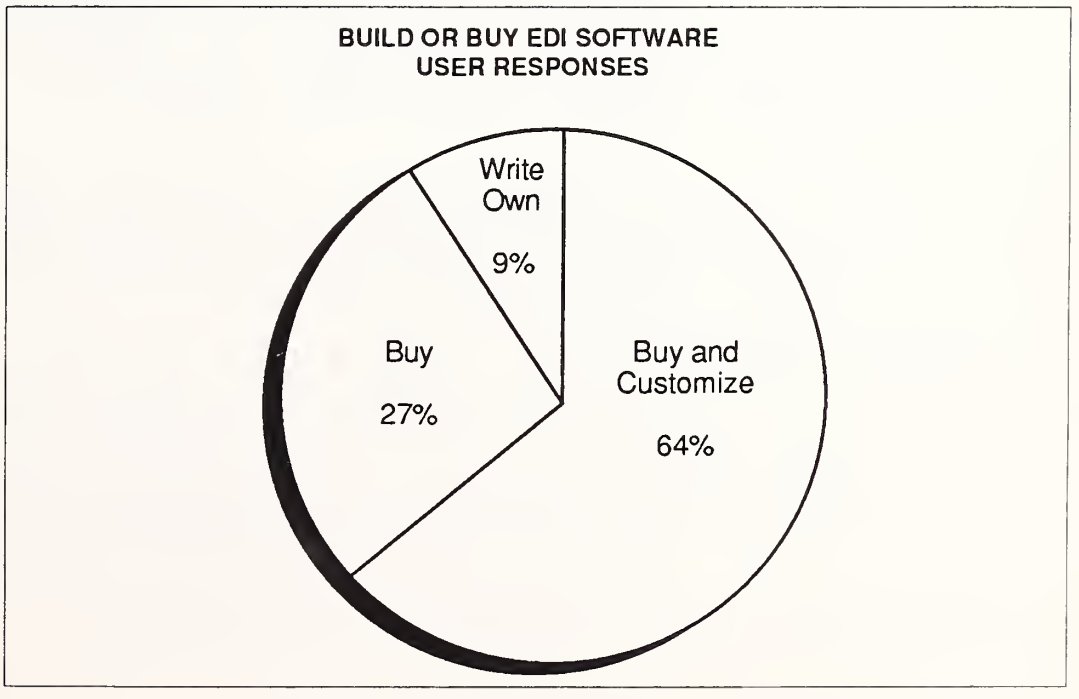
The Elements Involved in a Buy or Build Decision

The first decision a user needs to make is whether to get involved in EDI. This report assumes an affirmative answer, with the next decision being whether to buy or design the translation software.

1. SURVEY RESULTS - BUY OR BUILD

INPUT asked current and potential users if they would buy or customize their EDI software. As Exhibit IV-1 shows, nearly two-thirds said they expected to buy a package and then customize it, often because of unique needs.

EXHIBIT IV-1



Other reasons given for taking this approach were:

- "It takes less work and is the fastest way to get up and running."
- "We don't really have the manpower to write it ourselves."

2. CONVERSION AND DEVELOPMENT COSTS

EDI users indicate the time needed to implement an EDI solution ranged from two months to one man-year, depending on the scope of the implementation.

- Integration of EDI into mainframe production environments has been the most costly element, based on internal allocation of resources.
- Companies installing translation software usually require customization to convert or map their currently used data formats to EDI formats.
- Links to other applications need to be written. This process is being eased through commercial systems integration contractors and by introduction of EDI modules for mainframe business applications.

Users initiating a micro-based EDI project will incur costs equivalent to the price of a microcomputer and its associated software. Mainframe implementation costs have been reported of $20,000-$70,000.

A vendor of generic microcomputer-based EDI software claims that its product can cost 60 to 80 percent less than user-developed mainframe EDI software.

Large prospective users indicated they would be willing to invest up to $500,000 to implement EDI. Such installations would typically involve large system processors and software, with heavy transaction load expectations.

A company may not have the resources to handle an EDI project due to an applications backlog. Several companies interviewed would employ consultants or professional services firms to handle customization and assist in implementation.

3. SURVEY FINDINGS - IMPLEMENTATION ASSISTANCE

Users and prospective users interviewed by INPUT hold overwhelmingly that the IS department is responsible for the overall implementation of EDI. Since EDI is an application of computing and communications, this is to be expected.

However, IS will not necessarily go it alone.

- On average users planning or in the early stages of implementation rated the likelihood they would use a third party to assist them as 2.9, with 5 being very likely.
  - Professional service firms and industry associations were the most cited sources of this assistance.
  - These users were less likely to totally implement the system themselves, rating this option at 2.1.
- However, 43 percent of the actual users and advanced implementors of EDI reported using a third party for help, with VANs and RCS firms the most often cited source of this assistance. The balance said they implemented EDI totally themselves.

These findings are shown in Exhibit IV-2.

EXHIBIT IV-2

EDI IMPLEMENTATION ASSISTANCE

RESPONDENT	USE THIRD PARTY?	LIKELY SOURCE	IMPLEMENT ALONE
Planning or Early Implementation Stage	2.9*	Professional Services, Industry Associations	2.1*
Current Users/ Advanced Implementation Stage	43%	VAN or RCS	57%

*5 = Highly Likely

Several third-party service vendors also provide professional services in training and education, software customization, and project management to assist users developing EDI systems. As it is in their interests to encourage usage, these services have often been provided at no charge.

Since optimization of EDI cuts across multiple departmental lines, optimization may be seen as a risky project. Some firms seek commercial systems integration (CSI) skills to build the system and reduce risks.

- CSI service providers take total responsibility for developing the system, from project design, through management and implementation,

bringing together the necessary computing, telecommunications, and software.

- Some CSI vendors go beyond these activities to actually manage users' facilities.

Commercial Systems Integration is the subject of a 1987 Market Analysis and Planning Service (MAPS) INPUT report.

4. THE COMMUNICATIONS ENVIRONMENT

Users have a choice of establishing private point-to-point communications with each partner or communicating through a third-party service, such as VAN or an RCS.

Developers of in-house systems may buy communications software products that collect and distribute data to use in establishing store and forward capabilities.

- As noted earlier, INPUT does not classify this kind of software as EDI software. It does, however, enter into overall cost considerations, and at least one vendor of translation software has bundled this mailboxing feature into its EDI translator package.

- An in-house developer, or his consultant, may recommend that only the EDI standards translation software be purchased as part of private network development. In this case, customization by the software vendor, a professional service vendor, consultants, or the user's own development staff is usually required.

The user who decides on a third-party service solution must also decide which of the individual service options to purchase: the communications transport service only, a store-and-forward messaging capability, or an on-network standards translation service.

- Conversion of private formats to industry standards in-house is often less expensive and is the dominant trend. The third-party service can still be used for store-and-forward capabilities or for occasional translations for specific trading partners.

- Each user needs individually to consider the costs of a translator (specifically for mainframes) in relationship to network translation costs and calculate the potential pay-back period.

Most mini and micro-based EDI translation software packages include software for establishing point-to-point connections through the public telephone network. This approach works well for limited numbers of trading partners with low volumes of communications, but becomes cumbersome as the network of trading partners increases.

Mainframe translator software, such as that of market leader TranSettlements (Atlanta, GA), is independent of communications protocols and procedures. A system table provides information essential for creating an appropriate transmission envelope for communication directly to a trading partner or to a third-party service for ultimate distribution.

5. THE COMPUTING ENVIRONMENT

Some might assume that mainframe shops will want to write their own software, as opposed to small users who would buy micro packages.

- Several third-party vendors have observed, however, that it is not such an easy task for in-house programmers to link their mainframe applications to EDI directly.

- Instead, they are chosing to put a translator on a PC and download flat files from the mainframe as an intermediary step to accelerate the process of being able to use EDI.

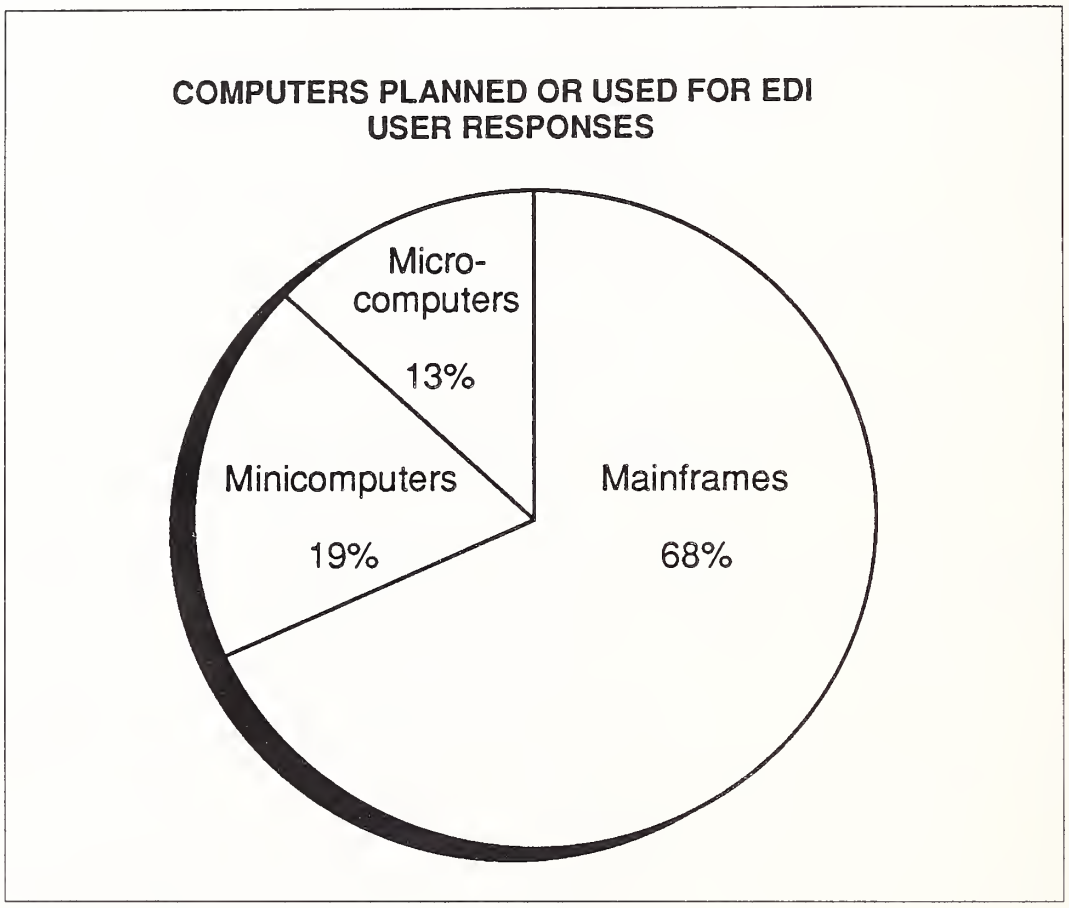
Still, one vendor of software for minicomputers argues, that many PC product vendors tell prospects to use an PC, even thought they already have a mainframe or a minicomputer, for the function of integrating EDI with applications such as inventory control.

- The problem is that the user of, for example, an IBM S/36 or S/38 already thinks he's got a small computer. Why should he have to get another for EDI?

INPUT believes each solution has its place. For security reasons, many interviewed users wish to isolate their mainframe from access by outsiders. Further, PCs or minis off-load EDI processing from mainframes while providing EDI functionality to the company.

As Exhibit IV-3 shows, the majority of users surveyed by INPUT said they were using or planned to use mainframes for EDI; one-fifth said they use, or would use, minicomputers; and even fewer said they use or would use micros.

EXHIBIT IV-3



INPUT believes that many micros will be used as front-ends to mainframes and as standalone, systems despite survey findings to the contrary.

- Functional departments, such as purchasing, will likely implement PC-based EDI which will interface to mainframe applications, and will do so with only consultative assistance by IS departments.
- PC-based EDI is the easiest route for many users, especially those being urged to trade electronically by their customers or essential suppliers.
- Smaller companies will likely use PCs for EDI since they do not require mainframe or minicomputers for their processing needs.

- Further, PCs have become more powerful.

These points are summarized in Exhibit IV-4.

EXHIBIT IV-4

MORE MICROS WILL BE USED FOR EDI THAN SUGGESTED

- Functional Departments Will Interface PCs to Mainframes
- PC Implementation - Easiest, Less Expensive
- Small Companies Do Not Have Larger Processors
- PCs Are Becoming More Powerful

Furthermore, minicomputer-based EDI solutions are more popular with vendors of turnkey application systems who add an EDI module than with developers of generic EDI translator products *per se*. This report does not systematically analyze the turnkey vendor solutions, a task which merits a report of its own.

6. USER INTEGRATION VERSUS PURCHASED INTEGRATED EDI APPLICATIONS

The integration of EDI capability with other applications was rated as very important (4.1 on a scale of 1 to 5) by users surveyed.

As Exhibit IV-5 shows, most felt that integration of EDI software with other applications is, or will be, done in-house; 7 percent said this task would be relegated to a consultant and 14 percent said they would prefer to buy new applications software with built-in EDI functions.

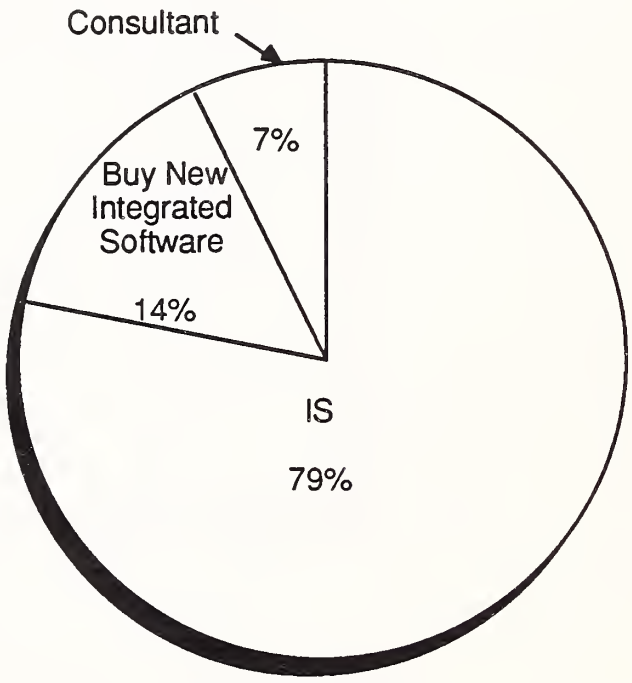
More than actual user preference, these results may indicate that there are relatively few integrated products currently on the market.

- Most translator products have a flat file in a variable format. This means it takes a considerable amount of programming to interface that product into an existing system.

- Many integrated solutions, both mainframe- and minicomputer-based, are being introduced this year. Vendors are betting that users will choose these packages over in-house development.

EXHIBIT IV-5

EDI INTEGRATION METHOD
USER RESPONSES



Comment: Reflects a Lack of Integrated Solutions.

a. Mainframe Applications Integration

TranSettlements' TranSlate is the dominant EDI mainframe translator at this time. The company provides the source code and necessary tables for the user to perform integration with existing applications.

- The interface between the TranSlate software and the user's internal files is accomplished through skeletal programs.
  - Skeletal programs are incomplete.
  - They require additional procedural code written by the user.
- Sending modules select and extract, reformat/analyze, verify and generate appropriate transaction sets, and select the desired communication media.
- Receiving modules gather, edit for acceptance/rejection, and translate formats.

- The vendor claims that normally there is no need to customize modules other than the skeletal programs.

Atlanta-based Management Sciences America (MSA) has integrated its order entry and purchasing applications from its Expert management packages, with TranSettlements' TranSlate, to produce the EDI Expert series. The company is also developing accounts receivable and accounts payable packages integrated with EDI capability.

- Users can purchase one integrated application that eliminates or reduces in-house development costs and/or fees for additional professional services.

- According to the company, MSA's applications are designed and built to provide EDI capability —not modified to add to them.

- The MSA system is also designed to provide application-to-application communications.

The TranSettlements/MSA integration solution in being challenged by York & Associates' subsidiary, EDI Solutions, Inc. (Bloomington, MN).

- In addition to its generic translator currently on the market, York is developing generic interfaces to make it easier for users to place EDI formatted data into their own applications.

- According to York, MSA is tacking TranSlate onto each application. It says that EDI is analogous to a mail system, and that MSA's approach is like creating a separate mail room in each department, with each one distributing to every other. York thinks this will become very inefficient as more applications are added.

IBM is believed to be integrating its manufacturing software, MAPICS, with some EDI capability.

McCormack and Dodge (Needham Heights, MA), Cullinet (Westwood, MA), Global Software (Dallas, TX), and others are monitoring developments in this area.

Data Design Associates (Sunnyvale, CA) markets what it calls an EDI translator and has installed thirty to forty translator packages for use with its own accounting applications. Only five to ten are actually used for intercompany communications, and none uses the X12 standard. Rather, the translator module is most often used to translate from one program to another within the same company.

Other developers of mainframe applications, such as Distribution Science Inc. (Des Plaines, IL), have chosen a different route.

- DSI's freight bill rating and payment authorization system, MATCH PAY, has an EDI module that receives freight bills in TDCC formats. It has no plans to integrate other functions.

- DSI will recommend TranSettlements to any of its users who wish to do any further integration of EDI with existing applications.

b. Integration of Mini- and Micro-based Applications

The list grows daily of applications developers serving a wide variety of industries who are either adding EDI software modules to existing product lines or integrating some EDI functionality into turnkey systems.

- Many of these systems are minicomputer-based and will increasingly include UNIX-based workstations.

- For this report, INPUT sampled the offerings of representative market leaders but has not sought to perform an exhaustive analysis of this group.

- Companies interviewed all have their origins in manufacturing applications: automotive industry, general MRP systems, apparel manufacturing and, distribution.

American Business Computer (Farmington Hills, MI) offers a generic micro-based translation product, EDE, that also comes in multiuser UNIX systems.

- EDE will work with all of ABC's other micro and multi-user based applications software using fixed format screens.

- With the introduction of its mainframe translator, XL12, ABC is encouraging its users to migrate upward to a system that will allow them to define document formats and thus integrate with their own mainframe applications.

Supply Tech (Southfield, MI) markets itself as a provider of MRP software, but in fact, its flagship product and its leading revenue generator, is ST1, a fixed-format EDI product designed for materials releases and advance shipment notices in the auto industry.

- Supply Tech introduced an ANSI X12 product in Spring 1987 that will be integrated into MRP products still under development.

- This direction in product development goes counter to most turnkey and systems providers who are established in given applications and then add EDI capability to them.

ACS Network Systems (New York, NY and Concord, CA) develops minicomputer solutions for the apparel industry. It claims to have an integration approach that is different from other vendors. The company is now marketing to other industries.

- Instead of having flat files with variable length formats embedded in its EDI/36 and EDI/38 translators, ACS allows the user to define the flat file format that comes out of the translation so that it will integrate with the user's existing applications.

- The company claims this approach makes it very easy for the user, with a minimum of programming, to interface the EDI translator with his order file, accounts receivable, and other related applications.

7. TIME AND MANPOWER CONSIDERATIONS

How a user judges his own in-house manpower capabilities is a highly subjective matter. A typical user response as to why he would write his own is that "it is not conceptually difficult". However, as software vendors are fond of pointing out, one needs more than a copy of the ANSI standards to write code.

If a company builds its own EDI translator, it needs to divert programming resources and develop an in-house EDI expert.

Mainframe users are often constrained by their budgets which will not provide for programmers to rewrite software. By buying a software package, users can concentrate resources in business areas, rather than software development.

On the other hand, a company might choose to hire a consultant to develop in-house software. However, not all software consultants are adequately familiar with ANSI X12 standards.

- Cites one EDI software vendor, "Consultants say, 'Sure, we can write it in four weeks.' Then the managers start getting into it with them and find it's not four weeks, it's four months down the road, and they still don't have a product."

- Consultants write software for one company. This is fine if the client is going to exchange data with only one other company. When it starts communicating with hundreds of companies, the consultant and client may find the effort inadequate.

- The other issue is that a consultant is often hired to write something that will handle one document; when the company decides to add a second document, it has to call back the contractor to do more custom coding.

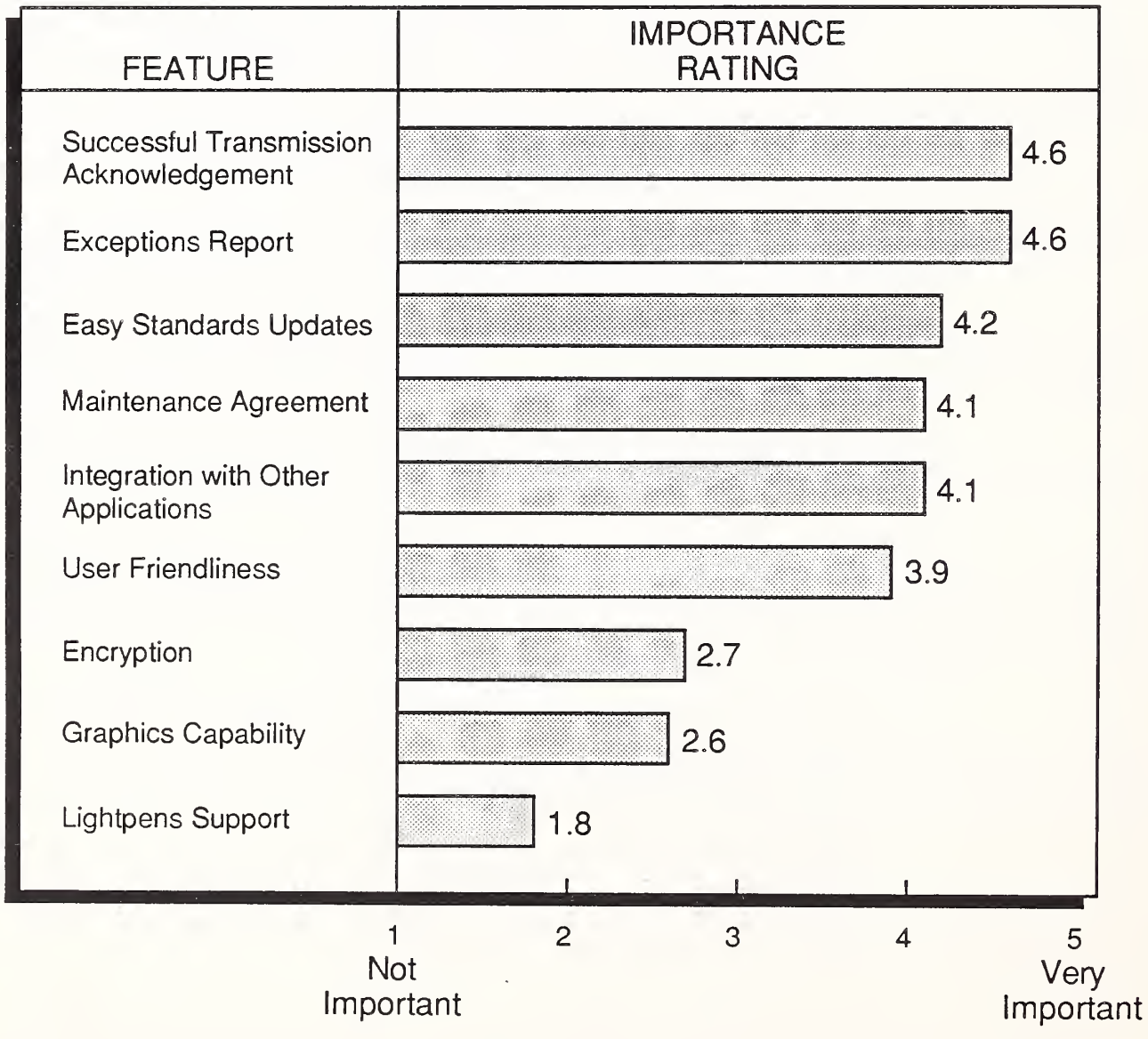
B

EDI Translation Software Features

INPUT interviewed current and potential users from a cross-section of industries about the relative importance they placed on a variety of features. Exhibit IV-6 illustrates their average responses. These and other features are discussed where relevant.

EXHIBIT IV-6

SOFTWARE FEATURES IMPORTANCE



In addition to the communications and applications integration features already discussed, there are several other factors that distinguish one EDI software product from another.

Users were asked about the user interface.

- Although ease of use was rated at higher than average importance, light-pens were not seen as the way to achieve this. Graphics are being used in some industries in association with EDI, but in general, users do not see this feature as important.

- A feature that distinguishes one EDI software package from another is whether its document screens are standardized and the user just fills in the blanks, or whether the screens are user definable. One vendor

EXHIBIT IV-7

FULL-FEATURED GENERIC EDI SOFTWARE

VENDOR	PRODUCT	COMPUTER PLATFORM	PRICE	COMMUNICATIONS	DOCUMENT PROCESSING
APL	A.C.D.I.	Micro	$1650-$5800	Asynch Hook, or Bisynch Board Extra	Integrated Report Generators
DNS	EDI Edge	Micro	$3000	Dial-up/Hook to Packet Net Included	User-Created Documents Multiple Trans-actions on Same Form
EDI, Inc.	Telink	Micro	$7500	1 Direct Dial Connection	Any Two Transaction Sets
Metro Mark	Translator* 34/36/38	Mini	$5000-$6,000	Bisych S/W Included; Board Extra	Any Two Transaction Sets
	Micro* Translator	Micro	$1995	Includes Asynch or Non-2780/3780 Bi-Synch Hook User Configured Parameters	Grocery, Motor, General Business Facilities (Extra)
PSI	X-Change	Micro	$3500	Asynch Connection	Three Fixed Format Documents
York	EDItran	M/F Mini	$18,000 $18,000	None None	Creating Interfaces to User Applications

Note: Base price is for the translator. Communications column indicates how much capability is included in base price (does not indicate full range of options). Document processing column indicates whether screen formats are fixed or user definable and how many transaction sets are included in the base price.

EXHIBIT IV-8

FULL-FEATURED GENERIC EDI SOFTWARE

VENDOR	PRODUCT	COMPUTER PLATFORM	PRICE	COMMUNICATIONS	DOCUMENT PROCESSING
CDC	Redi-Micro	Micro	$500	Extra	Basic
GEIS	EDI*T	M/F	$10,000	Extra	Compliance Checking Only
	EDI*PC	Micro	$950	Asynch	Fixed Screen
Railinc	EDI/ Synapse	Micro	$1,985	Asynch	None
Tran Settlements	Translate	M/F	$25,000	None	User-Defined

EXHIBIT IV-9

EDI SOFTWARE FROM APPLICATIONS DEVELOPERS

VENDOR	PRODUCT	COMPUTER HARDWARE	PRICE	COMMUNICATIONS	DOCUMENT PROCESSING
ABC	EDE	Micro/ Mini	$3,000-$5,000	CLEO 3780+ required	Standarized Screen
	Vari-Comm	Micro/ Mini	$3,000-$5,000	CLEO 3780+ required	Fixed Screens for Auto Industry
	XL12	M/F	$24,000*	Extra	In User's Application
ACS	EDI/36 EDI/38	Mini	$5,000-$8,000	Data Comm and Mail-boxing Included	User-Defined Flat Files
MSA	Expert EDI	M/F	$50,000	Universal Network Interface	Integrated w/MSA Applications
Supply Tech	STX12	Micro	$3,900	Asynch Connect	Data Entry Overlay

* Includes mandatory $4,000 fee for installation and integration.

allows the user to create multiple forms on one screen. Exhibits IV-7, IV-8, and IV-9 show which vendors offer which type of screens. The exhibits also summarize pricing and communications supported by EDI software packages.

- Other features that provide the user more flexibility are user definable reports generation and user selection of translation tables by trading partner.

- Some systems operate in a more automatic environment than others. Most require operator intervention.

Security is of great importance to some users and a relatively minor one to others.

- Mainframe users prefer to restrict or prohibit outsider access to the mainframe computer. This is often accomplished by offloading EDI functionality to a smaller system.

- In addition, password protection is offered by most EDI software vendors; password protection is likely to become a standard feature of mainframe EDI software.

- Encryption, on the other hand, is rated by users as of less than average importance. Encryption is a desirable feature primarily when the transfer of electronic funds is involved. It is therefore offered as an optional feature by some vendors.

- Data need to be secure from unauthorized users and also from loss due to power failure and/or loss of telephone connections. An automatic recovery system is usually built in to EDI software for just such occurrences.

Vendors offer a wide variety of controls to help the user monitor transactions and detect errors in both data formatting and transmission.

- Users require feedback that an EDI transmission was successful; they need to know if any transaction was refused because of improper entries or other reasons. Most, but not all, EDI packages offer transmission acknowledgement, though not all are fully automatic.

- Along with transmission acknowledgements, exceptions reports, which call out data elements that do not conform to standard, were rated as of highest importance by users surveyed.

- Most full-featured EDI software provides for auditing the translation process, such as updating the current transmission session number.

C

Pricing Trends in Packaged Software

EDI software prices range from as low as $500 for an microcomputer-based translator designed to interface with a specific network service to $25,000 for a generic mainframe translator, with no communications software. MSA charges $50,000, a fee which includes installation, integration, support, and other professional services.

A vendor's pricing strategy will vary widely depending on whether EDI software is the company's central product or whether it is peripheral to other products and services.

The generic micro- and mini-based EDI software vendors generally follow a philosophy of modular pricing.

- The base product is an EDI standards translator, usually with asynchronous communications software included. All other features and communications options are extra cost.

- The price range for a generic EDI translator with limited communications and flexibility in defining data formats is between $5,000 to $10,000 for a micro- or mini-based system. Micro-based systems that support a limited number of transaction sets are priced at approximately $3,000.

Network and processing services generally price their products lower than those offered by the software developers. Both GEIS and CDC are selling PC-based products for under $1,000; Railinc's is under $2,000.

- These were developed in response to demand from the third-party service users for an inexpensive translator product. These wrap the user's messages in a communications envelope that interfaces transparently with the network.

- As discussed below, other third-party service vendors have chosen not to develop their own EDI software products, but rather to certify or distribute other supplier's software.

Regarding mainframe software provided by the services, TranSettlements has historically had room to charge what the market would bear for its mainframe translator, since there was no competition. TranSlate software is $25,000 with no communications software.

GEIS, on the other hand, had been offering an industry-specific mainframe translator for $5,000 and recently announced a more generic product in the $10,000 range.

Some applications developers are offering generic EDI translators that are targeted for a general market; others are offering an EDI module to

enhance their current applications, but which are not intended as stand alone products.

- Prices for the EDI portion of these vendors' offerings tend to be lower than those offered by generic EDI software developers but higher than products offered by the EDI services.

INPUT's assumptions on EDI software pricing through 1992 are shown graphically on an exhibit in Chapter V.

D

Maintenance, Support, and Professional Services

Maintenance and support are hidden costs if users develop their own EDI solution. Packaged software is generally already debugged before final release; an in-house developer must test, maintain, and support the software once it is written.

Software maintenance is partially a standards issue. It involves upgrades, fixes, and maintaining standards to be in conformance with updates. This means the vendor must design his own standards data base so it can be maintained and updated quickly and accurately before passing on changes to customers.

Most vendors charge a 10 percent to 12 percent annual fee after the first year for maintenance and support. This amount usually covers software and standards updates, along with telephone support.

- Most standards updates are offered on magnetic media and/or in written documentation.

- Several third-party service providers are considering remote electronic updates through the network.

As in the case with any software vendor, care must be taken to distinguish between what services are covered under the service agreement and what is considered additional professional services.

- Many of the EDI software vendors started out as consultants and are still deriving a major portion of their revenues from installation and integration fees. A mainframe computer translator typically requires three to five days of professional services billed at less than $1,000 per day.

- ABC, a recent entrant into the mainframe translator market, has innovatively itemized its pricing: the base price is $20,000 plus a mandatory $4,000 installation and applications integration fee.

- Several EDI software vendors are also conducting educational seminars as a marketing tool, as well as providing training sessions after purchase. These add to the cost of converting to EDI.

Users rated maintenance agreements and easily upgraded standards as very important (over 4 on a scale of 1 to 5). One user reports updating his standards to the version one step behind the newest version. In this way, any "bugs" in the latest release can be rectified by the standards maintenance organizations before creating problems at the user site.

Support is such an important issue to both user and vendor that McDonnell Douglas decided to get out of the software business in Spring 1986.

- Among other reasons the company cites is the fact that its overhead was too high to compete against small software suppliers. McDonnell Douglas didn't want to get into the EDI software support business.

- Now the company certifies, but does not support, EDI software from other vendors for use on its network.

E

Patterns of EDI Software Distribution

Exhibit IV-10 represents the distribution pattern in a portion of the current EDI software market.

- Excluded from the exhibit are companies with little or no distribution outside their own direct sales effort, and the certification program used by McDonnell Douglas' EDI*Net. INPUT believes the MDC certification effort has resulted in informal service agent relationships, bringing new business to the network.

- Also excluded are those cases where software providers recruit large users as distributors in the user's trading cluster. This is further discussed below.

1. DISTRIBUTION BY HARDWARE PLATFORM

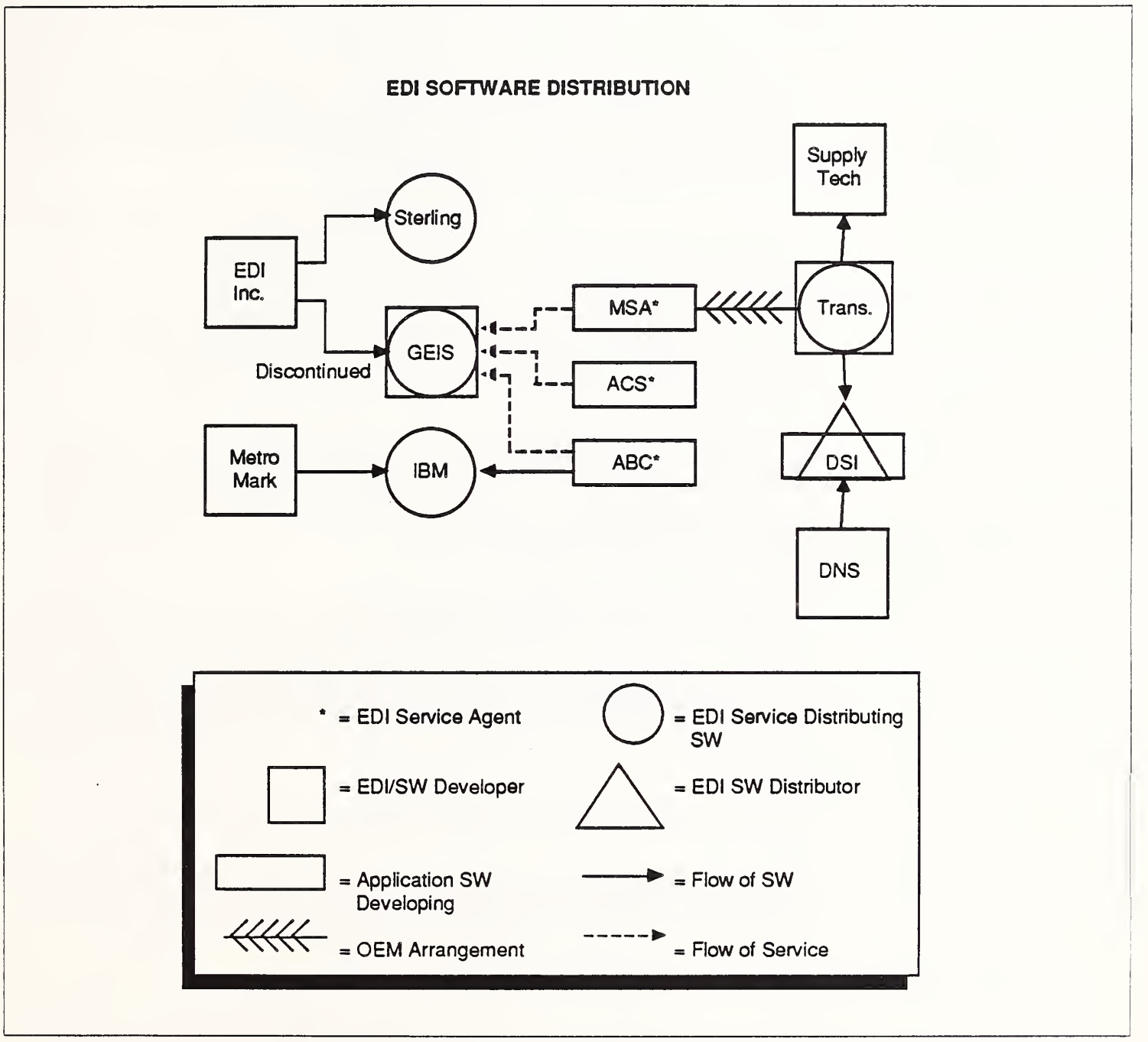
It should be noted that the number of EDI software offerings are in inverse proportion to user responses regarding what size of computer they plan to use for EDI. However, INPUT expects more microcomputer-based EDI implementation than the survey sample indicated, for reasons discussed in Chapter IV, section F.

a. Mainframe Software Vendor Distribution Trends

TranSettlements, which currently dominates the EDI mainframe software market, sells its TranSlate software directly, but has also licensed the product to MSA for integration with that vendor's Expert series of application software.

TranSettlements also has had marketing and distribution agreements with

EXHIBIT IV-10



Distribution Sciences Inc. (Des Plaines, IL), Supply Tech (Southfield, MI), and Crowntek (Markham, Ont.) a Canadian information services firm. This last agreement has lapsed.

York and Associates has signed with LEK Product Marketing (Bloomington, MN) which is positioning itself as an EDI-oriented sales and marketing organization.

GE Information Services has recently introduced its EDI-T mainframe EDI package, and is selling directly to large users and prospects for its EDI*Express services. It is not the company's intention to sell the software without its service.

b. Minicomputer Software Vendor Distribution Trends

The biggest hole in EDI software offerings has been in the minicomputer area.

- Metro-Mark has been the main supplier of generic IBM System/36 and S/38 translator software, but this is about to change with the entry of ACS, Inc., and the expected entry of the major minicomputer vendors such as Digital Equipment Corporation.

- Further, York and Associates has ported its EDITran software to both the S/38 and Hewlett-Packard HP 3000 minicomputers.

ACS is targeting the apparel industry for its direct sales, but has signed with GE Information Services for marketing outside that industry. ACS is willing to partner with others for distribution and marketing.

Metro-Mark distributes directly, through IBM's Information Network and through turnkey vendors and systems integrators, such as Superior Software (Augusta, GA). It has been endorsed by the American Warehousing Association and hopes to use large users as distributors to their trading partners within specific niches.

There appears to be some movement into the UNIX environment with several software companies, primarily focused on the automotive market, offering or preparing software for systems supporting the language. These companies include American Business Computer (Farmington Hills, MI), Info-Data (Southfield, MI), and LDJ Electronics (Troy, MI).

c. Microcomputer Software Vendor Distribution Trends

The most successful microcomputer EDI software provider, EDI Inc., has leveraged its small direct sales force with third-party service company distribution. Two of these distribution agreements have lapsed.

- GE Information Services developed its own product.

- McDonnell Douglas discontinued software distribution, chosing to certify packages for use on its network.

Sterling Software has distributed the EDI Inc.'s product, and there are agreements with General Electric of Canada and Telecom Canada, where EDI Inc. has received 40 percent of its revenues, primarily from the food and grocery industries.

- Western Union will also be distributing the company's products when its EDI service is implemented late in 1987.

EDI Inc. is also sponsoring EDI seminars produced by EDI Education, Inc. (Oak Park, IL) and was considering a strategy of setting up EDI capabilities at "hub" companies at no or low cost, with the hopes of selling software to customers and suppliers of that company.

In addition to direct sales, DNS's strategy is to market through large users to that company's customers. Its micro software is being distributed by Distribution Sciences Inc. which also distributes TranSettlement's mainframe product.

2. NETWORK AND REMOTE COMPUTING SERVICE EDI SOFTWARE DISTRIBUTION

GE Information Services is directly marketing its own translators called EDI*T and EDI*PC plus the International Workstation. However, GEIS has found it attractive to forfeit its rights to market software products into certain markets in order to gain network transaction business.

- GEIS has joint marketing agreement with MSA, which is incorporating TranSettlements' mainframe translator into its EDI*Expert product. GEIS prefers to gather network transactions business from the MSA installed base rather than attempt to sell its own EDI*T product to that market.

- It is in this context that GEIS created the Sales Agent Program.

  - EDI software developers such as ACS, Inc. and American Business Computer are given rights to sell EDI*Express services into the apparel and automotive industries respectively.

  - Agents receive commissions and support fees based on revenues generated by EDI*Express users in those industries.

3. LARGE USERS AS EDI SOFTWARE DISTRIBUTORS

Large users are also serving as distributors of EDI software, although this strategy may best be applied in specific niches. Several have recruited or plan to recruit large users as distributors to the user's customers and suppliers. This strategy hinges on the belief that satisfied customers make the best sales staff.

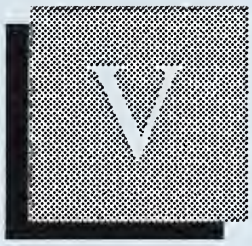
Railinc, the American Association of Railroad's EDI clearinghouse, sells EDI Synapse software. Railinc assumes it will be selling software in volume and at a discount to these "distributors" which are the railroads. Only 15 percent of Railinc's software sales are direct.

- Railroads, like automakers, can, in some measure, require or encourage their suppliers and large users to adopt electronic transactions.

- Some of the railroads have given shippers incentives to use EDI by lowering the cost of transportation to those conforming.

As the exhibit shows, there is some overlap in relationships. At this time, competing service providers are often associated with the same software vendors, a reflection of the few EDI software companies presently participating in the market.

The next chapter presents INPUT's EDI software market forecasts, and describes the assumptions and criteria used to develop those forecasts.



EDI Software Market Forecasts

EDI Software Market Forecasts

A

The Aggregate EDI Market

INPUT sizes the total 1986 EDI market at $46 million, growing at an average annual growth rate of 88 percent to become a $1.9 billion market by 1992.

As Exhibit V-1 shows, about ten percent of the 1986 market is attributed to EDI software, with processing/network services making up the majority of the market and professional services the balance.

INPUT believes processing/network services will continue to comprise the largest portion of the EDI market throughout the forecast period and that software will decrease its share.

B

Assumptions/Criteria

Sizing the current EDI market is relatively easy since there are few providers and the market is small.

- INPUT estimates the 1986 EDI software market at $4.6 million.
- However, projecting the future market is complicated because EDI functionality will likely be integrated with other applications.

Accordingly, the forecast presented herein includes the incremental price users will pay when purchasing applications with integrated EDI capabilities.

The forecast also includes the first year's maintenance fees associated with buying an EDI package and an annual 10% (of the purchase price) software licensing fee which covers maintenance, updates, and standards revisions for the second year and beyond. It is expected that recent and newly installed packages will be used throughout the forecast period.

- This maintenance fee works like an annuity and is incremental over

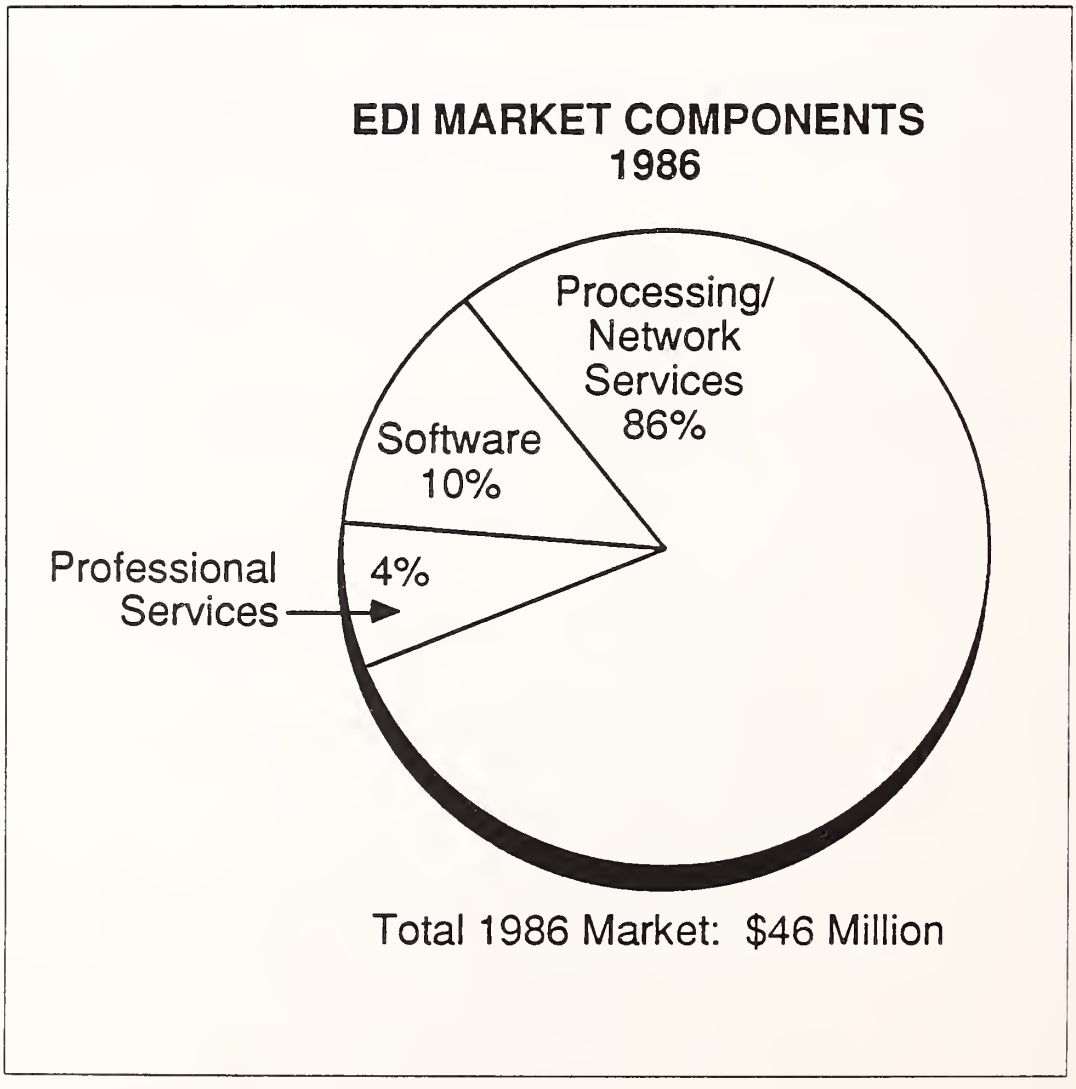
time. Vendors can expect this income to increase due to the growing number of installed packages.

Also included in the forecast is the communications interface software when sold with the package; however, terminal emulation boards (when required) are specifically excluded.

Finally, the forecast covers only software supporting the X12 standard.

- There are a many companies offering private or industry-specific EDI software (e.g. in the automotive industry).
- INPUT believes new EDI users will predominantly use the X12 standard while those requiring and using earlier formats have already purchased software, or developed it themselves.
- Replacement software will likely support the X12 format (as well as others), permitting a migration to X12 to allow inter-industry trading.

EXHIBIT V-1

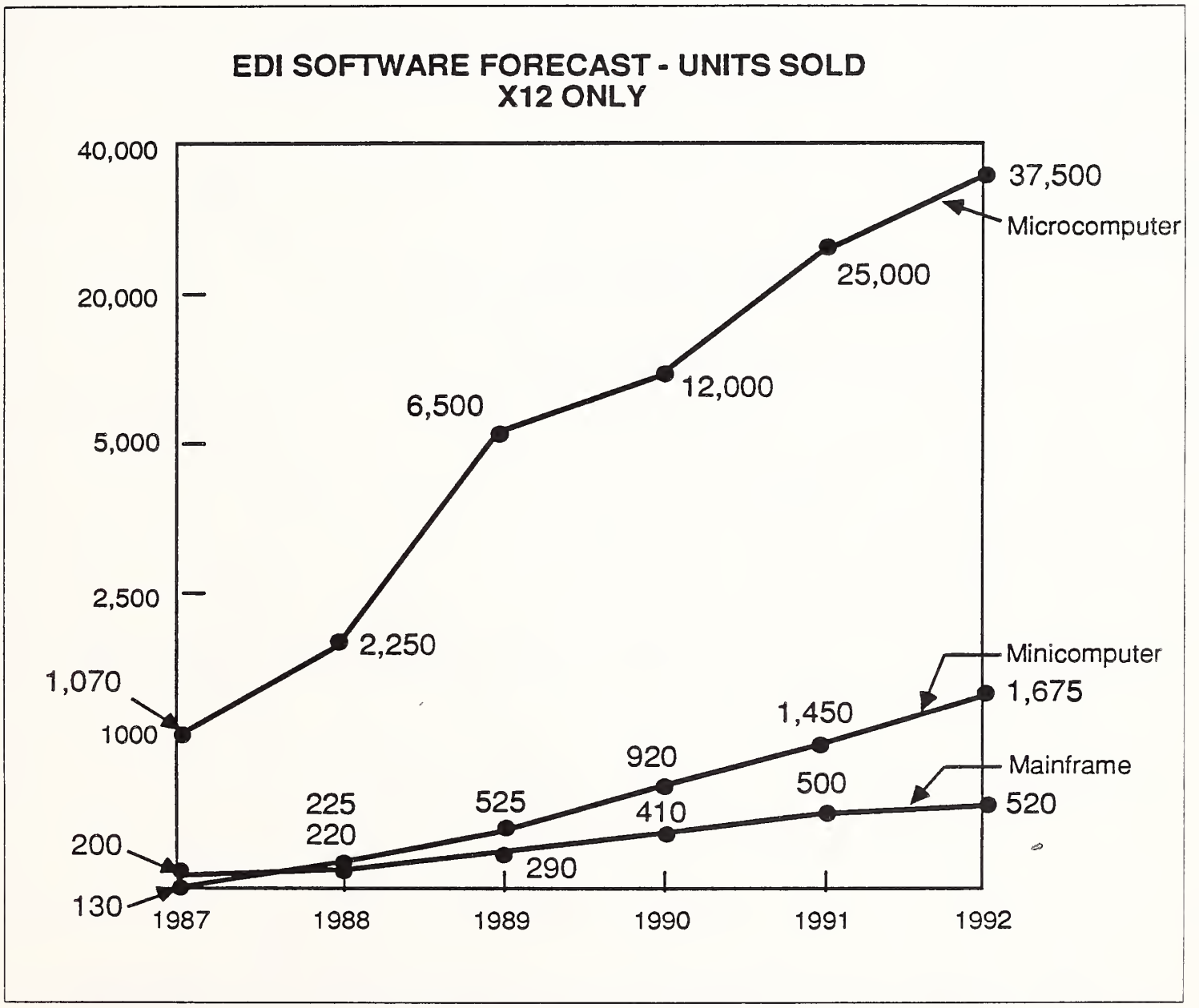


C

The EDI Software Market Forecast - Units Sold

Exhibit V-2 shows the forecast number of units sold for each computer platform (micro, mini, and mainframe) and the total number of installations forecast.

EXHIBIT V-2



The substantial growth shown in microcomputer software is based on INPUT's analysis that large numbers of smaller companies will adopt EDI to satisfy the conditions of doing business imposed by larger trading partners. Further,

- Many small companies will not have requirements for larger processors.

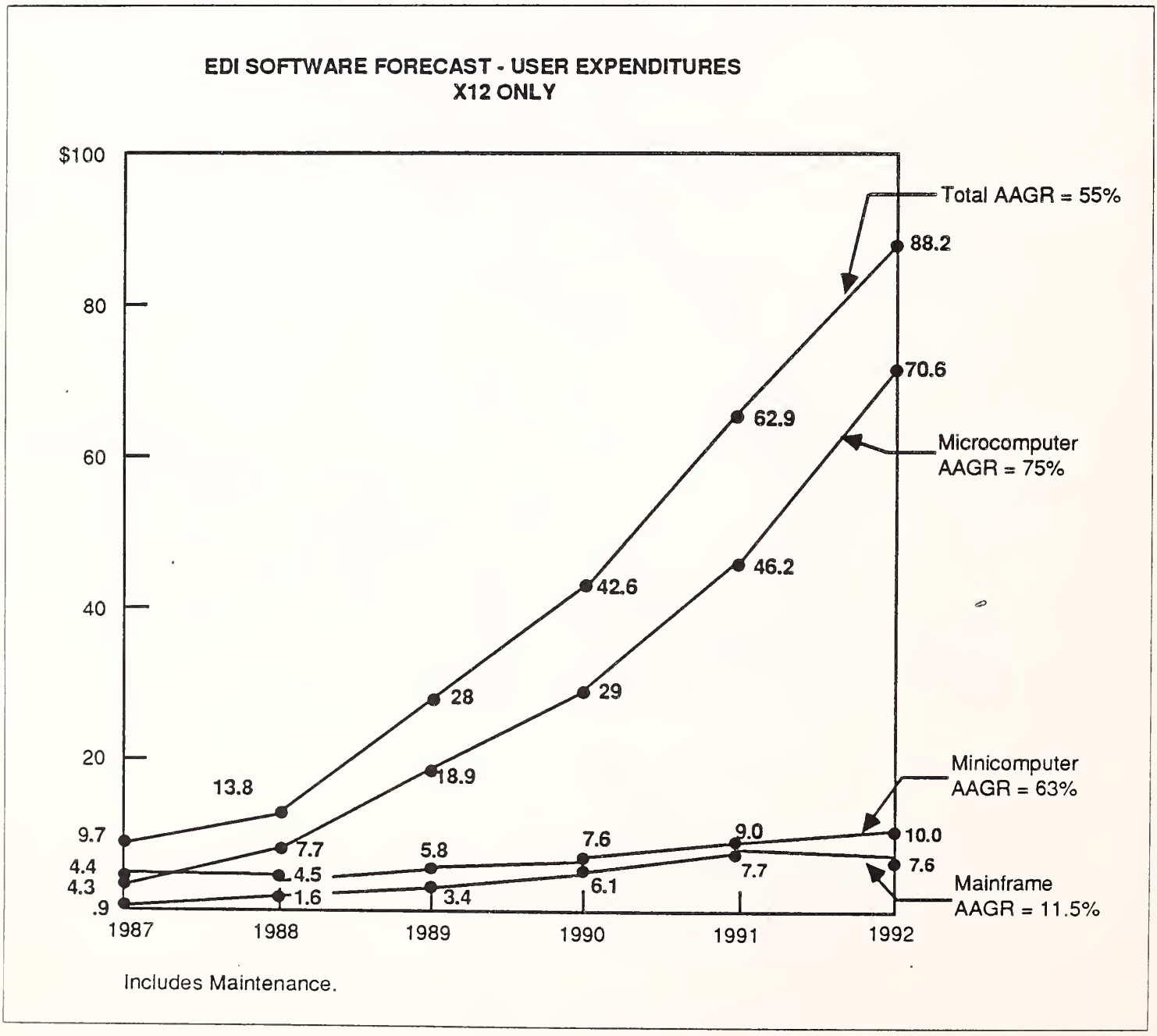
- Some companies wish to isolate their mainframes from telecommunications access for security reasons.
- Micros are becoming more powerful and more able to handle the transaction volumes required by most users.

D

The EDI Software Market Forecast - User Expenditures

Exhibit V-3 shows the user expenditure forecast for each computer type and the total.

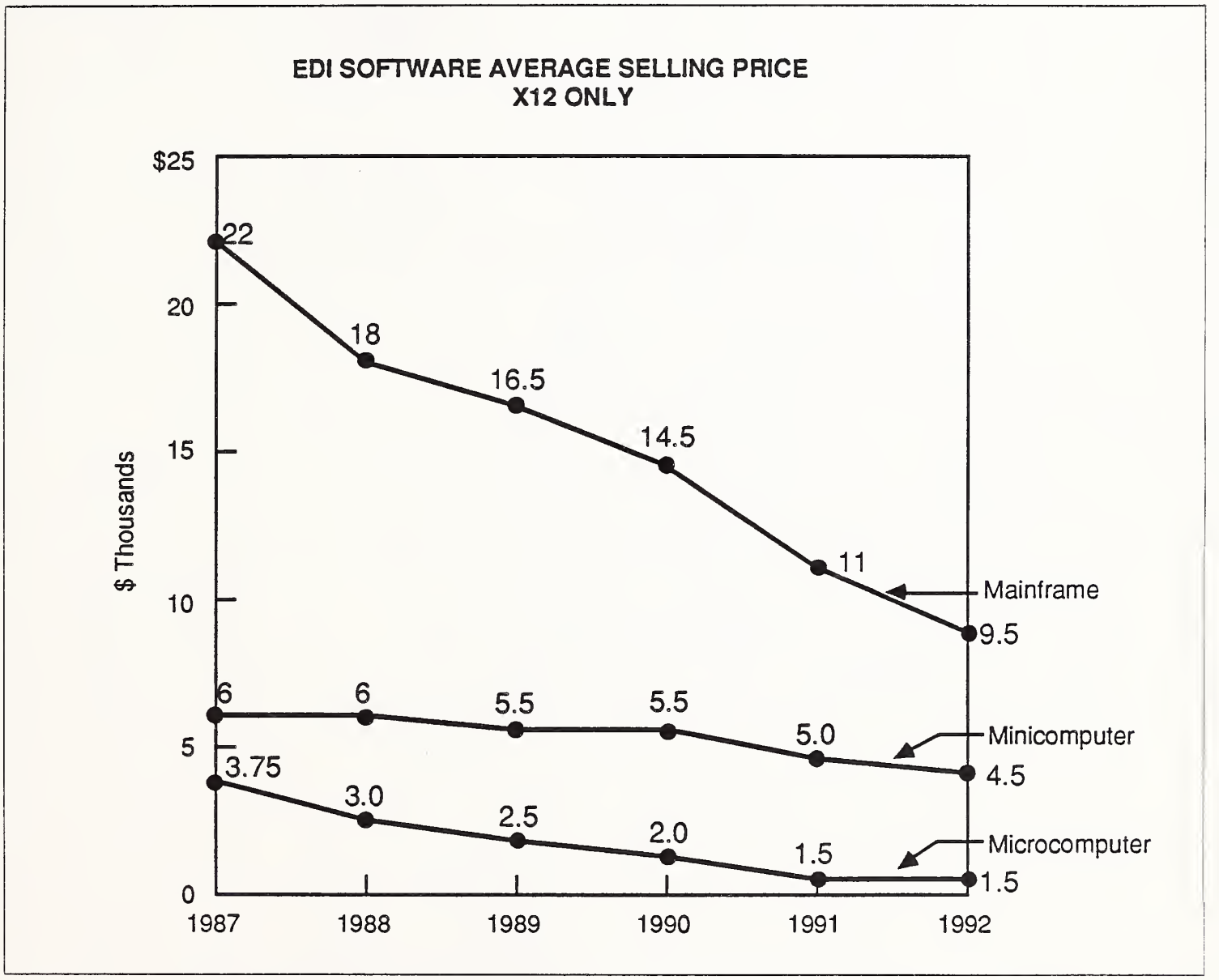
EXHIBIT V-3



Includes Maintenance.

The forecast assumes declines in the average selling price for each type of software over time, as shown in Exhibit V-4.

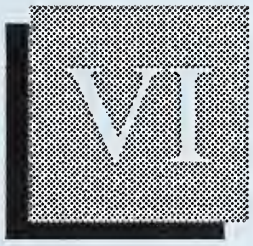
EXHIBIT V-4



INPUT expects the EDI software market to grow from the 1986 base of $4.6 million to become an $88 million market by 1992, reflecting a 55.5 percent AAGR.

1986 market share data, based on user expenditures for each computer platform, can be found in the companion report, *EDI Software Provider Profiles.*

The final chapter presents INPUT's conclusions from this study of the EDI software market, and provides recommendations to users and EDI software providers to consider.



Conclusions and Recommendations

VI

Conclusions and Recommendations

This chapter summarizes INPUT's observations on the EDI software market, contains recommendations to all involved parties, and concludes the study.

A

A Fragmented Market

As illustrated in this study and the companion study *EDI Software Provider Profiles*, the EDI software market is a fragmented one, largely inhabited with smaller, entrepreneurial firms and several applications vendors adding EDI to their product mix.

The installed base is small, and there are no clear winners at this early date.

Similarly, sales volumes are still low, and there is little evidence of bulk sales, although this is the strategy of several vendors.

With one exception (MSA), missing from the marketplace are the large application software vendors. Also missing are the major turnkey systems vendors (e.g. ASK, Altos) and most of the major computer manufacturers who also offer or distribute software. The exceptions are IBM and Control Data.

As the EDI market matures, more partnering is likely and acquisitions probable as vendors seek to strengthen their mainline products by improving their usefulness. The industry is in an alliance forming period. Although there is experimentation with a variety of relationships, no clear pattern is emerging.

B

Network Services are Responding to User Demand

Based on the assumption that for many users on-network translations will be, in the long run, less economical that translations done prior to data transmission, the network service vendors are offering or recommending EDI software.

Network service providers are taking several approaches.

- Developing their own packages.
- Distributing software from other vendors.
- Certifying software from a variety of vendors for use on the network.
- Offering exclusive agent agreements in exchange for marketing EDI services in specified market sectors.

C

Multiple Solutions Are Available

No one software solution appears to dominate the market. There are more product offerings for microcomputers but there are indications that most new activity will be in mainframe software, System/3X, and Unix-based applications.

Generic solutions appeared on the market first, but now there is increasing activity in integrated solutions which include EDI functionality with traditional applications in inventory, purchasing, distribution, cash management, and other appropriate areas. Integrated solutions will be the wave of the future.

D

Missionary Selling Is Required

Exhibit VI-1 shows how interviewed users rate their self awareness of EDI over three INPUT surveys. Although users are becoming more aware of EDI's benefits, the ratings are still relatively low.

In addition to functional departments, corporate management needs to be sold on the EDI solution.

The most apparent, and most fruitful, strategy is to sell to large users who, in turn, introduce or induce their trading partners to adopt EDI as a condition of doing business.

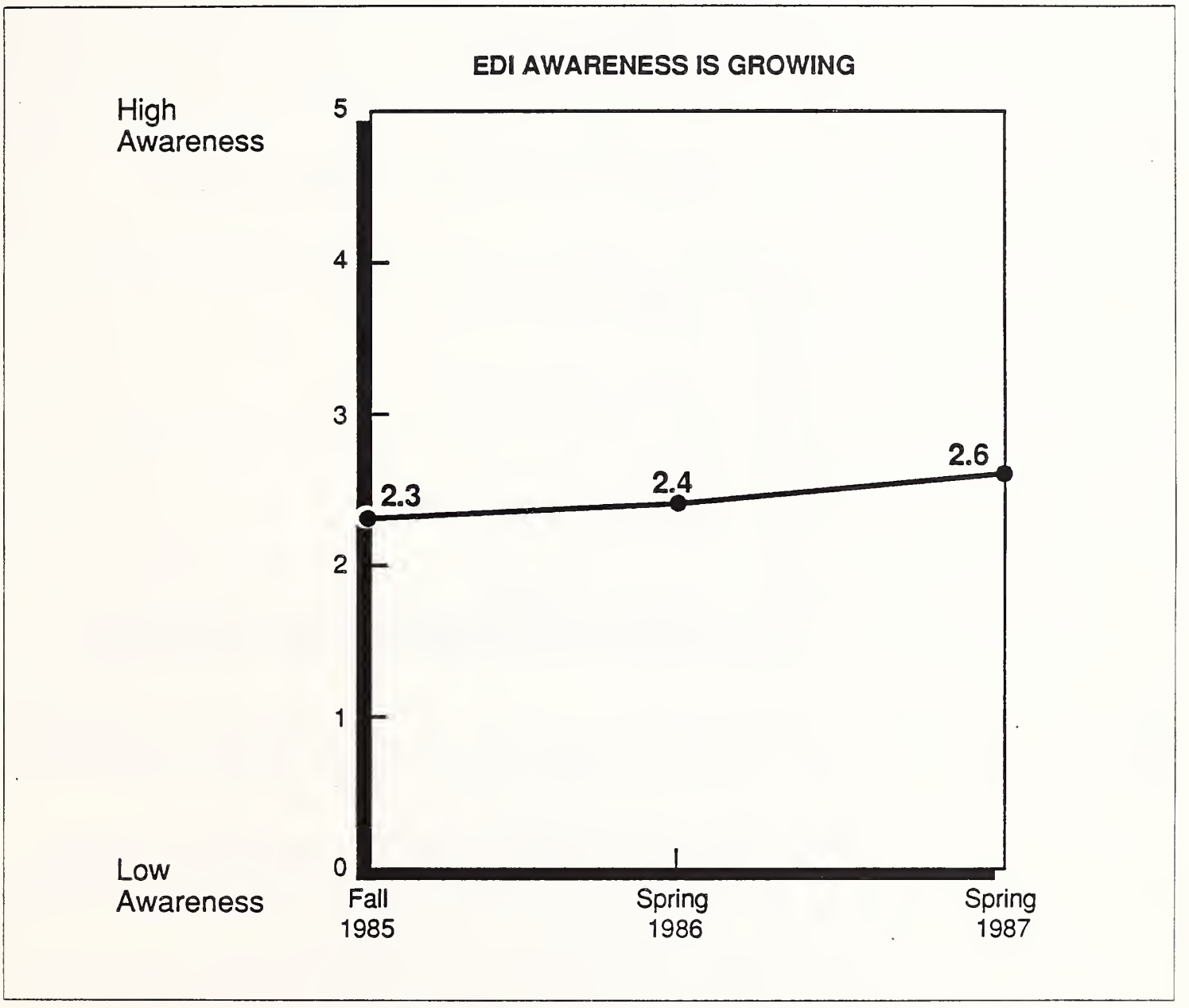
Several independent EDI consultancies have formed and several software and service providers are sponsoring training and orientation sessions for potential users with good results.

E

Usage Is Limited to a Few Transaction Sets

Currently, invoices and purchase orders are the dominant transactions used in EDI implementations. The full benefits of the method will not be recognized until additional transaction sets are used. This can be accelerated through corporate mandates to use EDI throughout the organization.

EXHIBIT VI-1



F

Creative Pricing Is Needed

No clear patterns have emerged regarding pricing differences between bundled and unbundled software. Customers are given a variety of options, such as what transactions are supported, what standards are used, and if communications software is included.

As more integrated solutions emerge, pricing of the value-added EDI modules will moderate.

- Unfortunately, users may expect this and delay purchasing unless compelling reasons are presented to adopt EDI in the near term.

- These reasons will be associated with clearly demonstrated cost and competitive benefits and large companies requiring their trading partners to adopt EDI.

Key conclusions about the EDI software market are shown on Exhibit V-2.

EXHIBIT VI-2

EDI SOFTWARE MARKET CONCLUSIONS

- A Fragmented Market
- Major Vendors Missing
- Alliance Formation - Experimental Relationships
- Missionary Selling Needed
- Integrated Solutions - The Wave of the Future

G

Central Recommendation

INPUT's central recommendation is linked to the finding of only moderate awareness of EDI by IS professionals.

This indicates a need to better promote EDI as a strategically important tool applicable to a range of industries and functions, improving company operations while reducing costs and increasing competitiveness.

Accordingly, INPUT recommends that users and vendors adopt an EDI symbol for cross-industry use, to identify companies using the method (shown in Exhibit VI-3). Promotional use of such as symbol on letterhead and, in advertising and marketing literature will enhance corporate imagery while creating more EDI awareness.

H

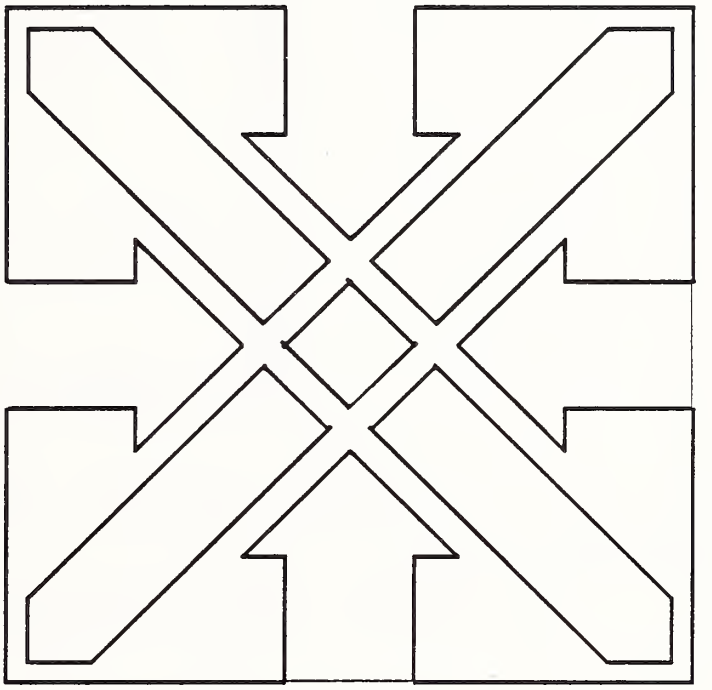
User Recommendations

Because of the range of options available to users, and because EDI will affect various corporate functions, the first step should be to form an EDI task force with broad company representation to work across departmental lines and avoid internal jurisdictional problems.

- The task force should educate management on EDI's benefits and request a funds allocation to its development.

EXHIBIT VI-3

CENTRAL RECOMMENDATIONS CREATE AWARENESS



- Promote the EDI Solution
- Adopt an EDI Symbol

- Information about EDI and specifically about competitors' EDI usage should be used to support the effort.

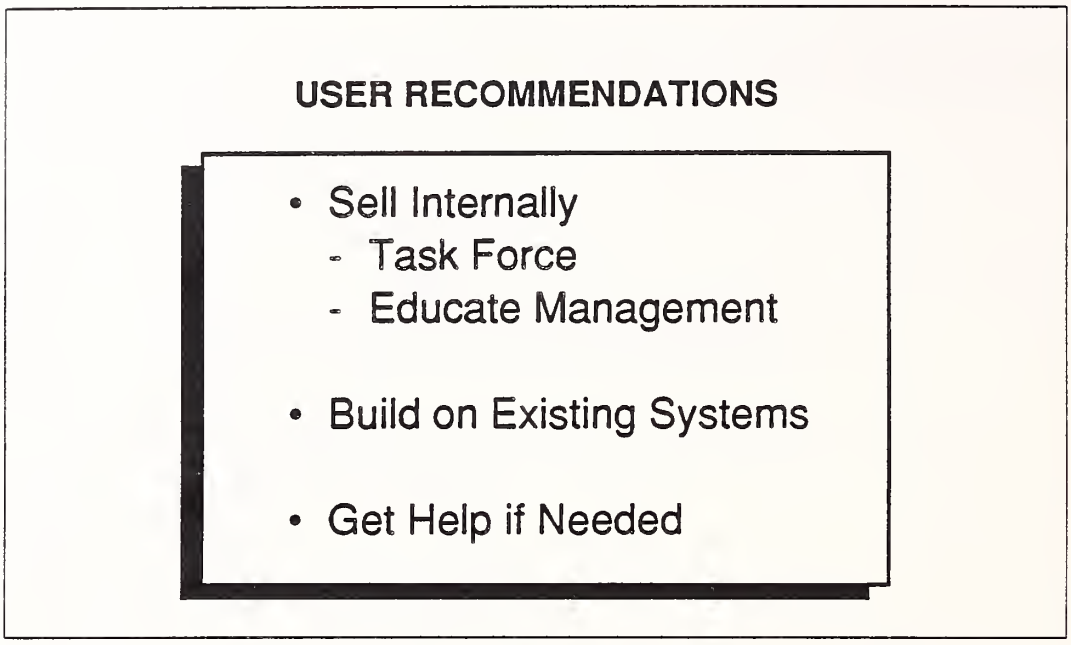
An EDI development strategy can be based on migrating from existing management information or on-line order entry systems to provide remote on-line ordering, order inquiries, and electronic messaging with principal customers, later adding additional functions and trading partners.

If the applications backlog or the need to involve multiple departments causes problems in planning EDI implementation, assistance is available from industry associations, network services, software firms, and professional service firms.

These points are summarized in Exhibit VI-4.

More detailed recommendations to users will be found in an upcoming INPUT report, *A Guide to EDI Implementations*.

EXHIBIT VI-4



I

Vendor Recommendations

1. SOFTWARE VENDOR RECOMMENDATIONS

INPUT feels EDI software vendors should offer a full range of software solutions since users have varying needs.

- The EDI expertise required to sell one product can be economically applied to a broader product line.
- The growing acceptance of microcomputers is a key factor driving the growth of EDI, as is the desire of some large companies to isolate mainframe systems from possible security breaches.

EDI software vendors should seek to develop alliances with computer vendors, and Value-Added Dealers and Resellers (VARs and VADs), to develop turnkey systems, particularly for smaller, possibly uncomputerized users.

Smaller software firms should investigate strategic partnering with larger companies and professional service firms which have marketing and support organizations and customer lists which would not otherwise be available.

- Such alliances may lead to more permanent bonding, such as merger, at a later date.
- Opportunities may be found with networks not currently offering EDI, including smaller VANS, International Record Carriers (IRCS), and the Bell Operating Companies which will likely offer limited information services in the future.

Industries which have yet to implement EDI remain opportunities.

- While many industries are at least planning EDI, others have yet to initiate programs.

- It is difficult to identify industries that could not benefit from EDI. Those most suitable are characterized by supplier-broker-buyer relationships and high volumes of repetitive transactions.

Industry associations are an economical way to address whole industries, and to gain the understanding needed to develop products meeting unique user needs. Industry endorsements can further the efforts of vendors.

With regards to product enhancements, plan integrated capabilities for links to industry-specific data bases for electronic funds transfers and integration with other, related applications.

Investigate links with electronic forms processing systems such as those provided by Moore Business Forms (Chicago, IL) and Electronic Forms Systems (Carrolton, TX). The goal of this approach is to integrate EDI with functional department authorization procedures.

Research the market for software on other than IBM-compatible computer systems of all types. One specific opportunity is the Apple MacIntosh as it becomes more accepted in business.

Develop custom programming and systems integration skills, along with other professional service capabilities. These activities may account for as much as 50 percent of a company's revenues from EDI activities in the near term as new users implement EDI.

These recommendations are summarized in Exhibit VI-5.

2. TURNKEY VENDOR RECOMMENDATIONS

Turnkey systems vendors have several opportunities to add value to their products and to link with partners to become full EDI service vendors through referral programs and agent relationships.

- Turnkey vendors targeting vertical market niches can leverage their industry knowledge to sell EDI services, software, and professional services to a trading cluster.

- Among those with this opportunity are Triad (Sunnyvale, CA - automotive parts), Trans-Tech (Pleasanton, CA - trucking logistics), Shared Medical Systems (Malvern, PA - hospital management systems), and ASK (Los Altos, CA - manufacturing systems).

EXHIBIT VI-5

SOFTWARE VENDOR RECOMMENDATIONS

- Offer a Full Line of Solutions
- Develop Alliances
- Enhance Products
  - Data Bases
  - EFT
  - Electronic Forms
  - Integrated Applications
- Investigate Non-IBM Solutions
  - eg., Macintosh
- Develop Professional Services Capability

- Since several of these firms offer timeshared access to their applications, it may be possible to consolidate EDI traffic through their remote computing facilities to trading partners or to third-party service providers as a service broker.

- Partnering with network service firms is attractive due to lower entry risks and the specialized, focused market knowledge vendors can bring to a relationship.

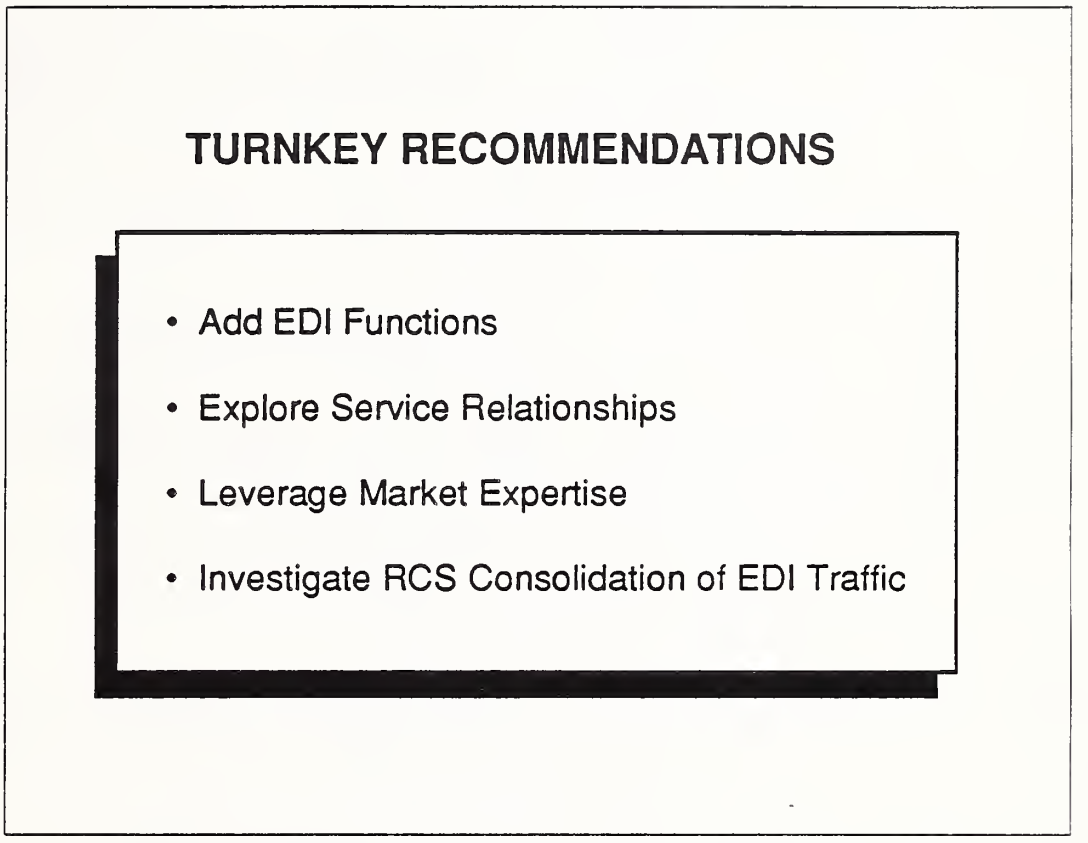
These recommendations are summarized in Exhibit VI-6.

3. NETWORK SERVICE VENDOR RECOMMENDATIONS

Although one major EDI service vendor (McDonnell Douglas) has replaced its software marketing effort with a certification program, others are offering their own software.

While increasing network traffic is the primary objective of these vendors, users require a full solution encompassing software and professional services. If an EDI service provider does not wish to invest in

EXHIBIT VI-6



staffing these functions, partnering remains an option.

Appropriate remote computing service (RCS) applications such as those supporting inventory management can be enhanced with EDI functionality.

More detailed recommendations to EDI services can be found in INPUT's report, *U.S. EDI Service Markets 1987-1992*.

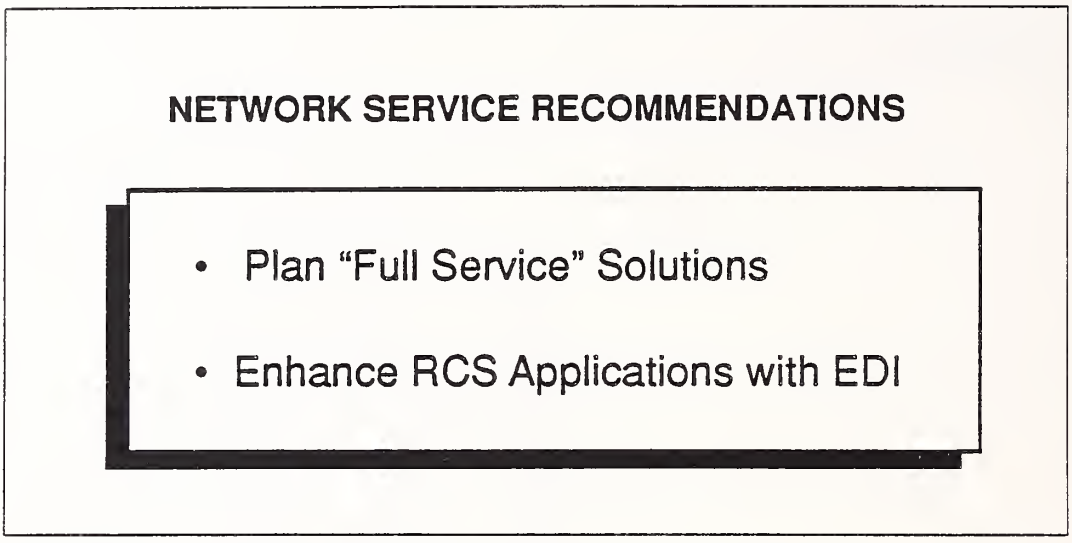
These recommendations are summarized in Exhibit VI-7.

J Conclusions

EDI software is the core of any successful EDI implementation, but is not an isolated consideration. The multitude of choices and approaches makes the decision-making process difficult for users.

For vendors, a fragmented market populated largely by small entrepreneurial firms means opportunity to stake out market share or a market niche. It also means the opportunity, and, for some, the requirement, to partner with firms more able to penetrate and support accounts.

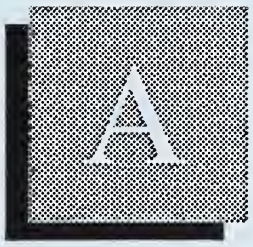
EXHIBIT VI-7



EDI addresses a fundamental business need. This alone suggests the market for services and software will grow substantially over the forecast period.

EDI shows every indication of being poised for explosive growth. Accordingly, companies with EDI plans, products, and services are positioning themselves to capitalize on increasing demands.

In a competitive marketplace, poorly planned enterprises will suffer the consequences of their deficient actions, while those with foresight and good strategic planning will gain substantial benefits.



Appendix: EDI Terms Defined

A

Appendix: EDI Terms Defined

- ACH - Automated ClearingHouse. A banking industry mechanism for electronic funds transfer (also see NACHA).
- AIAG - The Automotive Industry Action Group. A trade association. Also refers to EDI formats developed by the association.
- ANSI - American National Standards Institute.
- ASC - Accredited Standards Committee.
- Bar Coding - A standardized method of identifying products which facilitates data entry through scanning of coded printed labels.
- Batch Processing - A data processing/data communications method which groups transactions. Compare to real time processing
- CAD/CAM - Computer Assisted Design and Computer Assisted Manufacturing. A set of applications which use graphics to manage these functions.
- CARDIS - Cargo Data Information System. A program of the National Council on International Trade Documentation.
- CCD - Cash Concentration and Dispursement. An electronic funds transfer format.
- CIDX - Chemical Industry Data Exchange. Based on ASC X12.
- CLM - Car Location Messages, applied to rail car logistics.
- Compliance Checking - A function which verifies that document information is received in the right order and in the proper format.
- COPAS - Council of Petroleum Accounting Standards. An industry association developing EDI standards.
- CSI - Commercial Systems Integration. A professional service whereby vendors take complete responsibility for designing, planning, implementing, and sometimes managing a complex information system.
- CTP - Corporate Trade Payments. An electronic funds transfer application.

- CTX - An electronic funds transfer mechanism which is compatible with the EDI X12 standard and which carries information about a payment as well as transferring value.
- Data Dictionary - An index describing the purpose, characteristics and usage of each data base item according to a name assigned each item.
- ECS - Electronic Claims Submissions. Insurance claims are automatically generated and electronically sent to insurance companies.
- EDI - Electronic Data Interchange. The computer-to-computer communications based on established business document standards or using translations by EDI software housed on users' computers,located at remote computer service bureaus, or on value-added network processors.
- EDX - Electronics Industry Data Exchange. Based on ASC X12.
- EFT - Electronic Funds Transfer. The transfer of monetary value.
- Electronic Mail - The transmission of text, data, audio, or image messages between terminals using electronic communications channels.
- Electronic Mailbox - A store-and-forward facility for messages maintained by a transmission or processing facility.
- Flat File - An organized collection of data items in a two-dimensional table of rows and columns.
- GTDI - General Trade Data Interchange. An international standard devel oped from TDI accommodating compromises of French participants in SITPRO, the agency behind U.N. certification of the standard.
- HCFA - Health Care Financing Administration. A U.S. government agency responsible for Medicare administration. Also describes a format for health care insurance claims.
- ICOPS - The Industry Committee on Office Products Standards. Sponsored by two office products trade associations for EDI applications.
- IRC - International Record Carrier. A common carrier providing messaging and network services, no longer limited to international communications.
- IVANS - Insurance Value Added Service. Provided on IBM's Information Network by an insurance industry association.
- JEDI - The Joint Electronic Data Interchange Committee, consisting of representatives of industry trade associations coordinating development of a reference EDI dictionary for the creation of new EDI transactions, segments, or data elements.

- JIT - Just-In-Time. An inventory management philosophy which plans delivery of needed materials and components immediately prior to final manufacturer or assembly.
- LDI - Logistics Data Interchange. Information about the location of materials in transit through the manufacturing/distribution cycle.
- Ordernet - Sterling Software's EDI service. Also refers to EDI standards developed by the National Wholesale Druggist's Association for use in pharmaceuticals.
- NACHA - National Automated Clearinghouse Association. A banking services industry group.
- Real Time - A data processing or transmission method with data entered interactively. Response to input is fast enough to affect subsequent input. The results are used to influence a currently occurring process.
- RCS - Remote Computing Service. A facility which arranges to process some or all of a user's workload. Similiar to a VAN (see below) but without network services
- SAM - Shippers Administrative Messages. A logistics service/application.
- SITPRO - Simplification of Information Trade Porcedures. Refers to European/international EDI standards approved by the United Nations.
- Skeletal Program - An incomplete program which requires additional procedural code be written by the user for execution.
- Store and Forward - The capability of a transmission or processing facility to hold messages or data until requested or until a prescheduled time.
- SUPER - Study for the Utility of Processing Electronic Returns. An Internal Revenue Service test for electronic filing.
- SUPERB - The IRS' electronic filing test program for business returns.
- TALC - Textile/Apparel Linkage Council. A subcommittee addressing EDI standards.
- TAMCS - Textile/Apparel Manufacturer's Communications Standards.
- TDCC - The Transportation Data Coordinating Committee. An early advocate for EDI. Also refers to U.S. EDI standards.
- TDI - Trade Data Interchange. An international shipping standard (also see GTDI).
- Translation - Transforming information sent in one format to another format.

- UB82 - A format for health claims insurance submissions.

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

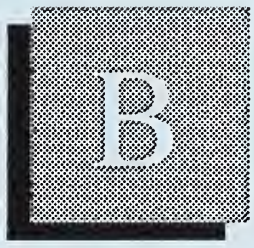
- VAN - Value Added Network. A common carrier network transmission facility, usually augmented with computerized packetizing which may also provide store-and-forward switching, terminal interfacing, and error detection and correction and host computer interfaces supporting various communications speeds,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

- VICS - Voluntary Inter-Industry Communications Standards. A committee developing EDI standards between retailers and manufacturers.

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

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

- X.400 - An international electronic mail standard.



Appendix: EDI Package Software Vendor Questionnaire

B

Appendix: EDI Package Software Vendor Questionnaire

I. BACKGROUND

A. Business
B. Founded
C. Number of Employees

II. PRODUCT DESCRIPTION

A. Introduction _____ Releases _____
B. Features:
C. Hardware platform/operating system:
D. Memory requirement:
E. Communication requirement:
F. Standards supported: International?
G. Documents supported:

H. Is the EDI translation software package already integrated with communicatons? Y / N

With other applications? Y / N Which ones? _____

I. Will you provide professional services to integrate your software with that of other vendors? Y / N

III. PRICING (including maintenance)

Volume discounts are available? Y / N

What is ASP? _____

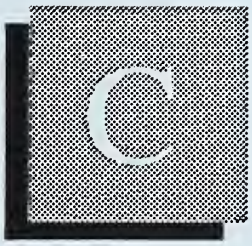
IV. MARKETING AND DISTRIBUTION

Direct _____ Indirect _____
Deals in the works:

Targeted markets:

V. COMPETITORS

VI. REVENUE/UNIT PROJECTION



Appendix: User's Questionnaire

C

Appendix: EDI User Starter Questionnaire

EDI User STARTER Questionnaire

Hello, I'm _____ calling from INPUT, a Mountain View, California research firm. We're doing a series of studies on data communications between companies.

I would like to ask you about your activities, your plans and awareness of this field. The interview will take approximately 20 minutes, and I think you'll find it interesting. Your comments will be reported in aggregate and you will not be identified in our report. In exchange for your help, we will send you a summary of our findings for your files.

Is now a good time?

The first set of questions involves your awareness and level of activity in Electronic Data Interchange or EDI. We define EDI as exchanging electronic purchase orders, invoices and other routine business documents, directly between computers, or through a third party. It is related to, but different from, an online order entry system which your customers may log onto from their terminal to buy products from you.

1. On a scale of 1-5, with five being high awareness, how would you RATE YOUR PERSONAL KNOWLEDGE OF EDI, not so much from a technical standpoint, but from a strategic standpoint, that is, what EDI "does"? 1 2 3 4 5

2. How would you describe your company's involvement in EDI?

(a)___JUST BEGINNING to look at it [GO TO QUESTIONNAIRE "A"]

(b)___ACTIVELY PLANNING an EDI project [GO TO QUESTIONNAIRE "A"]

(c)___IMPLEMENTING an EDI project [GO TO QUESTIONNAIRE "B"]

(d)___CURRENTLY USING EDI or if you [GO TO QUESTIONNAIRE "B"]

(e)___Have NO CURRENT PLANS to use it. [GO TO QUESTIONNAIRE "C"]

QUESTIONNAIRE "A"

BEGINNING/PLANNING EDI QUESTIONNAIRE

3. Who would be responsible for your EDI PLANNING activity.
(a)___The Information Services Department (b) ___a functional dept. (c) ___a committee (d)___ d/k (e)___other specify:_____

BACKGROUND

4. Can you ESTIMATE WHEN YOU MIGHT ACTUALLY START IMPLEMENTING EDI?

(a)___this year (b) ___next year (1988) (c) ___in 3-5 years
(d)___no current plans

5. (a) On the scale of 1-5, with 5 being "highly likely", HOW LIKEL would it be that you would CONTRACT with a THIRD PARTY to help implement your EDI system? 1 2 3 4 5

(b) How would you rate the likelihood that you would implement the system TOTALLY YOURSELF? 1 2 3 4 5

(c) Assuming you were to use a third party for some help in implementing EDI, would that third party likely be:
[READ OPTIONS:]
(i) ___An independent consultant

(ii) ___ A professional services firm

(iii) ___An industry association:_____

(iv) ___A communications company, such as a value added network

(v) ___A Remote Computing Service

(vi) ___A financial services organization

COMMUNICATIONS & HARDWARE ENVIRONMENT

EDI is different from an on-line order entry system. Typically, in an on-line order entry system, your staff or your customers use terminals to interactively input orders or query the system. It does not accept machine readable data from another computer.

6. a. Does your company have any sort of ON-LINE ORDER ENTRY SYSTEM now? Y/N

b. [IF YES] Is it USED DIRECTLY BY YOUR CUSTOMERS? Y/N

c. [IF YES] Could you please DESCRIBE it.

d. [IF YES] Are there any PLANS TO ENHANCE YOUR ONLINE ORDER ENTRY SYSTEM to become an EDI system. Y/N If yes, when?

(i) ___this year (ii) _____next year (iii) ____within three years (iv) ___no plans/dk

e. (IF NO ORDER ENTRY SYSTEM) Are you planning any type of system like this? Y/N

7. (a) Could you please tell me what Value Added Networks (VANs) OR remote computing service (RCS) your company uses or plans to use.

_____ Will they be used for EDI? Y/N

_____ Will they be used for EDI? Y/N

8. (a) To your knowledge, are you USING ANY FORM OF ELECTRONIC MAIL, including telex or facsimile, TO TRANSFER PURCHASE ORDERS OR INVOICES TO TRADING PARTNERS? Y/N

(b) [IF YES] Is this ___computer electronic mail, ___telex or ___facsimile?

(c) [IF YES] Could you estimate the percentage of your transactions which are sent out this way? _____%

9. What HARDWARE do you anticipate using for EDI? Will it be a (a) micro, a (b) mini or a (c) mainframe?

Comments:_____

SOFTWARE

10. (a) Do you plan to WRITE THE EDI SOFTWARE yourself, will you PURCHASE it, or will you BUY a package THEN CUSTOMIZE it?
___(i)WRITE ____(ii)PURCHASE ___(iii)BUY AND CUSTOMIZE

b. Why will you take this approach?

c. What vendors are you looking at?

d. Could we rate the importance of software features? On our scale of 1-5, with 5 being very important, how important is it for EDI software to:

(i)	BE INTEGRATED with other business applications such as accounting, inventory, etc.	1	2	3	4	5
(ii)	Support GRAPHICS	1	2	3	4	5
(iii)	Be EASILY USED by non-computer users	1	2	3	4	5
(iv)	Be Usable with LIGHTPENS	1	2	3	4	5
(v)	Have ENCRYPTION capabilities	1	2	3	4	5
(vi)	Be EASILY UPGRADED to new standards	1	2	3	4	5
(vii)	ACKNOWLEDGE successful transmission	1	2	3	4	5
(viii)	Report EXCEPTIONS clearly	1	2	3	4	5
(ix)	Have a MAINTENANCE AGREEMENT for updates/fixes	1	2	3	4	5

11. With regard to INTEGRATING EDI SOFTWARE with other applications such as accounting, or purchasing, which is more preferable:

___(a) To integrate the EDI software with your other applications yourself.

___(b) To hire a consultant or professional services firm to integrate the EDI software with your other applications, OR

___(c) To buy new software for accounting, inventory, etc. with built-in EDI functionality.

12. What transactions are you planning to do via EDI, and in what time frame?

type of document	time frame 1987	1988	3yrs	d/k
(a)__Purchase Orders FROM customers	___	___	___	___
(b)__Purchase Orders TO suppliers	___	___	___	___
(c)__Bills of Lading	___	___	___	___
(d)__Invoices	___	___	___	___
(e)__Payments	___	___	___	___
(f) Others_____	___	___	___	___
_____	___	___	___	___

13. Have you done any cost analysis, on a per-transaction basis, of your PAPER BASED systems for purchase order processing, invoicing or other routine paperwork of this nature? (If yes: What did you find out?)

14. With approximately how many other companies do you exchange ANY TRANSACTIONS?(a)1-5
(b)6-10
(c)11-20
(d)21-30
(e)31-40
(f)41-50
(g)50+ how many:_____

THIS FINAL PART OF THE SURVEY DEALS WITH EDI ISSUES AND CONCERNS. DO YOU HAVE JUST A FEW MORE MOMENTS?

ISSUES

15. Let me read you a list of issues and problems which we believe people may be concerned about, and ask you for a rating, again on a 1-5 scale, with "5" being "a serious concern" and 1 being "not a serious concern" and get your reaction:

How much of a concern are:

(a)The actions of your COMPETITORS with regards to EDI	1	2	3	4	5
(b)Concerns about the ENTIRE SYSTEM including hardware and software which you may install	1	2	3	4	5
(c)Network/Data SECURITY	1	2	3	4	5
(d)Software MAINTENANCE	1	2	3	4	5
(e)INTERNATIONAL EDI capabilities, that is, the ability to do business with people in other countries (e.i.) Are you doing any international trading now?	1	2 Y/N	3	4	5
(f)Changing BUSINESS PRACTICES, for example managing the change from paper forms to electronic forms	1	2	3	4	5
(g)RELIANCE on ONE VENDOR or Service	1	2	3	4	5
(h)VENDOR VIABILITY	1	2	3	4	5
(i)EDI STANDARDS and COMPATIBILITY	1	2	3	4	5
(j)OTHER CONCERNS?_____	1	2	3	4	5
(k)_____	1	2	3	4	5

THAT CONCLUDES OUR FORMAL INTERVIEW. Is there anything else you think we should consider in our report on electronic data interchange? Are there any collegues at other companies we might call? Name_____ phone:_____

Thank you very much for your help. Your comments are appreciated, and will help make our report most informative and valuable. We should have the executive summary out to you within 6-8 weeks. Can I verify your address and a little about your company? [[INTERVIEWER: COMPLETE COVER PAGE REGARDING SALES REVENUES, NUMBER OF EMPLOYEES AND INDUSTRY SECTOR.]

Thanks again.

INTERVIEWER: PLEASE EVALUATE THIS RESPONDENT:

(a)_____very helpful (b)____somewhat helpful (c)___not helpful

QUESTIONNAIRE "B"

IMPLEMENTORS/USING EDI QUESTIONNAIRE

3. Is/Was your EDI IMPLEMENTATION MANAGED BY THE FUNCTIONAL DEPARTMENT, or did INFORMATION SERVICES (IS) MANAGE its implementation? (a)___IS (b) ___functional dept.
(c)___committee (d)___ d/k (e)___other answer:_____
_____

BACKGROUND

4. Can you tell me WHEN YOU STARTED IMPLEMENTING EDI?

(a)___this year (b) ___LAST year (1986) (c) ____ 1985
(d)___1984 or earlier

5. How did you go about IMPLEMENTING EDI? Did you:

___(a) Contract with a THIRD PARTY to help implement your EDI system? (IF YES ASK:) Why did you take this approach?

___(b.) Did you implement the system TOTALLY YOURSELF? (IF YES ASK:) Why? [THEN SKIP QUESTION c.]

c. Since you used a third party to help you implement EDI, was that third party: [READ OPTIONS]

(i) ___An independent consultant

(ii) ___A professional services firm

(iii) ___An industry association:_____

(iv) ___A communications company, such as a value added network

(v) ___A Remote Computing Service

(vi) ___A financial services organization

COMMUNICATIONS & HARDWARE ENVIRONMENT

EDI is different from an on-line order entry system. Typically, in an on-line order entry system, your staff or your customers use terminals to interactively input orders or query the system. It does not accept machine readable data from another computer.

6. Did your company have any sort of ON-LINE ORDER ENTRY SYSTEM before it had EDI THAT WAS ENHANCED to become the EDI system? Y/N
Comments:_____
_____
_____

7. Could you please tell me what Value Added Networks (VANs) OR remote computing service (RCS) your company uses for EDI?

_____

_____

8. (a) To your knowledge, were you (or are you still) using any form of electronic mail, including telex or facsimile, TO TRANSFER PURCHASE ORDERS OR INVOICES TO TRADING PARTNERS? Y/N

(b) [IF YES] Is this ___computer electronic mail, ___telex or ___facsimile?

(c) [IF YES] Could you estimate the percentage of your transactions which are [still] sent out this way? _____%

9. What HARDWARE are you using for EDI? Is it a (a) micro, a (b) mini or a (c) mainframe?

Comments:_____
_____

SOFTWARE

10. (a) Did you WRITE THE EDI SOFTWARE youself, did you PURCHASE it, OR did you BUY A PACKAGE AND CUSTOMIZE IT?
___(i)WRITE ___(ii)PURCHASE ___(iii)BUY AND CUSTOMIZE

b. Why did you take this approach?

c. If you purchased software, what vendor did you choose? Why?

d. Could we rate the importance of software features? On a scale of 1-5, with 5 being very important, how important is it for EDI software to:

(i)	BE INTEGRATED with other business applications such as accounting, inventory, etc.	1 2 3 4 5
(ii)	Support GRAPHICS	1 2 3 4 5
(iii)	Be EASILY USED by non-computer users	1 2 3 4 5
(iv)	Be Usable with LIGHTPENS	1 2 3 4 5
(v)	Have ENCRYPTION capabilities	1 2 3 4 5
(vi)	Be EASILY UPGRADED to new standards	1 2 3 4 5
(vii)	ACKNOWLEDGE successful transmission	1 2 3 4 5
(viii)	Report EXCEPTIONS clearly	1 2 3 4 5
(ix)	Have a MAINTENANCE AGREEMENT for updates/fixes	1 2 3 4 5

11. With regard to INTEGRATING EDI SOFTWARE with other applications such as accounting, or purchasing, which is more preferable:

___(a) To integrate the EDI software with your other applications YOURSELF.

___(b) To hire a CONSULTANT OR PROFESSIONAL SERVICES firm to integrate the EDI software with your other applications, OR

___(c) To buy NEW SOFTWARE for accounting, inventory, etc. with built-in EDI functionality.

d. DO YOU HAVE ANY COMMENT ON HOW LONG IT TOOK YOU TO INTEGRATE YOUR SOFTWARE, OR ON THE COSTS ASSOCIATED WITH THE PROJECT?

12. What transactions are you now doing, and which do you plan to do via EDI, and in what time frame?

type of document	time frame now	1988	3yrs	d/k
(a)__Purchase Orders FROM customers	___	___	___	___
(b)__Purchase Orders TO suppliers	___	___	___	___
(c)__Bills of Lading	___	___	___	___
(d)__Invoices	___	___	___	___
(e)__Payments	___	___	___	___
(f) Others_____	___	___	___	___
_____	___	___	___	___

(numbering off)

14. Could you estimate the GROWTH IN THE NUMBER OF EDI TRANSACTIONS, first between the end of 1985 and the end of 1986? ____%

15. And how about your EDI EXPECTATIONS FOR THIS YEAR... what percentage of growth in transactions would you estimate?____%

comments:_____

_____

16. Have you done any cost analysis, on a per-transaction basis, of your PAPER BASED systems for purchase order processing, invoicing or other routine paperwork of this nature? (If yes: What did you find out?)

17. Have you done any analysis of the cost, on a per transaction basis, of any EDI transactions? (If YES: What did you find out?)

18. With approximately how many other companies do you exchange

ANY TRANSACTIONS?(a)1-5
(b)6-10
(c)11-20
(d)21-30
(e)31-40
(f)41-50
(g)50+ how many:_____

EDI TRANSACTIONS:(a)1-5
(b)6-10
(c)11-20
(d)21-30
(e)31-40
(f)41-50
(g)50+ how many:___

ISSUES

THIS FINAL PART OF THE SURVEY DEALS WITH EDI ISSUES AND CONCERNS. DO YOU HAVE JUST A FEW MORE MOMENTS?

15. Let me read you a list of issues and problems which we believe people may be concerned about, and ask you for a rating, again on a 1-5 scale, with "5" being "a serious concern" and 1 being "not a serious concern" and get your reaction:

How much of a concern are:

(a)The actions of your COMPETITORS with regards to EDI	1	2	3	4	5
(b)Concerns about the ENTIRE SYSTEM including hardware and software which you may install	1	2	3	4	5
(c)Network/Data SECURITY	1	2	3	4	5
(d)Software MAINTENANCE	1	2	3	4	5
(e)INTERNATIONAL EDI capabilities, that is, the ability to do business with people in other countries	1	2	3	4	5
(e.i.) Are you doing any international trading now?		Y/N			
(f)Changing BUSINESS PRACTICES, for example managing the change from paper forms to electronic forms	1	2	3	4	5
(g)RELIANCE on ONE VENDOR or Service	1	2	3	4	5
(h)VENDOR VIABILITY	1	2	3	4	5
(i)EDI STANDARDS and COMPATIBILITY	1	2	3	4	5
(j)OTHER CONCERNS?_____	1	2	3	4	5

(k)_____ 1 2 3 4 5

THAT CONCLUDES OUR FORMAL INTERVIEW. Is there anything else you think we should consider in our report on electronic data interchange? Are there any collegues at other companies we might call? Name_____ phone:_____

Thank you very much for your help. Your comments are appreciated, and will help make our report most informative and valuable. We should have the executive summary out to you within 6-8 weeks. Can I verify your address and a little about your company? [[INTERVIEWER: COMPLETE COVER PAGE REGARDING SALES REVENUES, NUMBER OF EMPLOYEES AND INDUSTRY SECTOR.]

Thanks again.

INTERVIEWER: PLEASE EVALUATE THIS RESPONDENT:

(a)_____very helpful (b)____somewhat helpful (c)___not helpful

QUESTIONNAIRE "C"

NO PLANS FOR EDI QUESTIONNAIRE

EVEN THOUGH YOU ARE NOT CURRENTLY PLANNING TO IMPLEMENT EDI, WE WOULD APPRECIATE IT IF YOU COULD ANSWER SOME QUESTIONS ON YOUR COMMUNICATIONS ENVIRONMENT AND ON SOME GENERAL EDI ISSUES.

COMMUNICATIONS ENVIRONMENT

We mentioned that EDI is different from an on-line order entry system. Typically, in an on-line order entry system, your staff or your customers use terminals to interactively input orders or query the system. It does not accept machine readable data from another computer.

3. a. Does your company have any sort of ON-LINE ORDER ENTRY SYSTEM now? Y/N

b. (If NO ask:) Are you PLANNING any type of system like this? Y/N

c. (If YES ask:) Could you please DESCRIBE it.

d. (If YES ask:) Might there be PLANS TO ENHANCE your online order entry system TO BECOME AN EDI SYSTEM. Y/N If yes, when?

(i) ___this year (ii) _____next year (iii) ____within three years (iv) ___no plans/dk

4. Could you please tell me what Value Added Networks (VANs) OR remote computing service (RCS) your company uses for ANY REASON?

_____ _____ _____

5.(a) To your knowledge, are you USING ANY FORM OF ELECTRONIC MAIL, including telex or facsimile, TO TRANSFER PURCHASE ORDERS OR INVOICES TO TRADING PARTNERS? Y/N

(b) [IF YES] Is this ___computer electronic mail, ___telex or ___facsimile?

(c) [IF YES] Could you estimate the percentage of your transactions which are sent out this way? _____%

4. With approximately how many other companies do you exchange transactions in your buying and selling relationships?

(a)1-5

(b)6-10

(c)11-20

(d)21-30

(e)31-40

(f)41-50

(g)50+ how many:_____

ISSUES

7. Let me read you a list of issues and problems which we believe people may be concerned about when considering Electronic Data Interchange, and ask you for a rating, on a 1-5 scale, with "5" being "a serious concern" and 1 being "not a serious concern" and get your reaction:

How much of a concern are:					
(a)The actions of your COMPETITORS with regards to EDI	1	2	3	4	5
(b)Concerns about the ENTIRE SYSTEM including hardware and software which you may install	1	2	3	4	5
(c)Network/Data SECURITY	1	2	3	4	5
(d)Software MAINTENANCE	1	2	3	4	5
(e)INTERNATIONAL EDI capabilities, that is, the ability to do business with people in other countries	1	2	3	4	5
(e.i.) Are you doing any international trading now?		Y/N			
(f)Changing BUSINESS PRACTICES, for example managing the change from paper forms to electronic forms	1	2	3	4	5
(g)RELIANCE on ONE VENDOR or Service	1	2	3	4	5
(h)VENDOR VIABILITY	1	2	3	4	5
(i)EDI STANDARDS and COMPATIBILITY	1	2	3	4	5
(j)OTHER CONCERNS?_____	1	2	3	4	5
(k)_____	1	2	3	4	5

THAT CONCLUDES OUR FORMAL INTERVIEW. Is there anything else you think we should consider in our report on electronic data interchange? Are there any collegues at other companies we might call? Name_____ phone:_____

Thank you very much for your help. Your comments are appreciated, and will help make our report most informative and valuable. We should have the executive summary out to you within 6-8 weeks. Can I verify your address and a little about your company? [[INTERVIEWER: COMPLETE COVER PAGE REGARDING SALES REVENUES, NUMBER OF EMPLOYEES AND INDUSTRY SECTOR.]

Thanks again.

INTERVIEWER: PLEASE EVALUATE THIS RESPONDENT:

(a)_____very helpful (b)____somewhat helpful (c)___not helpful