

VERTICAL MARKET

EDI DIRECTIONS AND POTENTIALS

INPUT

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INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

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EDI VERTICAL MARKET DIRECTIONS AND POTENTIALS

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**Electronic Data Interchange Program
(EDIP)**

EDI Vertical Market Directions and Potentials

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Abstract

There is Electronic Data Interchange (EDI) activity in virtually every industry segment. Research indicates the EDI phenomenon is growing as this cost-effective method of electronically transferring business data wins wider acceptance.

This study, one of a series on Electronic Data Interchange, provides a research-based overview of the entire EDI marketplace, then focuses on individual market sectors to present, in journalistic, anecdotal, and case study fashion, some of the drivers and inhibitors in approximately 40 separate industries. These industries include automotive manufacturers, apparel makers, chemical companies, railroads, booksellers, utilities, banks, government agencies, and more.

End user EDI expenditures for 14 high-level industry segments (manufacturing, transportation, distribution, etc.) are provided for 1987 and forecast for 1993.

The study concludes by identifying opportunity areas for further market development, and presents recommendations to vendors.

EDI Vertical Market Directions and Potentials has 169 pages and 55 exhibits.



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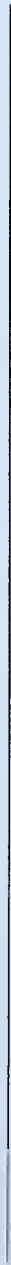
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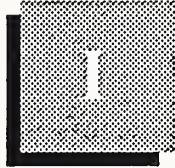
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Introduction





Introduction

A

Background

This report, produced by INPUT's *Electronic Data Interchange Program (EDIP)* examines Electronic Data Interchange (EDI) activities in a wide range of industries.

INPUT defines EDI as the intercompany electronic transfer of business information between applications in structured formats that conform to public or de facto standards (Exhibit I-1).

EXHIBIT I-1

ELECTRONIC DATA INTERCHANGE

The Application-to-Application Exchange
of Intercompany Business Data
in Standard Formats

The information or data thus transferred represents standard business documents such as invoices, purchase orders, and logistical information. EDI techniques are also used for electronic health insurance claims submissions and in agent-to-company insurance industry communications.

EDI commonly involves the transmission of data in one of several standard formats. In most cases, data extracted from corporate applications is translated to the standard prior to transmission.

In many industries, EDI implementations use private or industry-specific standards. Increasingly, commonly agreed standards, such as the Ameri-

can National Standards Institute (ANSI) X12 formats, are being used. The adoption of public standards allows communications across industry lines, thus paving the way for additional information interchange applications.

Many industries are just getting started with EDI. Those active for several years are adding additional electronic transactions to those they are now using.

The reasons for using EDI include the time value of information, cost avoidance, and better inventory control. There are other benefits to be realized by integrating EDI data and corporate information processing.

Often, the first companies in an industry implementing EDI did so as a way of gaining competitive advantage. Many companies then followed the industry pioneers to maintain competitive parity. INPUT's surveys indicate that many companies implemented EDI in response to demands to do so by their customers. The implication was clear: "Use EDI or you will no longer be trading with us."

B

Scope

This study takes the following approach:

Chapter II is an Executive Overview of the entire study.

Chapter III provides an overview of EDI, with particular attention on user survey findings.

Each following chapter examines EDI activity, trends, and directions in several industry segments.

Chapter XII identifies vertical market opportunities and concludes the study.

Definitions of EDI-related terms are found in Appendix A.

C

Methodology

The research for this report consisted of:

- Corporate interviews
 - A structured questionnaire on general information systems and services issues was administered to 210 information systems (IS) managers in 14 industries between March and May, 1988. This survey collected data on EDI awareness levels and EDI states-of-readiness in a broad, representative sample of users.

- An additional 85 in-depth telephone interviews were conducted with EDI managers and with users of the Electronic Medical Claims and Insurance Interface varieties of EDI. This survey was designed to probe EDI-related issues and intentions among companies already involved with the application. The questionnaire used is in Appendix B.
- Exhibit I-2 shows the sample distribution for these two surveys.

EXHIBIT I-2

INTERVIEW SAMPLE DISTRIBUTION			
	IS Managers	EDI Project Managers	Total
Discrete Manufacturing	41	32	73
Process Manufacturing	22	19	41
Transportation	15	7	22
Medical	3	2	5
Services	14	-	14
Utilities	17	2	19
Retail	10	7	17
Banking	18	-	18
Wholesale	3	10	13
Insurance	16	4	20
Federal/State Government	28	2	30
Education	16	-	16
Telecommunications	4	-	4
Other	3	-	3
Total	210	85	295

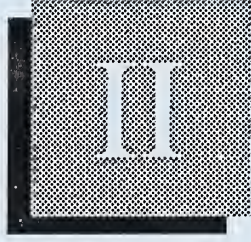
- Additionally, interviews were conducted with industry association representatives and academic observers of EDI developments.
- Vendor interviews
 - Interviews were conducted with senior level management of software providers, VANs, RCS firms, and professional service firms involved in EDI.
- Product, service, and industry analysis
 - INPUT collected and analyzed information on EDI software and services and reviewed secondary research sources. Additionally, INPUT monitored industry publications, attended conferences, and secured other relevant research data to inform this study.
- Custom research projects
 - INPUT has been engaged for several consulting projects bearing on EDI use in several vertical markets. While no proprietary information is revealed, the general knowledge gained is represented in this report.

D

Related INPUT Reports

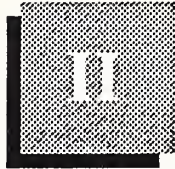
This study is one of a continuing series focused on EDI. Other reports in the series include:

- *North American EDI Service Market Analysis, 1988-1993*
- *North American EDI Service Provider Profiles*
- *EDI Software Products: Issues, Markets, and Trends*
- *EDI Software Product Provider Profiles*
- *EDI Implementation Case Studies*
- *EDI in Professional Services*
- *Network Services in Western Europe, focusing on EDI and EFT applications*
- *X.400 and EDI*
- *International EDI Services*
- *Federal Government EDI Initiatives*
- *Advanced EDI Services (1989)*



Executive Overview





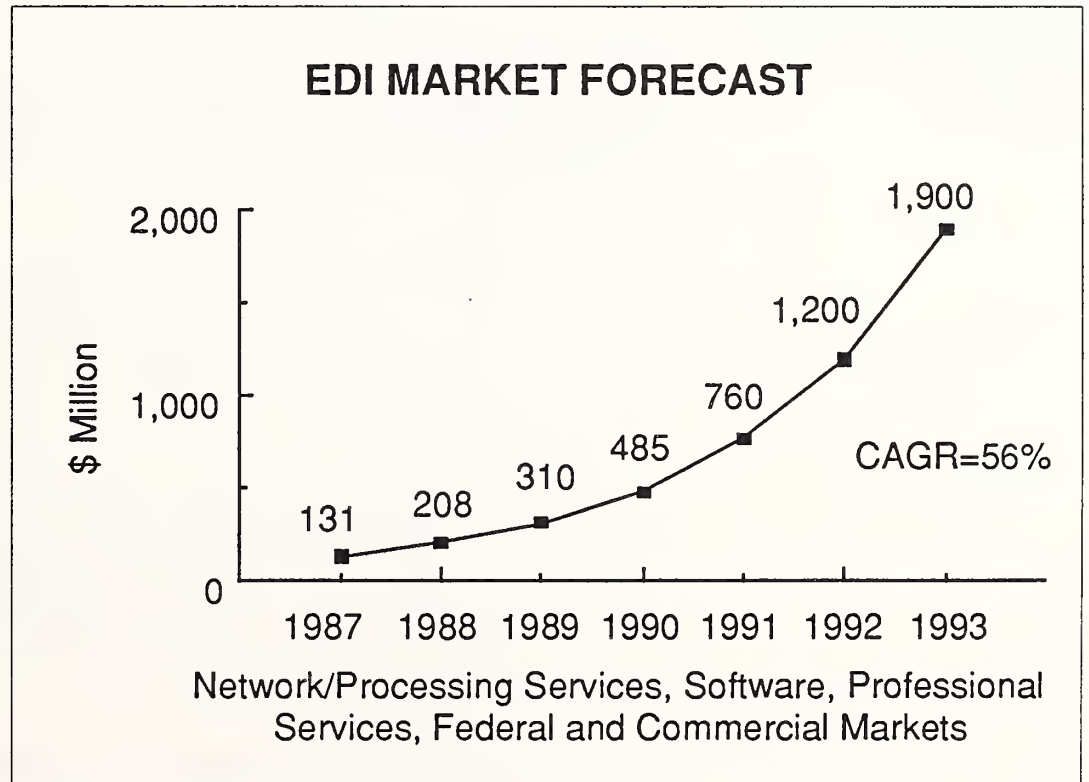
Executive Overview

A

The EDI Market, by All Measures, Is Growing

INPUT sizes the overall EDI market, consisting of network services, processing services, software, and professional services, at \$131 million at the end of 1987. It will grow to nearly \$2 billion by 1993, for a compound annual growth rate of 56%, as shown in Exhibit II-1.

EXHIBIT II-1



Several findings support this forecast. INPUT's research shows that the EDI market will grow as more information service (IS) managers become aware of EDI, as more companies and industries adopt it, as current users add electronic trading partners, and as companies start using additional transactions in their EDI functions.

EDI awareness has increased. INPUT has tracked user's self-rated awareness levels since 1985. Based on a survey of over 200 IS managers, this rating has increased dramatically this past year.

Of the nearly 200 IS managers interviewed, approximately one-third (34%) said they are now using some form of EDI. An additional one-fifth (20%) reported active planning and implementation of EDI projects, while nearly one-fourth (24%) said they are considering EDI implementation.

EDI users reported average EDI transaction growth of 181% between 1986 and 1987. These same users estimate transaction growth of 156% between 1987 and 1988.

On average, users reported 112 EDI trading partners in 1987; they added 74 in 1988 for an increase of 66%.

In short, the signs are clear for an aggressive EDI market growth path.

B

EDI Activity Is Found in Most Industries

Increasingly, companies in most industry sectors are promoting their EDI capabilities to customers, prospective customers, and suppliers by sponsoring EDI educational seminars, participating in EDI standards creation, publishing glossy EDI brochures, and representing their companies and industries in various EDI forums.

Industry associations have taken a key role. It is more than likely that where supportive associations are missing, so too is EDI.

INPUT's research has found evidence of EDI activity in approximately 40 industries.

Existing EDI standards are being adapted and adopted for use by a cross section of industries. Sometimes, the standards are enhanced for industry requirements. Other times, there is a migration from industry-specific formats to more generic formats, allowing additional cross-industry EDI trading. Exhibit II-2 lists several industry specific formats and sectors now using EDI.

In many industries, the EDI technique is adapted to specific industry needs. In the chemical industry, for example, a transaction for the Certificate of Analysis was created. Electronic forms for the banking industry's Letter of Credit have been designed for use in international trade. Electronic "forms" covering medical claims have been invented for use by health care providers and insurance companies.

One pattern emerges: EDI is being embraced by many, if not most, industries.

EXHIBIT II-2

EDI ACTIVITY IS FOUND IN MOST INDUSTRIES

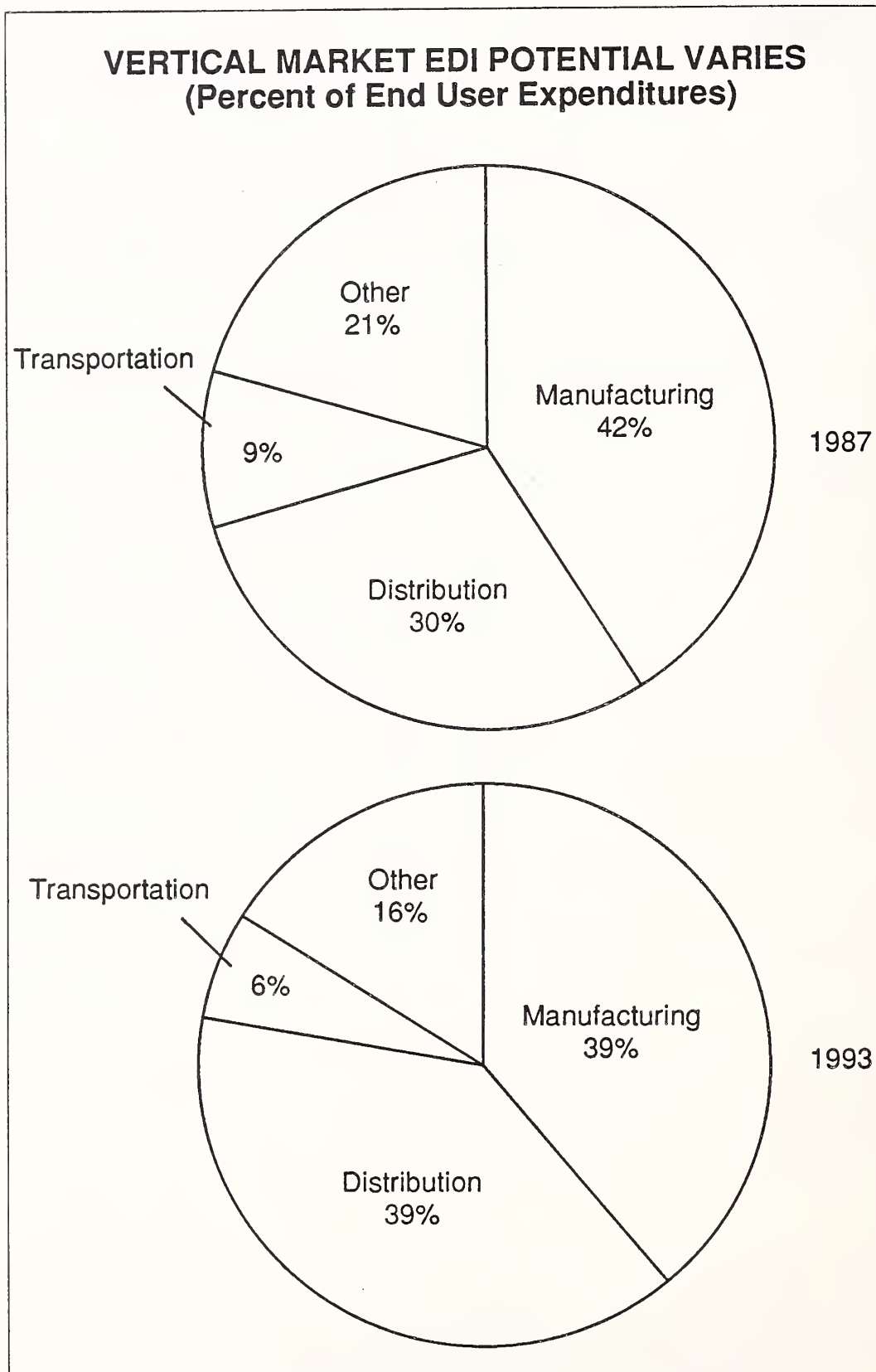
Format Subset	Industry Segment
AIAG	Automobile Manufacturing
CIDX	Chemicals
COMMNET	Medical/Surgical Supplies
COPAS	Oil/Gas
CTX	Banking
EAGLE	Retail Hardware
EDX	Electrical Equipment
EIDX	Electronics
EMBARC	Paper Products
HCFA	Health Insurance
TCIF	Telecommunications Equipment
UCS	Grocery
VICS	Retailers
WINS	Warehousing

C

Vertical Market EDI Potential Varies

Current and forecast end users' proportional expenditures by industry for EDI services and products have been derived. This is shown in Exhibit II-3. (The report provides more detail.)

EXHIBIT II-3



These sizings are based on analyses of several factors:

- Each industry's current end user expenditure level for information services and products. This proprietary data has been developed in support of other INPUT research programs. It considers industry

turnover, census data on the number of companies and the number of employees in each industry, and trends and directions regarding the use of information technologies.

- Evidence of present EDI activity in each of the industries studied, and an evaluated estimate regarding how quickly, and how widespread, EDI will be adopted in specific industries.
- Evaluation of the major EDI network services and their current customer base.

As can be expected, there are differing dynamics working in each industry segment, meaning the sizing presented here is based on the subjective as well as the objective.

D

EDI Market Opportunities Remain

Opportunities for EDI service and product vendors are conspicuous by their absence in INPUT's research. Other opportunities are suggested because they appear underdeveloped.

Opportunities for EDI, beyond developing the existing market, may be found in several of the financial services areas, in legal services, in services targeting small and localized businesses, and in hotel supply, fresh foods, speciality retail, veterinary medicine, and advertising. These are shown in Exhibit II-4.

A company investigating any of these areas would, of course, need to evaluate various factors validating the opportunity and sizing the business potential.

Vendors are advised to target new markets while fine tuning their marketing approaches. Further, they should investigate new market opportunities, particularly those adjacent to currently served areas. Vendors should also investigate adding value to existing EDI services and should evaluate various partnering opportunities.

Users should understand how EDI is being approached both in their own and similarly structured industries. Because of EDI's strategic value and proven ability to reduce expenses, consideration should be given to implementing EDI through outside assistance. In this way, mistakes can be avoided and the learning curve accelerated.

EDI shows every indication of being poised for explosive growth through wide-scale adoption. Users and vendors making informed decisions are most likely to be successful in reaching their goals.

EXHIBIT II-4

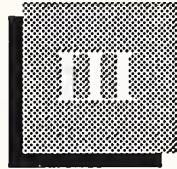
EDI MARKET OPPORTUNITIES REMAIN

- Financial Services
- Small and Localized Business
- Fresh Foods
- Veterinary Medicine
- Legal Services
- Hotel Supply
- Specialty Retail
- Advertising



EDI Market Overview





EDI Market Overview

This chapter presents the results of INPUT's user interviews regarding EDI concerns, highlighting vertical market findings. It also shows INPUT's overall market forecasts and sizes each of thirteen industry's EDI potential.

A

Overall EDI Issues and Concerns

EDI involves several issues including standards, control and financial responsibilities, business practices, cost issues, and security. Some of these concerns vary by industry, as indicated in the following chapters.

These concerns can influence market acceptance and the success of user and industry EDI implementations.

1. EDI Standards and Compatibility

EDI standards and their compatibility with existing systems and those of trading partners is the primary user concern.

Users appear aware of pressure on proprietary and industry-specific formats to conform to public standards and are uncertain about the migration plan of X12 to the international EDIFACT standards. There is also uncertainty about the appropriate roles of various EDI standards-making organizations.

Users' concerns on standards and compatibility averaged at the highest rating (4.4 on a scale of 5), with many users professing confusion about the status of standards.

INPUT believes that users are often dealing with partial information, but nevertheless, the perceived unsettled status of EDI standards is inhibiting the market; meanwhile the acceptance of cross-industry standards is having a countervailing effect, encouraging cross industry trading and the overall growth of EDI.

The use of standards by major corporations, particularly those with cross-industry trading relationships, is having a major impact on turning previously “academic” standards into standards applied to real needs.

2. Security

a. Confidentiality Is Critical

Sensitivity to security has been heightened with the much-publicized phenomena of computer viruses, which can take a benign form as a “peace message” or a Christmas Card. Far more destructive are “Trojan Horse” programs that can erase or scramble data and programs. The Iran-Contra affair, during which archived electronic mail files were widely publicized (files few realized were available after erasure) is another recent event heightening security awareness.

Information about a company and its customers and sales is generally held to be confidential and other companies are granted access to this information only to perform needed services in support of the trading function.

b. Survey Findings

Users interviewed by INPUT rated security at a relatively high 3.6 (on a scale of 5), but below standards-related issues and vendor viability.

Many companies are reluctant to talk about security concerns; however at least one large potential user company has assigned its security chief to devote attention to EDI security.

Some companies have higher security requirements than others. In certain industries, such as petroleum, individual transactions are large and errors can be particularly damaging, whether caused by misplaced decimals or by delay.

Security concerns relate to a number of issues. In addition to potential leaks of competitive information, potential exposure in law suits is a concern.

- Companies do not want to be accused of having viewed or altered a competitive company’s data.
- One oil company EDI user describing this concern noted that subpoenas have been issued for archived data and memos, data that could have been altered.

A common concern is the vulnerability of information passing through third parties.

- Users are reluctant to allow others access to their mainframes and many isolate it from networks.
- Using a microcomputer (or other processor) as an EDI front end would appear to address the issue by isolating the mainframe from direct network access. Many users have taken this approach.
- Third-party EDI offers a layer of security since trading partners do not directly access each other's computers.

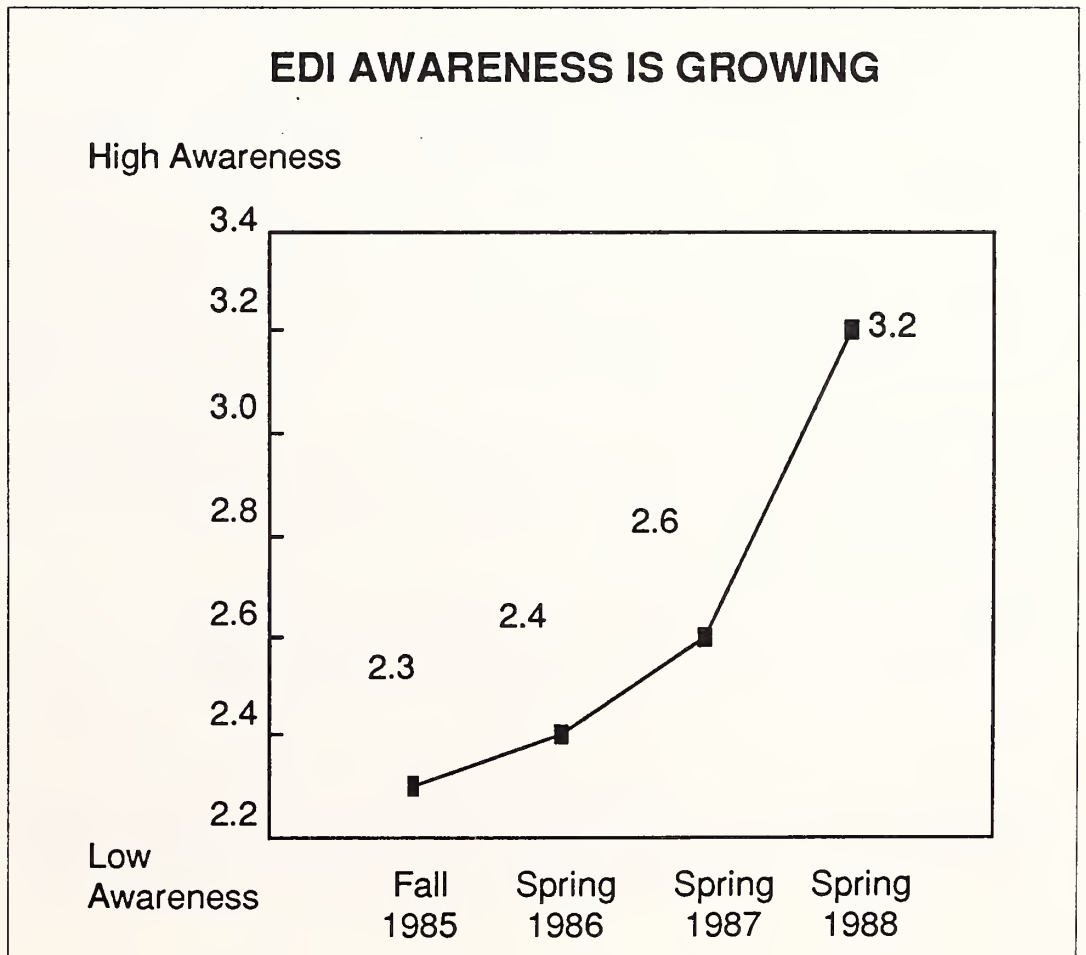
There are also concerns that data be properly translated between formats and validated.

Users are concerned about internal breaches of security as well. A company maintaining parallel paper and electronic systems may fear an unscrupulous employee issuing duplicate transactions, and through collusion with a trading partner, gain from a redundant purchase order or other transaction.

3. Awareness

INPUT has tracked users' self-rated awareness quotients in several surveys since 1985. Exhibit III-1, based on a survey of over 200 IS managers, shows how this awareness has changed.

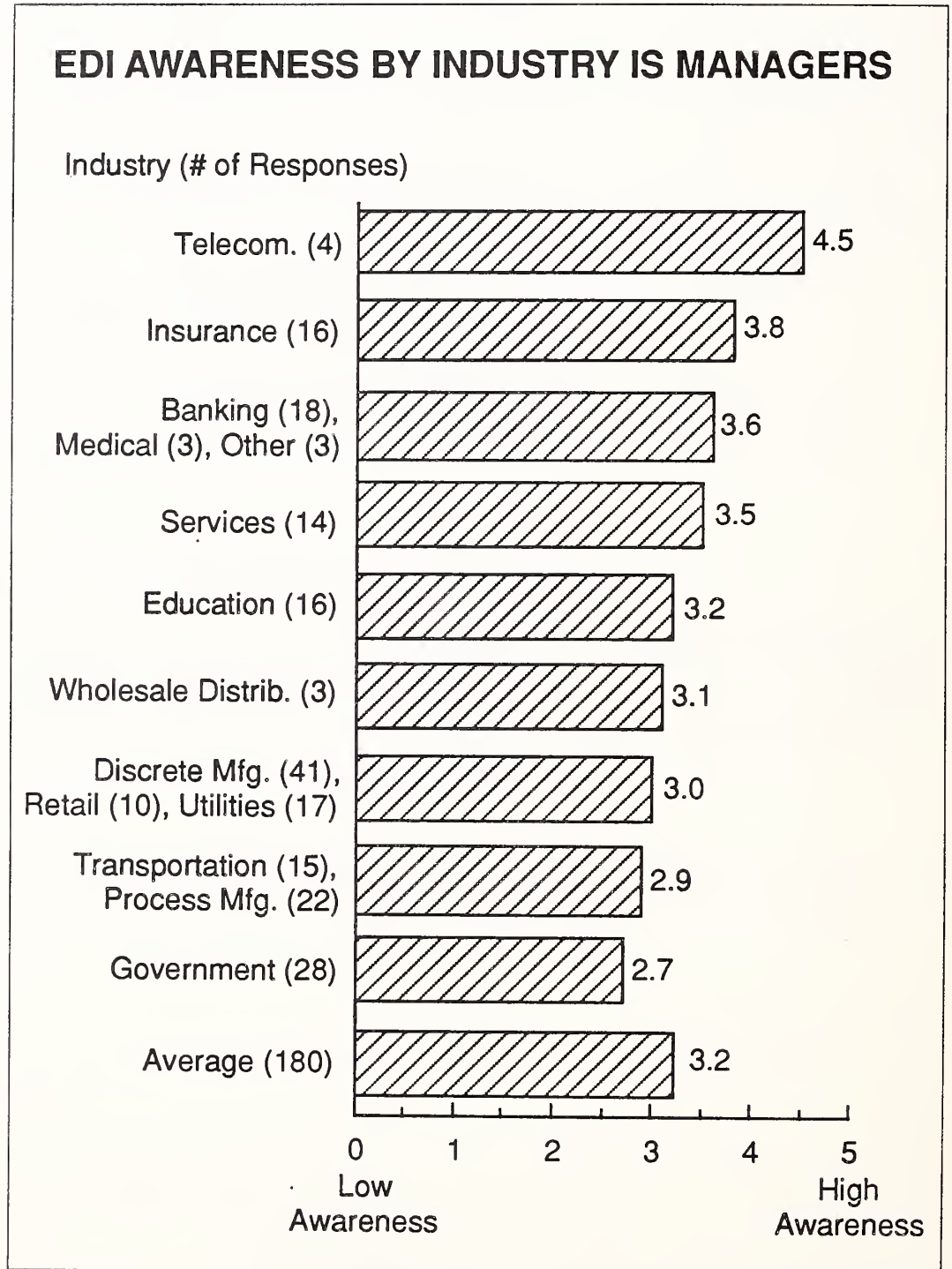
EXHIBIT III-1



As the exhibit illustrates, awareness of EDI is clearly increasing, with a substantial jump shown between the last two surveys.

However, as Exhibit III-2 shows, EDI awareness among IS executives varies by industry.

EXHIBIT III-2



More critical than IS awareness of EDI is upper-management awareness, since EDI potentially impacts multiple departments within the corporate environment.

- In a study commissioned by the American Electronics Association, 44% of the senior managers and executives surveyed confessed not knowing anything about EDI, a finding that INPUT believes may be consistently applied to many other industries.
- Additional marketing and promotional efforts are needed since EDI is a corporate, rather than an IS, issue.

4. Cost Savings

a. About Data Entry

The Data Entry Management Association reports that nearly 30% of an IS budget is derived from data entry, with 80% of data entry costs attributed to labor.

Technology is addressing this basic IS element with optical character recognition, voice data entry, and other methods. Regardless of methodology, most information needed for processing comes from documents.

In recent years, data entry functions have moved from a centralized, IS-based service to the end user level. Among advantages of this decentralized approach are faster data input from source documents and fewer errors, since end users are more familiar with the data and more inclined to accurately enter the information needed in their functions.

With EDI, core data is entered once by the document originator and incremental information may be added as the transaction moves between companies and internal departments.

b. Survey Results

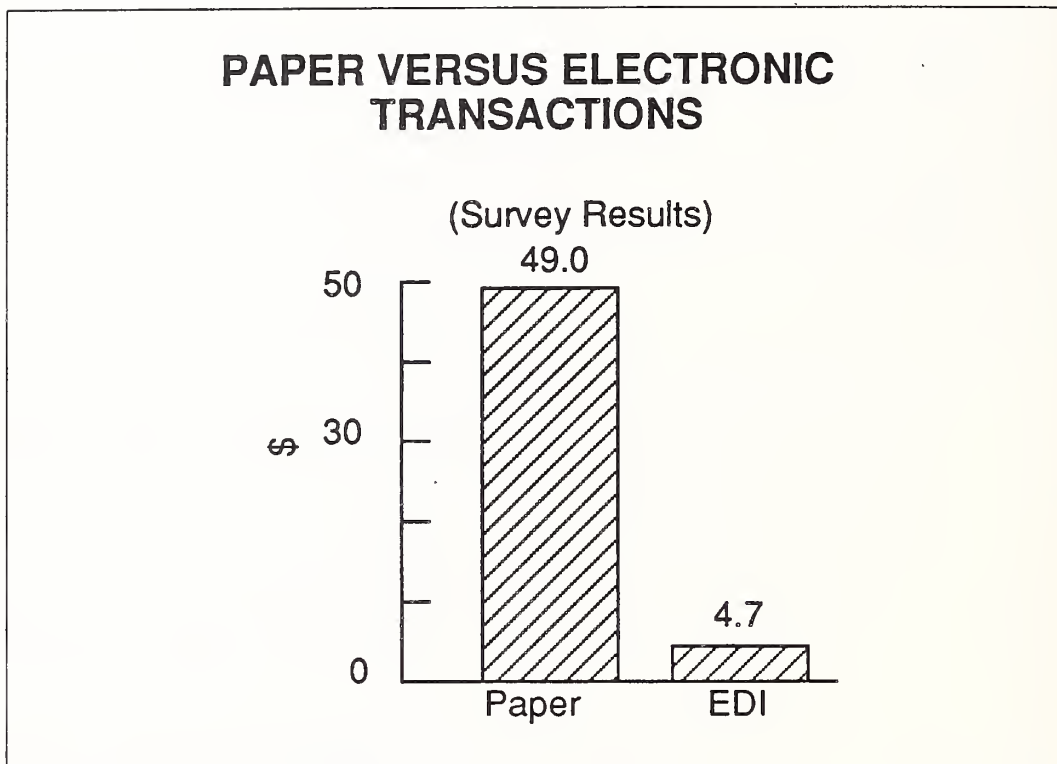
Interviewed users expect EDI to lead to substantial cost savings in their buying and selling relationships, but the majority of respondents (53%) failed to examine their costs per paper-based transaction.

- INPUT has found that new technology cost justifications are often done on a soft dollar, qualitative basis rather than on a quantified basis.
- It is sometimes difficult to separate out EDI from related systems, and many managers rely on the intuitive or the obvious when evaluating EDI's benefits. This may inhibit market acceptance, as it permits objections to be raised to which there is little or no data available for response.

Those users doing an analysis of their paper-based transaction costs said that on average, each paper-based transaction cost \$48.54, while each EDI transaction averaged \$4.70 or one-tenth the cost.

These findings are illustrated on Exhibit III-3.

EXHIBIT III-3



Other respondents reported savings in other terms:

- “We used to have five more people in the office to handle paperwork. We’ve saved \$100,000 in salaries.”
- “It used to take us four days to process the paperwork. Now it takes us less than an hour to process the same orders.”
- “We didn’t do it to save money. We did it as part of our competitive tactics.”

However, a few users reported no savings, one saying, “You don’t get any savings if you have only one or two customers using EDI.”

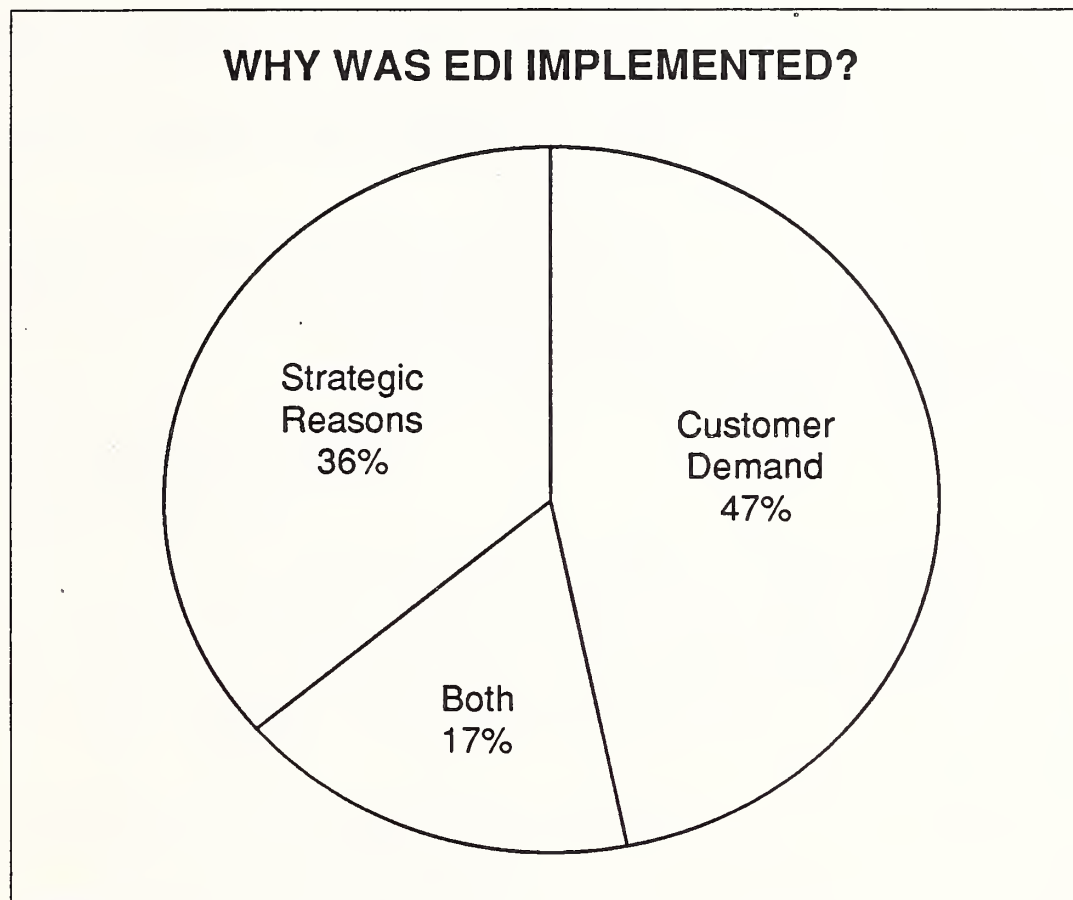
5. Implementation Issues

a. Reasons for Implementing

As shown in Exhibit III-4, most current EDI users (47%) implemented the application in response to their customers, while 36% adopted EDI for their own reasons, with the balance (17%) citing both motivations.

- In several industries, such as automobile manufacturing and retailing, companies are requiring their trading partners to use EDI as a condition of continuing a business relationship.

EXHIBIT III-4



- One auto executive called the process “desourcing” a supplier who has failed to comply with an EDI request.
- In some instances, the approach is only slightly more subtle: suppliers invited to a trading partner conference may be told that it is “likely” that those not adopting EDI will no longer be suppliers.
- This “big stick” approach is apparently an American industry phenomenon; sources in Europe and Canada have reported this coercion is not found in their business environments.

Specific corporate reasons cited for adopting EDI were desires to reduce inventories and improve cost effectiveness, cementing relationships with suppliers, strategic advantage, and improved customer service.

b. Who Implements EDI?

EDI managers interviewed by INPUT report that in most instances (90%), the IS department was solely or partially responsible for the EDI implementation. Since EDI is an application of computing and communications, this is expected.

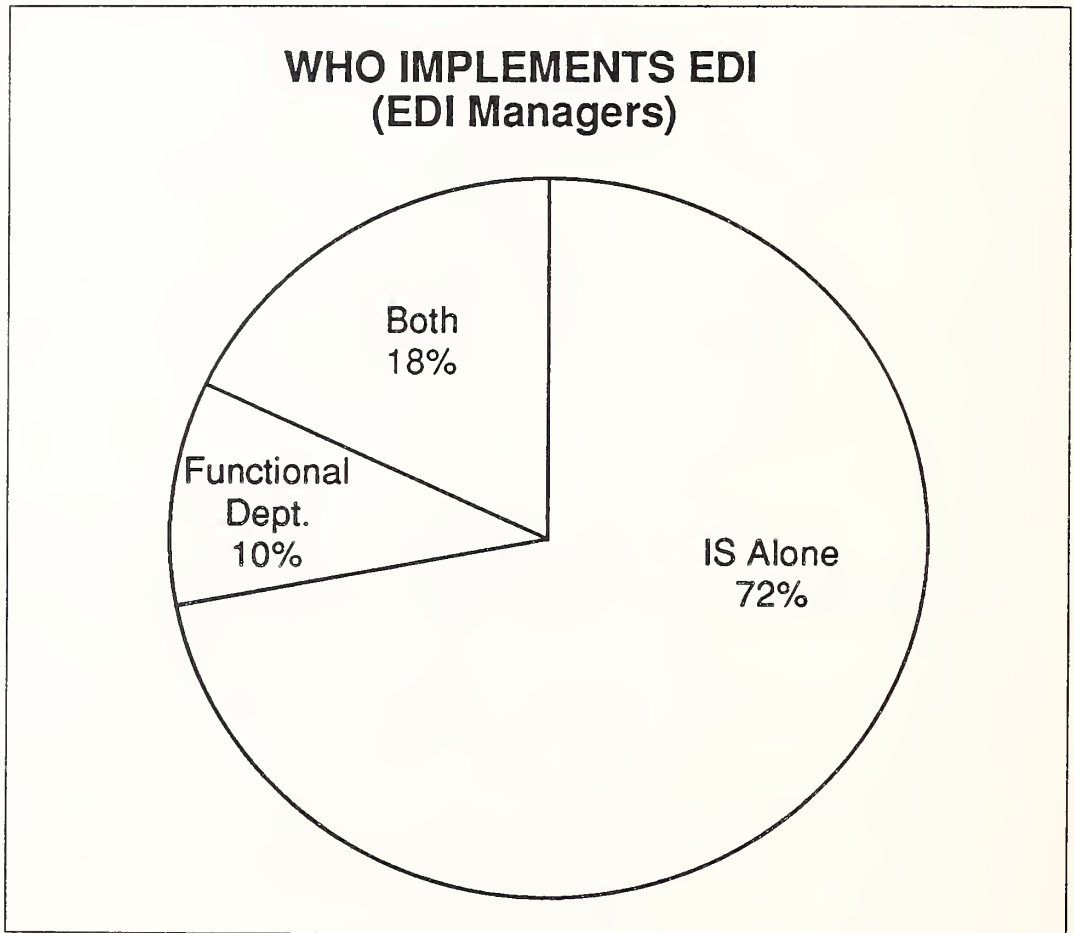
However, IS did not necessarily go it alone. Eighteen percent of the respondents reported that IS and a functional department managed EDI

implementation jointly. This partner may have been marketing, material planning, purchasing, or a combination of departments.

In 10% of the cases, the functional department managed EDI implementation alone.

These findings, show in Exhibit III-5 are expected to shift towards more joint implementation, with IS and functional departments sharing development responsibilities.

EXHIBIT III-5



c. Implementation Assistance

Users were asked if they implemented their EDI system alone, or if they had help. Respondents were nearly evenly divided between those who implemented without outside help and those that had assistance.

Of those reporting receiving external assistance, 82% received it from value-added networks (VANs) and 8% received assistance from industry associations. This finding is not surprising given that VANs offering EDI services have much to gain by assisting users.

What is surprising is that in some instances, industry associations have not been successful in introducing their members to EDI. This is discussed in the following chapters.

6. Who Pays?

Most EDI third-party network services permit billing to be allocated between trading partners, based on the business relationship.

Internally, chargeback systems are being adopted to bill end user departments for EDI transactions.

Often the hub of an EDI trading cluster will provide EDI software and pay for network services to encourage its trading partners to use electronic trading.

7. Competitive Concerns

Several users reported they were investigating or implementing EDI because of competitive reasons: either their direct competitors were believed to be implementing EDI or their major customers indicated (sometimes rather strongly) that future business would be dependent on the supplier's ability to handle electronic transactions.

The average rating given regarding a company's competitor's actions in EDI was a mid-range 3.3 on the scale of 5.

8. Internal Changes

On average, users rated their concerns regarding the changes required in converting paper forms to electronic methods above midrange, at 3.6 on the scale of 5.

Usually, the change from manual to electronic systems will involve parallel systems as the change-over is implemented. This does add costs due to maintaining dual systems.

However, users converting to EDI who wish to trade with others maintaining paper-based systems can do so without operating a parallel system. A growing number of third-party network services will convert EDI data to mail-delivered paper documents, E-mail, or facsimile-delivered documents.

Users usually test one or a few documents at a time to allow for gradual system adoption with minimal disruption or "surprises."

Users have sometimes gotten "stuck" in pilots, primarily because EDI may have been implemented under IS' direction without a corporate mandate or functional department champion. These pilots may have been considered demonstration projects by the IS department.

9. Legality

The acceptance of EDI-transmitted documents as binding contracts is left to the marketplace and negotiation between individual buyers and sellers.

Trading partners usually agree prior to electronic trading that EDI documents will have the same status as their paper-based equivalents, carrying the same terms and conditions as previously used methods.

A survey of several EDI active firms found that no industry-wide contracts exist, nor was one advocated; that legal issues are best addressed by each individual trading partner in a relationship; and that standardized legal agreements are not possible.

Legal issues commonly addressed by contracts between trading partners cover definitions, standards, how to share costs, and responsibilities for advising of changes in networks. Such contracts usually reference existing contracts as incorporated in the EDI trading agreement.

A committee of the American Bar Association, the Electronic Mail Association, the TDCC/EDI Association, and a European academic study group are all evaluating the legal issues involved in electronic trading.

Assuming an EDI system verifies data reception with a functional acknowledgement, EDI transmissions have the same legal force as Telex, which uses an answerback code to verify message receipt.

In some international regions, signatures are required by law for business transactions. Accordingly, at least one network vendor is examining ways of transporting digitized signatures (and other graphics) to meet this requirement. The X.400 message handling standard is expected to help in this area.

10. Vendor-Related Concerns

a. Vendor Viability

Vendor viability was the highest-rated vendor-related concern.

Users need assurances that any investment or effort incurred evaluating vendors and encouraging their trading partners to use a specific vendor will not be in vain.

Vendors rumored to be acquisition candidates or facing unfavorable financial news (which may be unrelated to their EDI business) need to overcome users' perceptions of vendor instability. This becomes a public relations task.

b. Reliance on One Vendor

Users rated this concern slightly below midrange on the scale of 5, and it trailed all other concerns. Since there are over 30 EDI software firms, and several vendors now offer EDI services, most users have options.

Service and software providers are reinforcing their relationships with customers through user groups and newsletters. It is obviously in their interests to maintain long-term relationships for maintenance and licensing agreements, add-on sales, professional service contracts, and other opportunities.

c. Vendor/Industry Focus

While many of the third-party EDI network services and software companies address a broad marketplace, historically there has been a tendency for industries to gravitate towards a few such providers.

Exhibit III-6 indicates the apparent industry focus of several such companies.

EXHIBIT III-6

**VENDOR INDUSTRY FOCUS
(Examples)**

Vendor	Type	Primary Industries Served
DNS	Software	Railroads, Major Shippers
GEIS	Network Service	Retail, Manufacturing, Petrochemicals, Banking, Trade, and Transportation
McDonnell Douglas	Network Service	Grocery, Transportation, Aerospace
Ordernet	Network Service/Software	Grocery, Hard Goods, Pharmaceuticals, Medical/Surgical, Retail
Rail Inc	Network Service	Railroads, Shippers
Supply Tech	Software	Auto Manufacturing
TranSettlements	Network Service	Motor Transportation, Shippers

11. Human and Business Factors

There are a number of human and business factors to be considered by those promoting EDI systems.

a. Human Relationships

Relationships developed over time can hinder acceptance of EDI. People like personal contact with business associates, and this element may be stronger in some industries (and companies) than in others.

b. Sales Staff Concerns

When EDI is implemented for marketing purposes, concerns regarding compensation and commission issues are often heard from the sales staff. Management is wise to avoid any changes in the commission plan, recruiting the sales staff to sell EDI to the customer base for the benefit of all, but making known its expectations for improved customer service and market development.

Sales staff concerns may be addressed by using a proactive management approach in co-developing (with sales) an EDI-related sales policy covering compensation issues and in expressing management expectations for additional personal customer service.

- The EDI system should be implemented in such a way as to route a copy (electronic or hard-copy) of a sales order or order confirmation to the account manager or to allow access to monthly summary reports by salesman, product line, and customer.
- EDI does not lead to bypassing salesmen or brokers or to impeding personal relationships in the sales channel.
- Rather, because less time is spent by sales staff correcting errors and handling routine paperwork, sales calls are more productive and sales staff can work in a close, consultative role with customers on new product development. Further, marketing strategies and customer service programs can be improved.

EDI generally reduces the number of routine phone calls, and the remaining calls become more precise and productive; users have more background information and know how they want to resolve issues.

EDI can also help mitigate the problems of high personnel turnovers in order processing and similar clerical functions. Less-experienced operators become more efficient due to the intelligence of the EDI system and can better represent their company.

c. Attitude and "Turf" Factors

IS managers are overcoming their "protective" postures regarding the facilities in their charge. There is growing recognition that IS serves the company and is not an entity unto itself.

Since EDI replaces current methods, functional managers have often developed protective attitudes towards their units and are sometimes resistant to change.

These problems point to the need for EDI to become a corporate-wide project. Not only can EDI benefit individual departments, but it benefits the entire corporation.

12. How Is EDI Internally Sold?

Many companies have developed sophisticated marketing programs to encourage EDI use within a company and the trading cluster. This becomes a market differentiator for the firm and enhances its image as being on "the cutting edge" in using technology for customer benefit.

Often, a full-time EDI coordinator/marketeer is assigned EDI marketing responsibility. Marketing brochures, videotapes, and trading partner conferences are often produced to educate members of the trading cluster and encourage usage.

User's ratings of EDI concerns are shown in Exhibit III-7.

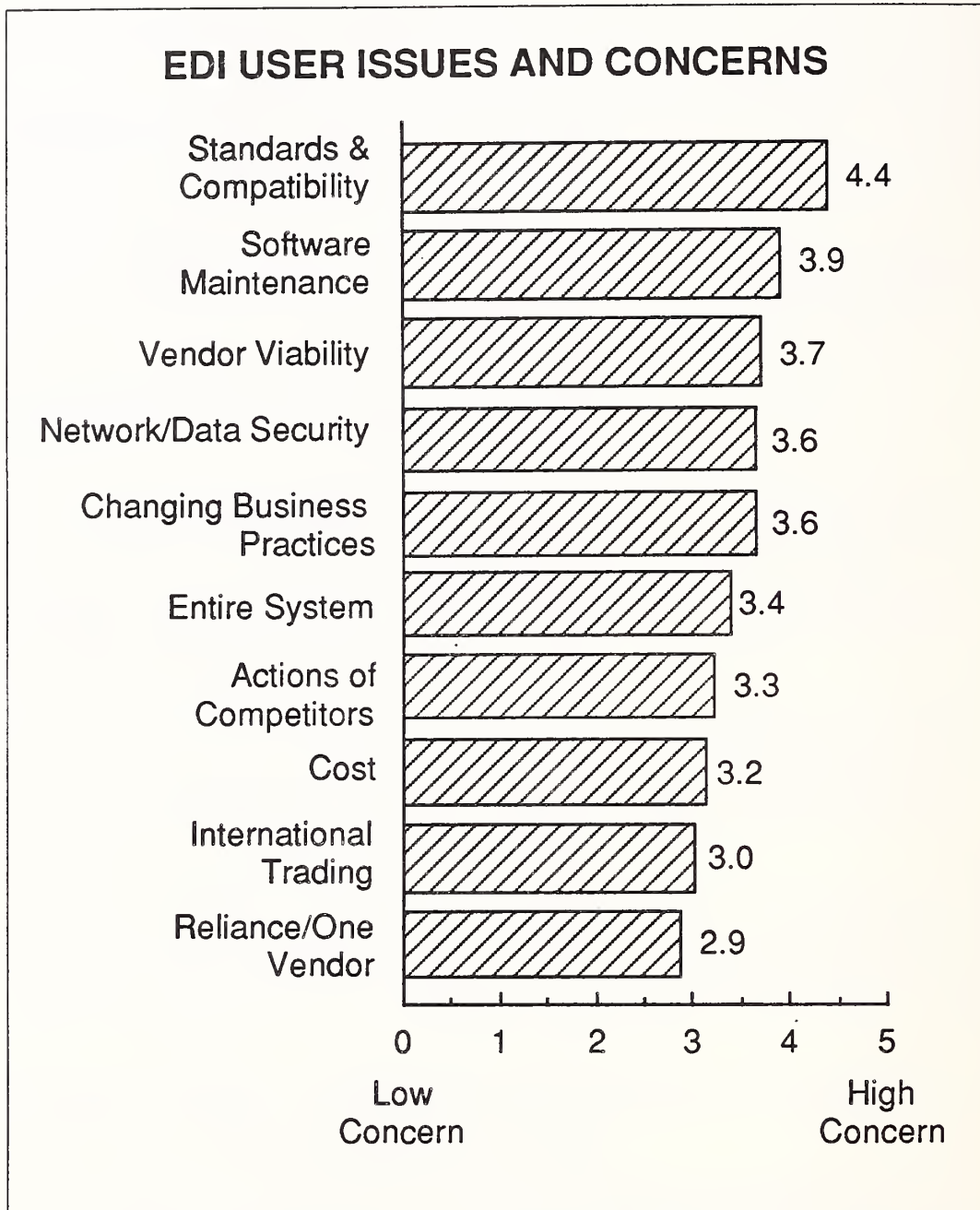
13. Graphics

The merger of images such as computer-assisted design and manufacturing (CAD/CAM) files with EDI will support design, specification, and blueprint exchanges between trading partners.

Graphics capabilities in association with EDI will be increasingly relevant in several industries such as apparel, aerospace, federal government (specifically defense), speciality manufacturing, telecommunications equipment, and electronics.

- GE Information Service's Design*Express has this capability, using a version of the IGES CAD\CAM standard. The service is being resold by Microdynamics (Dallas, TX), a CAD/CAM company focused on the apparel industry.
- Videolog, Inc. (Norwalk, CT) provides a videotex data base of components to the computer and electronics manufacturing industries, a service used by Schwerber, an electronics distributor. Schwerber, which has recently purchased Videolog, permits on-line ordering through the system.

EXHIBIT III-7



- CAD CAM, Inc. (Dayton, OH), developed the Wide-Scale Shared Data Operations Management (WSSDOM) system, linking manufacturers with suppliers and distributing graphics and text data to support purchasing decisions in speciality parts manufacturing.
- Software company Supply Tech has proposed a format and high-speed data communications method permitting CAD files to be transferred over dial-up lines. The method, said to be compatible with proposed X.400 standards, will likely be used over AT&T's forthcoming EDI service. The telecommunications industry EDI group has started examining ways to transfer such data, and AT&T's manufacturing operations will be a prime user of AT&T's EDI service.

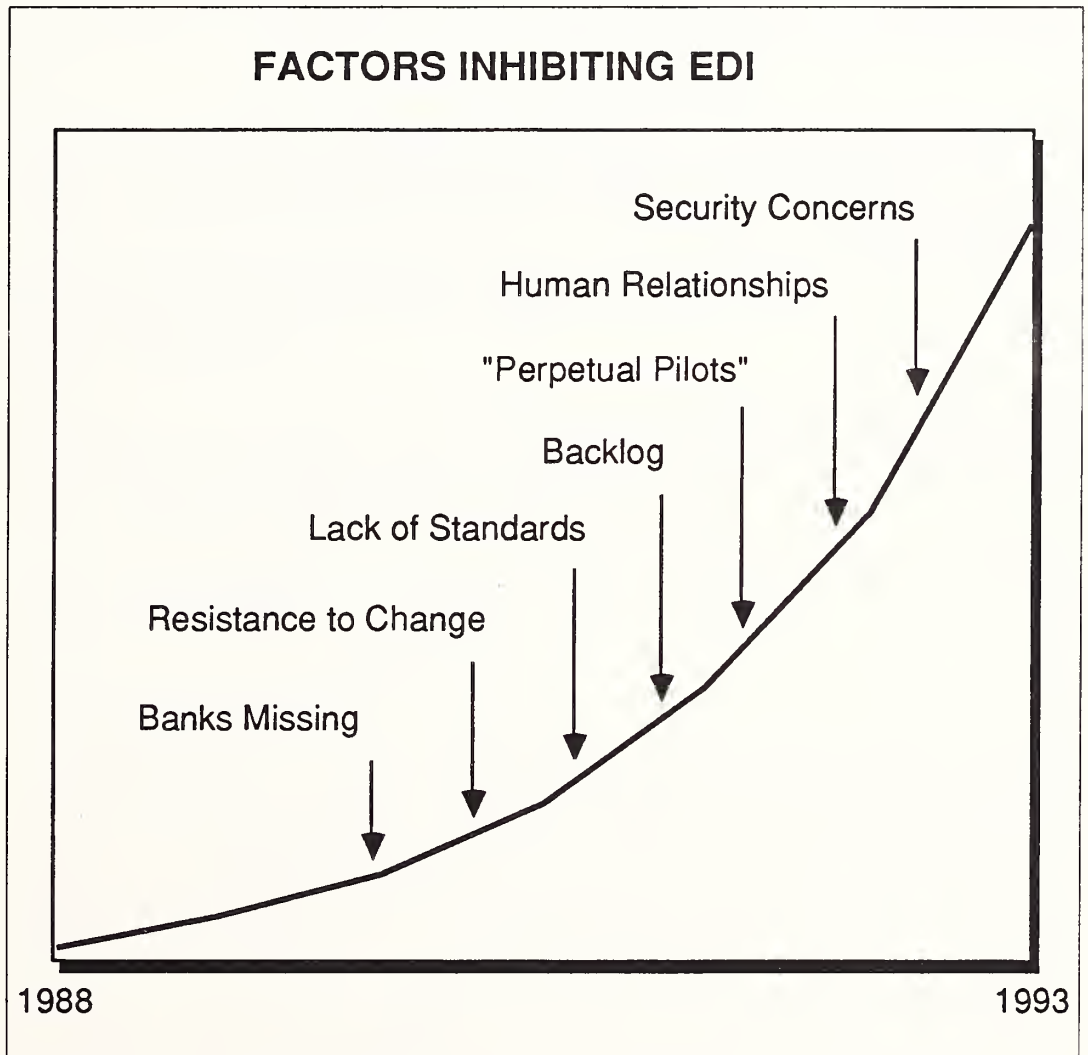
INPUT's survey shows that while some respondents (particularly in discrete manufacturing) rated the use of graphics in association with EDI highly, on average users do not see this feature as important and it received the lowest rating.

B

Market Inhibitors

It is necessary to acknowledge and address factors that will inhibit EDI's development in one or several industries, as illustrated in Exhibit III-8. Most of these inhibiting factors are self-descriptive, but some discussion will help clarify users' concerns.

EXHIBIT III-8



1. Resistance to Change

Without management directives to implement EDI, many corporate end user departments, and even whole industries, may be static, handling business as they always have. The press of daily activities, industry traditions, and "turf" factors often prevent advanced planning and inhibit planning within both industries and companies.

As EDI can reduce headcounts, management should be aware of labor relations issues and should use attrition and reassignment to adjust department loading.

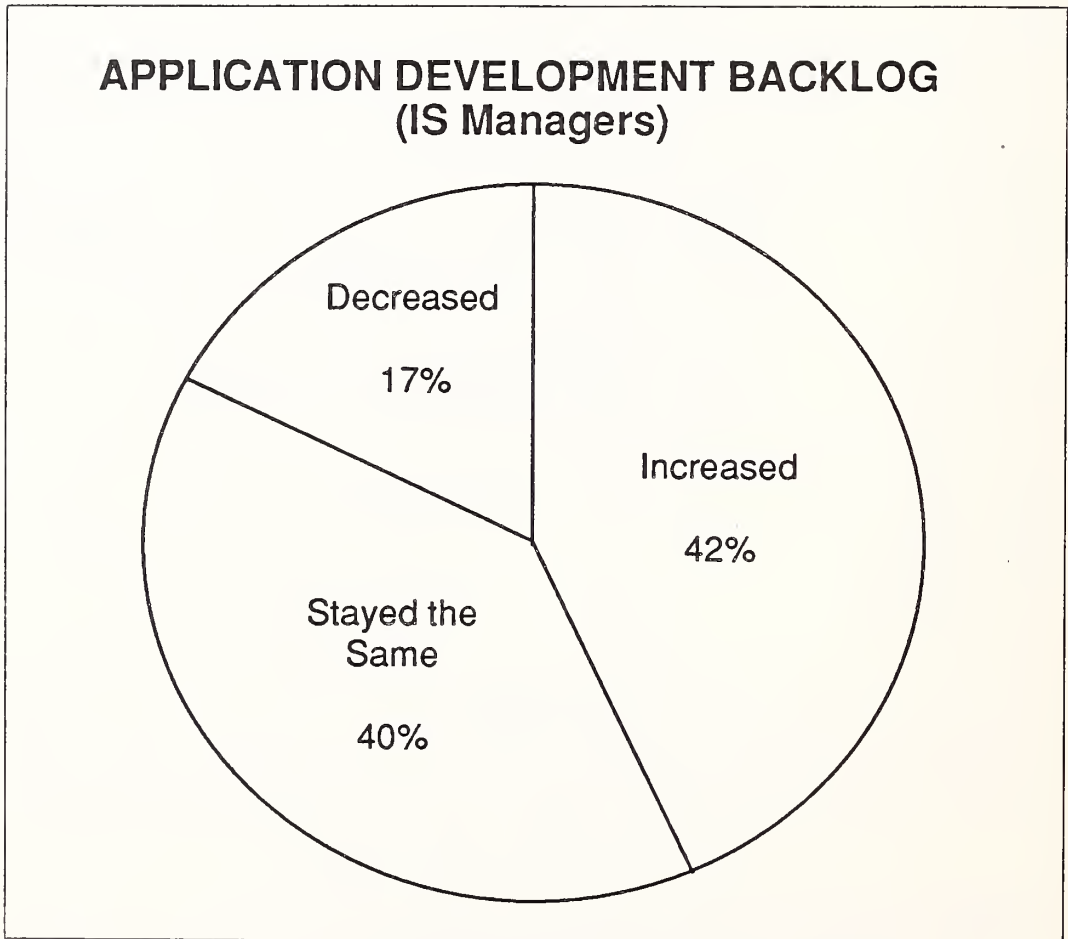
2. Perpetual Pilots

IS departments have often launched EDI pilots to gain experience with the technique. However, end user departments may not be aware of the opportunity available due to poor internal marketing; they may be unwilling to participate without a corporate commitment and department involvement in system development.

3. Backlogs

INPUT's surveys have found that for 42% of the users questioned, the applications backlog has increased, as shown in Exhibit III-9.

EXHIBIT III-9



An applications backlog may prevent IS departments from implementing EDI without an additional resource allocation and a priority impetus from corporate management.

As the scope of EDI implementation becomes clearer with the implied integration requirements IS will find it is not dealing with just one new application. Entire systems may need adjusting to respond to the change.

4. Perceived Lack of Standards

Although there are an ample number of transaction sets covered by EDI standards, including those developed to conform to industry specific needs, many users perceive standards as unsettled. This is illustrated in the survey findings that place standards and compatibility at the top of the concerns list.

Where industry specific standards predate ANSI X12 standards (e.g. pharmaceuticals and the Ordernet/NWDA standard and grocery with the UCS standard), those formats are widely used. However, the trend in most industries is towards X12 *in addition* to industry-specific formats to facilitate cross-industry trading.

For companies believing that standards are deficient, an appropriate response is to become involved in developing the standards for unique industry or corporate requirements and to develop an understanding of the standards and their relationships.

5. Security Concerns

Although network service vendors work to insure data security, many companies are reluctant to allow links to their production mainframes for fear of security breaches, as discussed above.

Encryption and authentication techniques are available for users requiring secure transactions.

6. Banking Services Missing

As a group, banks have been hesitant about becoming EDI service providers. First, there are questions on their appropriate role: should they be service providers in their own right, or should they be working with other providers to complete the cycle in a buy/sell transaction with an electronic funds transfer (EFT), accompanied with EDI information about the payment.

Secondly, banks have been concerned about the ability of their existing EFT networks to carry the volumes of data traffic possible with EDI.

With the exception of the institutions involved in General Motors' electronic payments program, banks are largely waiting for other banks to get involved in EDI. If banks are to provide EDI payment services, it necessitates having electronic relationships with other institutions ready, willing, and able to accept EDI/EFT transactions.

INPUT believes that the uncertainty of the banking industry regarding its appropriate role in the EDI market is inhibiting users from optimizing, and in some cases, adopting, the technique. There will be greater recog-

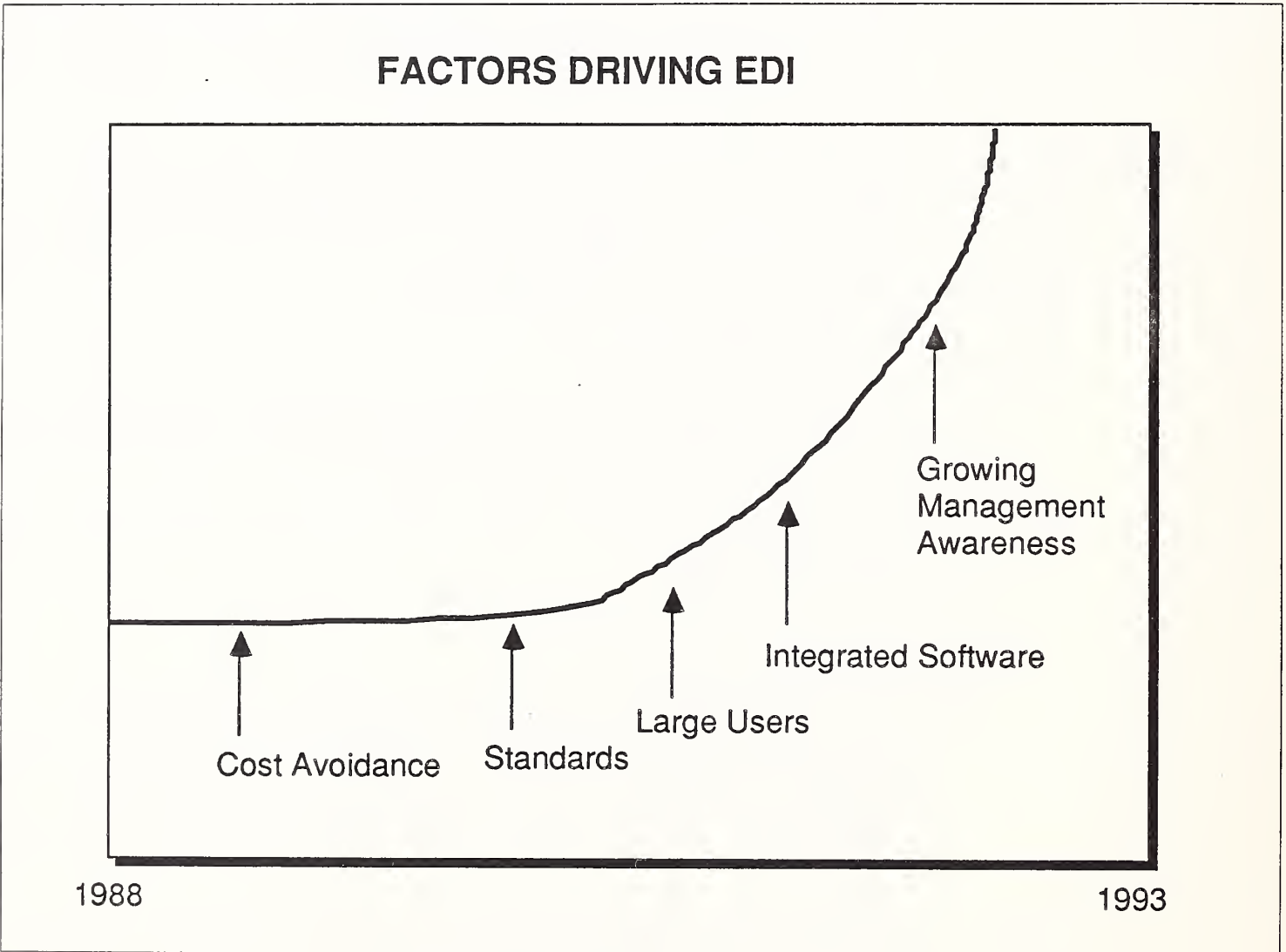
inition of EDI's benefits when a purchasing transaction can be culminated in an electronic payment. This means that the banks need to participate and to help develop EDI services.

C

Market Activators

INPUT believes the market's driving forces will overcome existing inhibitors. There is clearly a convergence of technological and business factors that are driving EDI use, as shown in Exhibit III-10.

EXHIBIT III-10



1. Cost Avoidance

Many companies have looked to EDI as a means of reducing expenses. This is especially critical in manufacturing industries such as automobile, heavy equipment, and apparel, where offshore suppliers have put severe price pressures on "made-in-U.S.A." products. However, cost avoidance is usually not the sole reason for adopting EDI. Corporations are increasingly pursuing EDI for strategic or competitive reasons.

2. Large Users

Companies dominating their industries have forced dependent suppliers to use EDI as a condition of doing business. Others have offered discount prices as an incentive to use electronic channels for trading. Regardless, the result is what has been termed "the domino effect" that affects an entire distribution and manufacturing chain.

3. Industry Associations

Industry associations, on behalf of their members, often take an active role in promoting EDI awareness and implementation within their segment.

Occasionally, the association develops a request-for-proposal for an industry-wide EDI implementation. Other times, an EDI service vendor may receive an endorsement.

Exhibit III-11 provides a partial listing of agencies and industry associations active in EDI.

EXHIBIT III-11

AGENCIES AND ASSOCIATIONS INVOLVED IN EDI STANDARDS (Partial Listing)

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

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

American Trucking Association
2200 Mill Road
Alexandria, VA 22314
(703) 838-1926

Association of American Railroads
50 F Street NW
Washington, DC 20001
(202) 639-2325

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

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

EDI Association/Transportation
Data Coordinating Committee
1101 17th Street, NW
Washington, DC 20036-4775
(202) 293-5514

EDI Council of Canada
5401 Eglinton Avenue West
Suite 103
Etobicoke, Ontario M9C 5K6
(416) 621-7160

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

Health Industry Business
Communications Council
5110 N. 40th Street, Suite 120
Phoenix, AZ 85018
(602) 381-1091

Continued

EXHIBIT III-11 (Con't)

**AGENCIES AND ASSOCIATIONS
INVOLVED IN EDI STANDARDS
(Partial Listing)**

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

Telecommunications Industry Forum
c/o Exchange Carriers Standards Association
5430 Grosvenor Lane Suite 200
Bethesda, MD 20814-2122
(301) 564-4505

National Trade Facilitation Council/
National Commission on International Trade Documentation
350 Broadway Suite 205
New York, NY 10013
(212) 925-1400

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

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

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

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

Uniform Code Council
8163 Old Yankee Road
Suite J
Dayton, OH 45459
(513) 435-3870

D

Market Forecasts

1. Market Growth—Information Service Components

The EDI market can be examined as the sum of its information service components—network and processing services, software, and professional services. The market can be further broken into the various types of EDI services: “mainline” (purchasing, logistics, and EDI/EFT), electronic medical claims, and insurance interface.

First, a look at the information service components.

a. Network and Processing Services

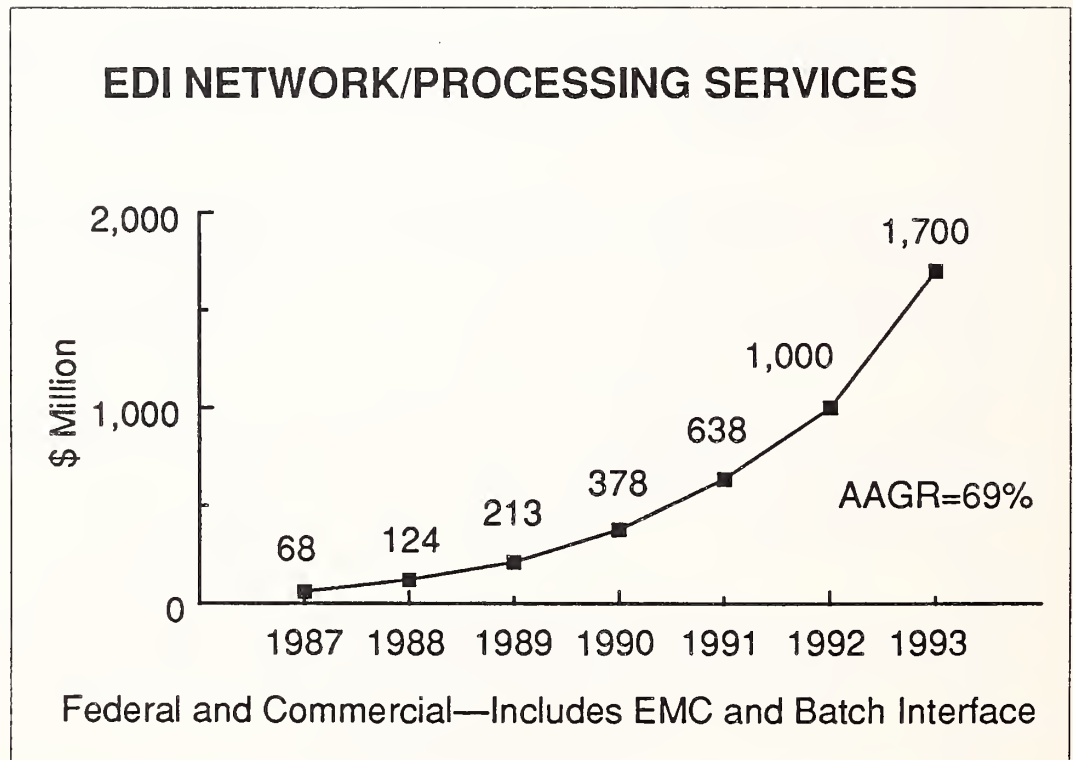
This category includes access point maintenance, error correction, protocol and speed conversions, switching, internetworking through gateways, outcall services, and store and forward (mailboxing) services.

Processing services include data field validation, data format translations, standards conversions, and directing electronic transactions submitted electronically in a batch mode (i.e. messages for many addresses transmitted together) to their individual destinations.

EDI processing services also include management and consolidation reports generated from traffic. These services are provided by value-added networks and remote computing services, although private networks may provide many, if not all, elements.

Exhibit III-12 shows INPUT's EDI network/processing services forecast.

EXHIBIT III-12

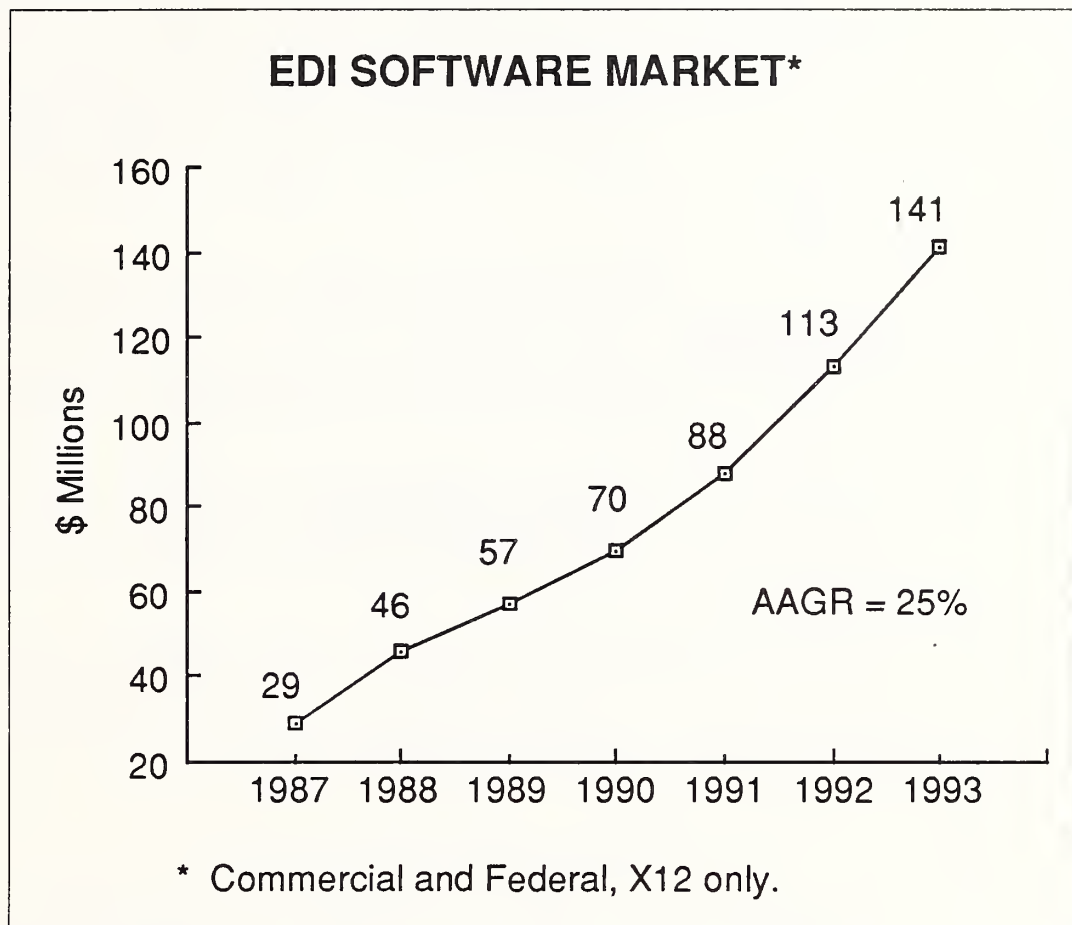


b. Software

EDI software translates data between EDI standards and handles communications. When associated communications software is part of an EDI package, it is included in the forecast.

Exhibit III-13 shows INPUT's EDI software forecast.

EXHIBIT III-13



It should be noted that the EDI software forecast presented on the exhibit *excludes* "other" (e.g. EMCS and Insurance Interface) EDI software. Accordingly, the market sizing and vertical market use of these two types of EDI has been derived separately from the previously published INPUT EDI software forecast.

Electronic Medical Claims will be the subject of a 1989 INPUT report.

c. Professional Services

Professional services include systems design, software customization, equipment selection and acquisition, systems integration, facilities management, and education and training. This topic will be further described in an upcoming study, *EDI and Professional Services*.

d. Computer Equipment and Peripherals—Not Forecast

Microcomputer workstations for data entry, preprocessing, and translation may be dedicated to EDI, as will modems and other data communications equipment. In the federal market, equipment is budgeted under specific projects, providing easy quantification of hardware used for EDI.

However, with the exception of the Federal and systems integration markets, INPUT does not track user expenditures for computer equipment. Specifically regarding EDI, INPUT has assumed that computer equipment and peripherals used by commercial companies can not be separately identified as part of the EDI market. EDI functionality often shares such equipment with other applications, making allocations difficult.

It does appear that high-volume users may be dedicating equipment to EDI. Several fault tolerant, on-line transaction processor minicomputer vendors are positioning products for these environments, and terminal emulation board makers are promoting products for EDI systems.

EDI is being listed on users' requirements list for new systems. Accordingly, Digital Equipment Corporation, IBM, Prime, Tandem, and other equipment manufacturers are showing signs of EDI-focused marketing activity.

As INPUT does not forecast commercial market equipment purchases, no sizing is offered. Accordingly, the entire EDI market, including services, software and equipment, is substantially larger than the aggregated forecast provided below.

2. The Federal EDI Market

The definition of EDI in the Federal government is often applied to unique agency needs not found in the commercial marketplace.

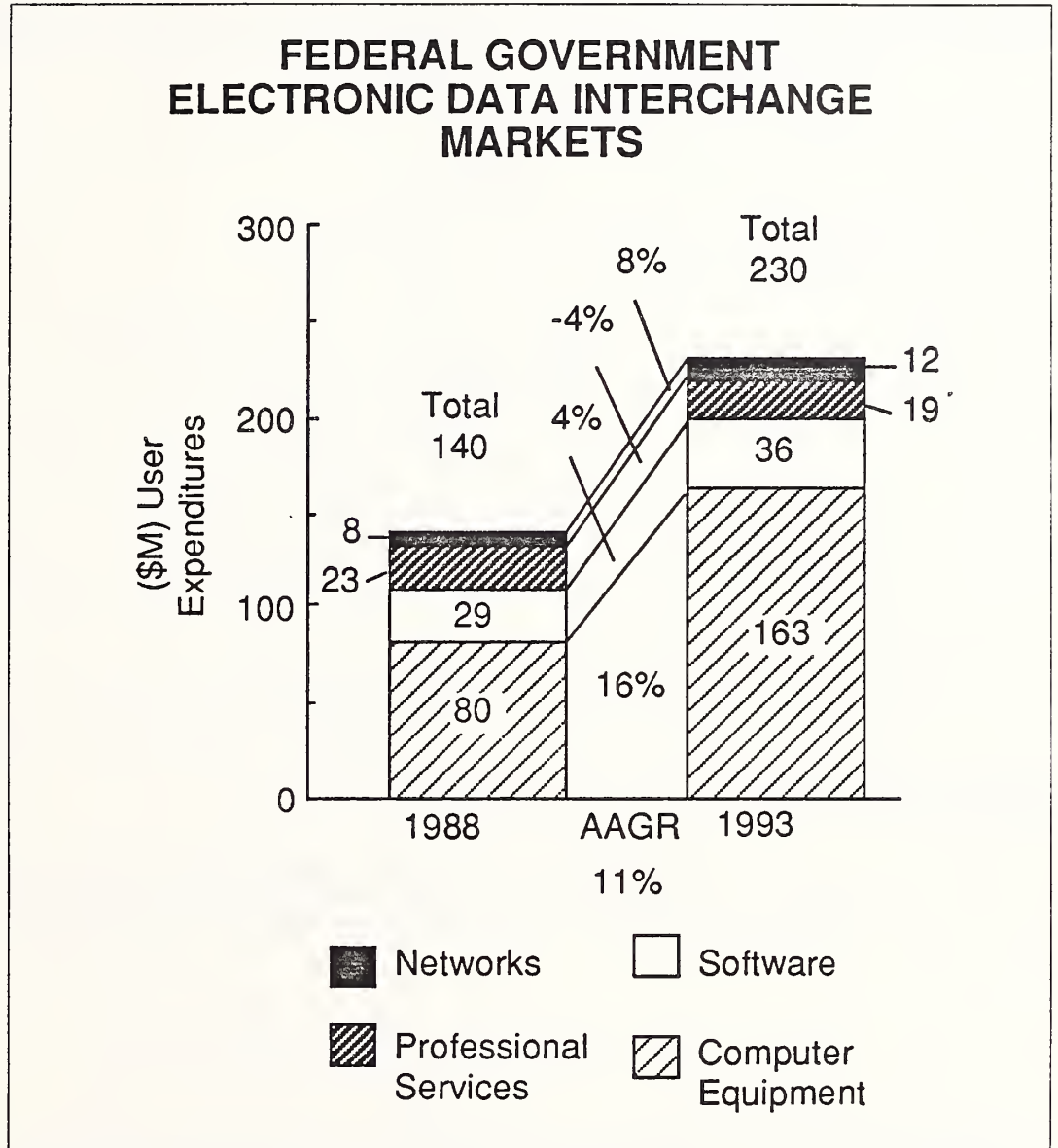
INPUT's Federal research program has sized the 1987 EDI market at \$97 million, growing at 11% AAGR to become a \$230 market by 1993. This market includes EDI-related equipment, sized in 1987 at \$52 million and growing to \$163 million in 1993, for a 16% AAGR, as shown in Exhibit III-14.

3. The Canadian EDI Market

The Canadian economy is anecdotally described as "two years behind and one-tenth the size" of the U.S. economy. In the case of Canadian EDI, this appears true.

- The Canadian EDI market for network services, software, and professional services has been estimated at \$2-3 million (1987) and will likely be \$5 million in 1988.
- INPUT expects the dynamics of the Canadian market to closely follow U.S. market development, particularly as fair trade initiatives phase in. Accordingly, the Canadian market is expected to grow at approximately the same rate as the U.S. for the forecast period.

EXHIBIT III-14



- However, industry sector growth rates in Canada will likely differ, based on the country's particular strength in industries such as natural resources.

The industry sector potentials and overall forecasts presented in this study include both the Canadian and U.S. EDI markets.

4. Aggregated Market—Information Services

Aggregated EDI market growth projections (with the exclusions noted) are shown in Exhibit III-15 representing a 56% average annual growth rate (AAGR) through 1993, with EDI services, software and professional services becoming a nearly \$2 billion market by that year.

A breakout of 1987 commercial EDI market components is shown in Exhibit III-16, while Exhibit III-17 shows this breakout for 1993. This breakout, for the Federal market, was shown in Exhibit III-14 earlier.

EXHIBIT III-15

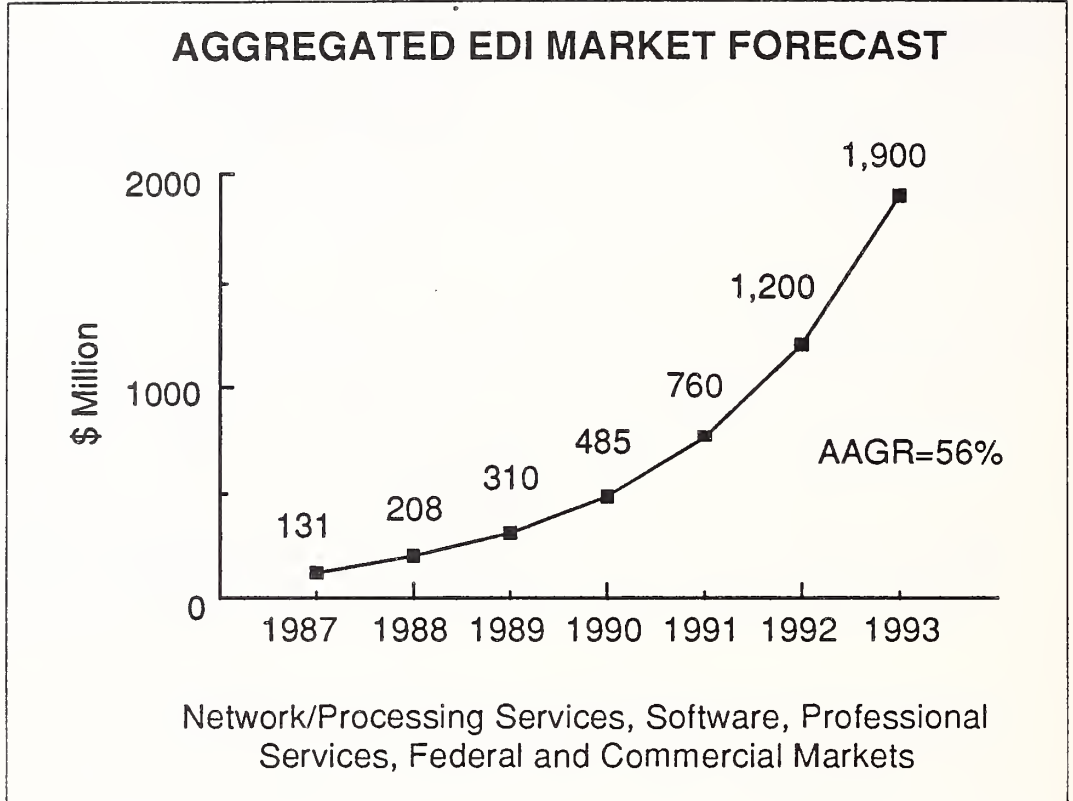


EXHIBIT III-16

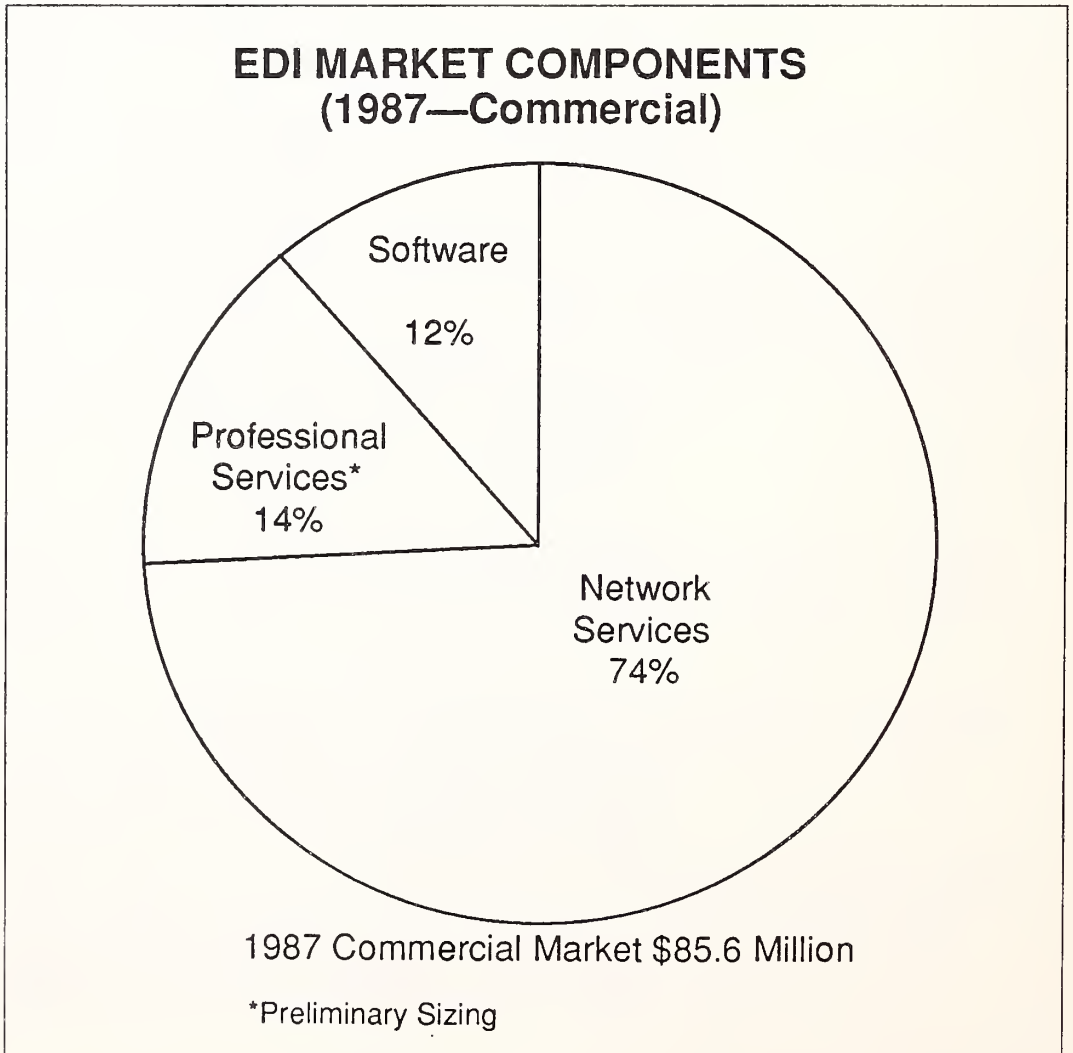
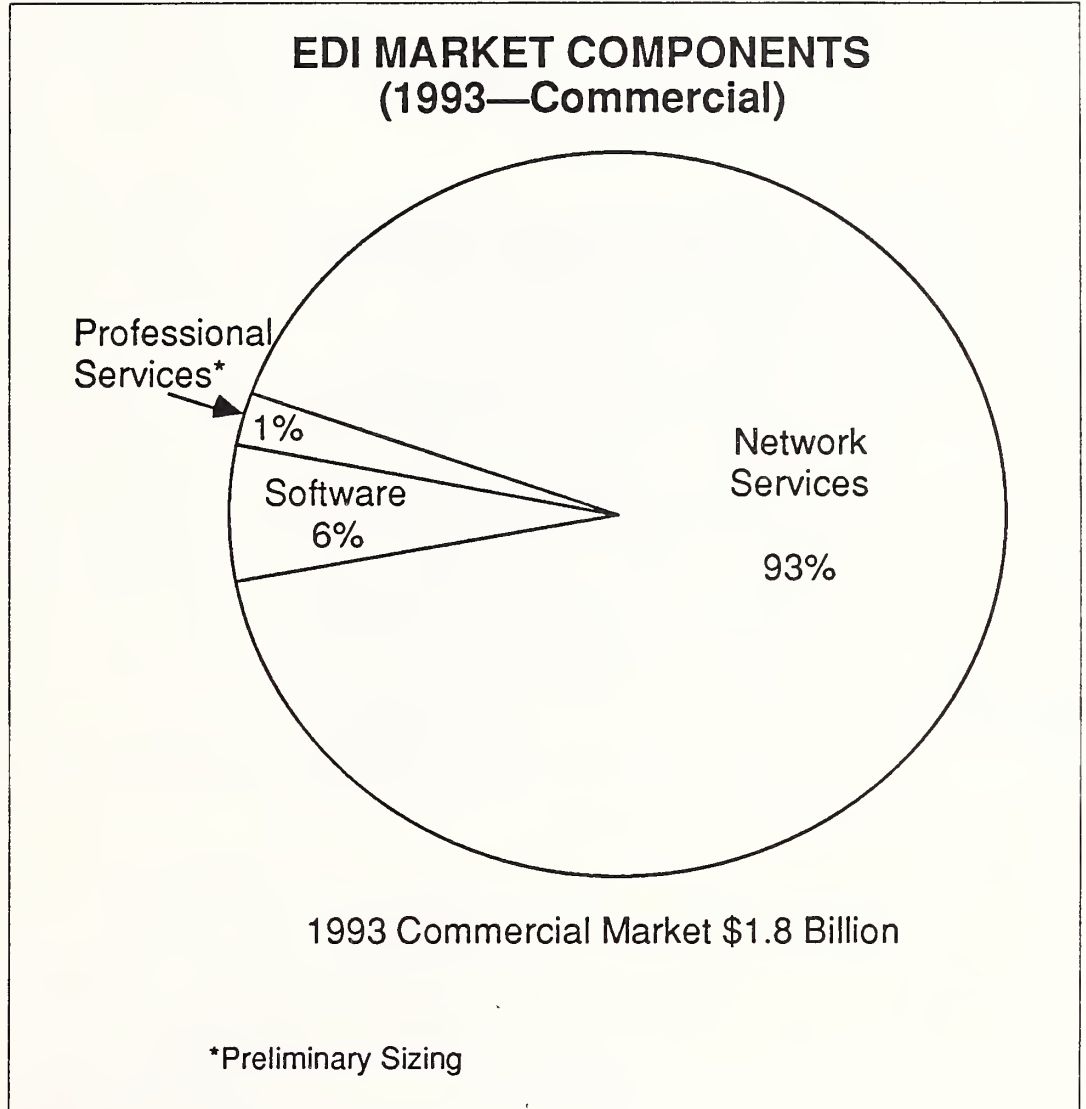


EXHIBIT III-17



Note again that EDI software for Electronic Medical Claims and Insurance Interface are excluded from the overall forecast, but are included in the vertical market sizing.

E

Impacts on EDI Market Growth

Growth in the EDI market will come as more companies adopt EDI, as current users add electronic trading partners and start using additional transactions in their EDI functions. Several use dynamics support INPUT's overall market forecasts.

1. The Cascade and Domino Effects—Impacts on Volume

It is estimated that 25 billion business documents are sent through the U.S. mails annually. This represents the potential number of EDI transactions.

Currently, EDI system users are using a few transaction sets. When extended, each exchange could require as many as 12, and potentially more, electronic transactions:

- A request for information requires a response.
- A request for bid leads to a bid, acknowledgement of the bid, and to an award.
- A purchase order leads to a confirmation, which leads to a shipping notice and an invoice.

...and so on.

The cascade effect may be more pronounced in smaller organizations where there is a close bridge between applications. In larger companies, with more diversity and less linkage between departments (and applications), the effect may be delayed since one department may implement EDI, while others would not immediately do so.

Exhibit III-18 illustrates the “cascade effect.”

EXHIBIT III-18

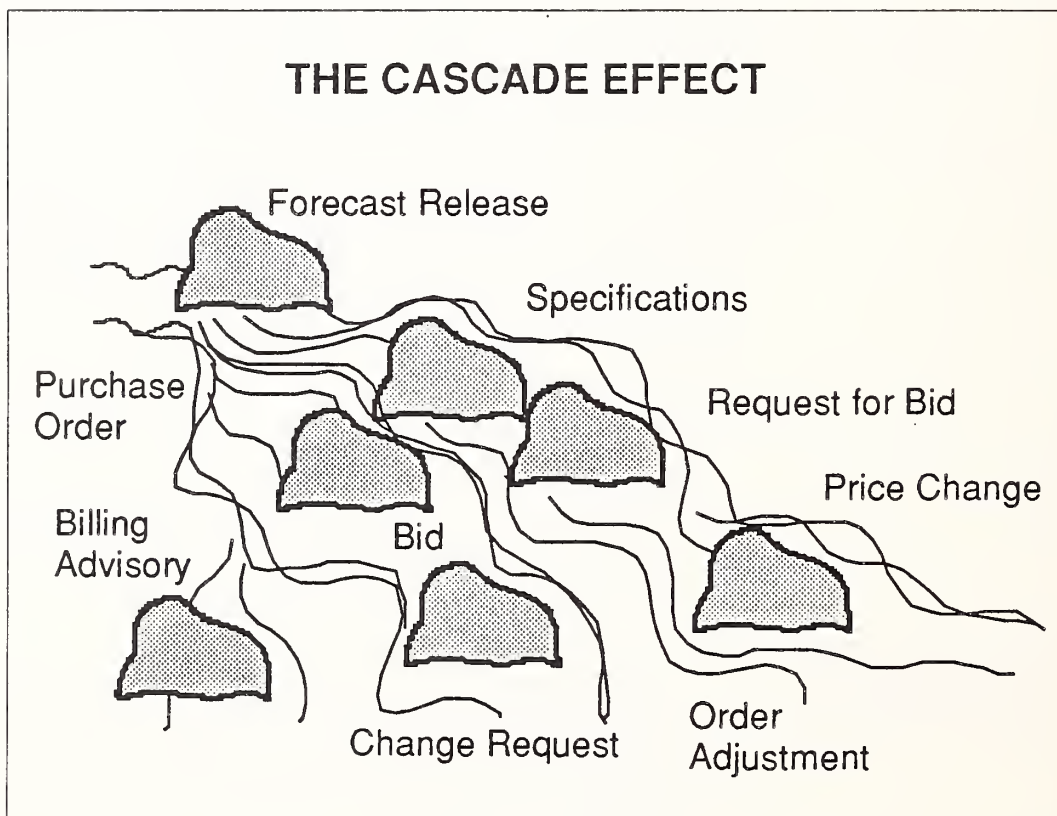
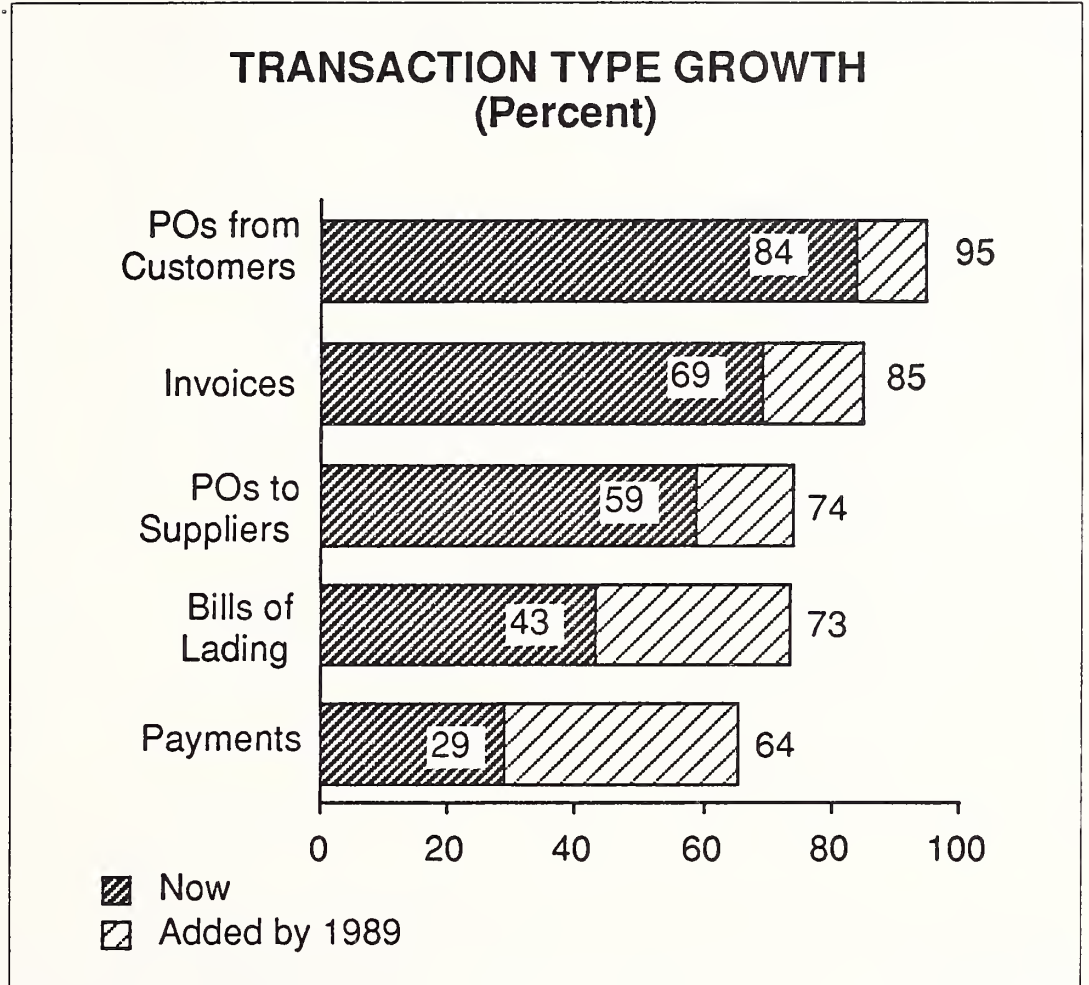


Exhibit III-19 shows which of the most often used transactions users are employing now, and which transactions they will likely add over the next two years.

In addition to the cascade effect is the “domino” effect. Large users at the center of a trading cluster may coerce their suppliers to adopt EDI as a condition of continued business, as described earlier.

EXHIBIT III-19



2. EDI Status

Of the nearly 200 IS managers interviewed, approximately one-third (34%) said they are now using some form of EDI. An additional one-fifth (20%) reported active planning and implementation of EDI projects, while nearly one-fourth (24%) said they are considering EDI implementation.

As shown on Exhibit III-20, 22% of the interview respondents reported no plans to implement EDI.

3. Transaction Growth Rates

On average, EDI users reported EDI transaction growth between 1986 and 1987 of 181%.

These same users estimate transaction growth of 156% between 1987 and 1988.

These findings are shown on Exhibit III-21.

EXHIBIT III-20

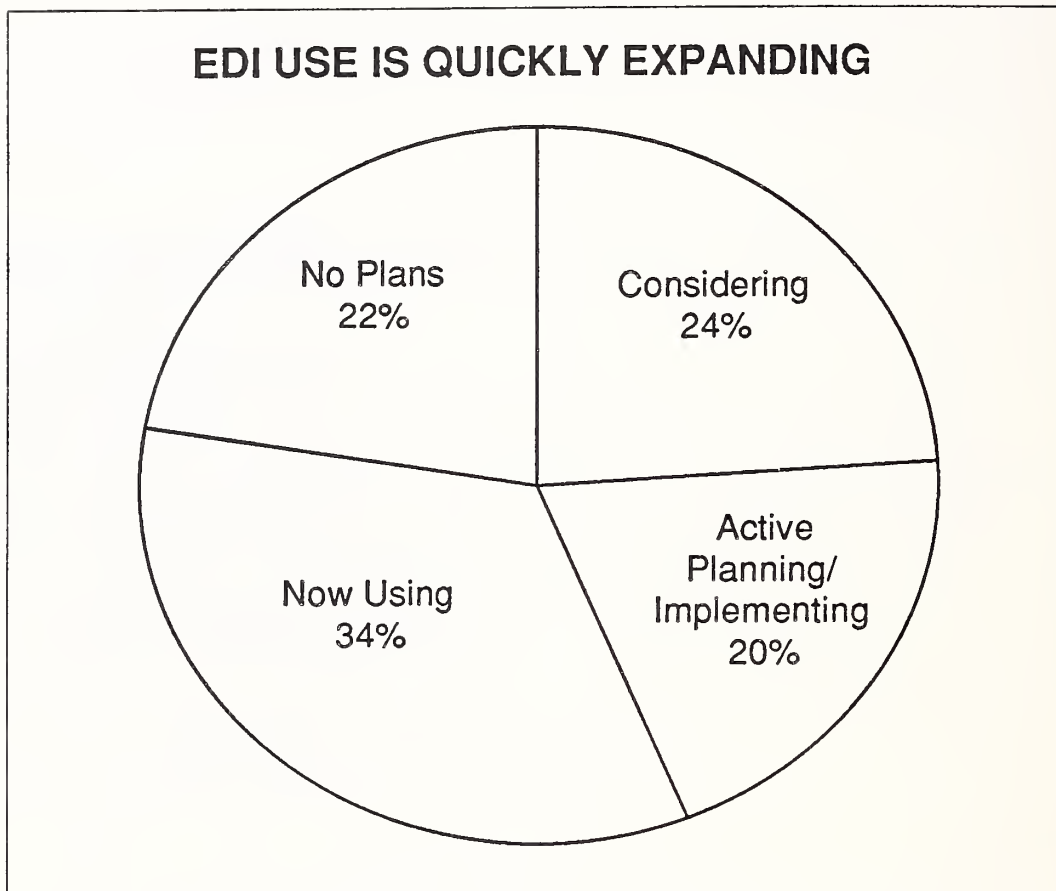


EXHIBIT III-21

TRANSACTION GROWTH (Users' Average Response)

1986-1987	1987-1988
181%	156%

4. Average Trading Partner Additions

Users were asked to provide the number of EDI trading partners they have now and the number they will be adding this year.

On average, users reported 112 EDI trading partners, adding 74 this coming year, for an increase of 66%, as shown in Exhibit III-22.

EXHIBIT III-22

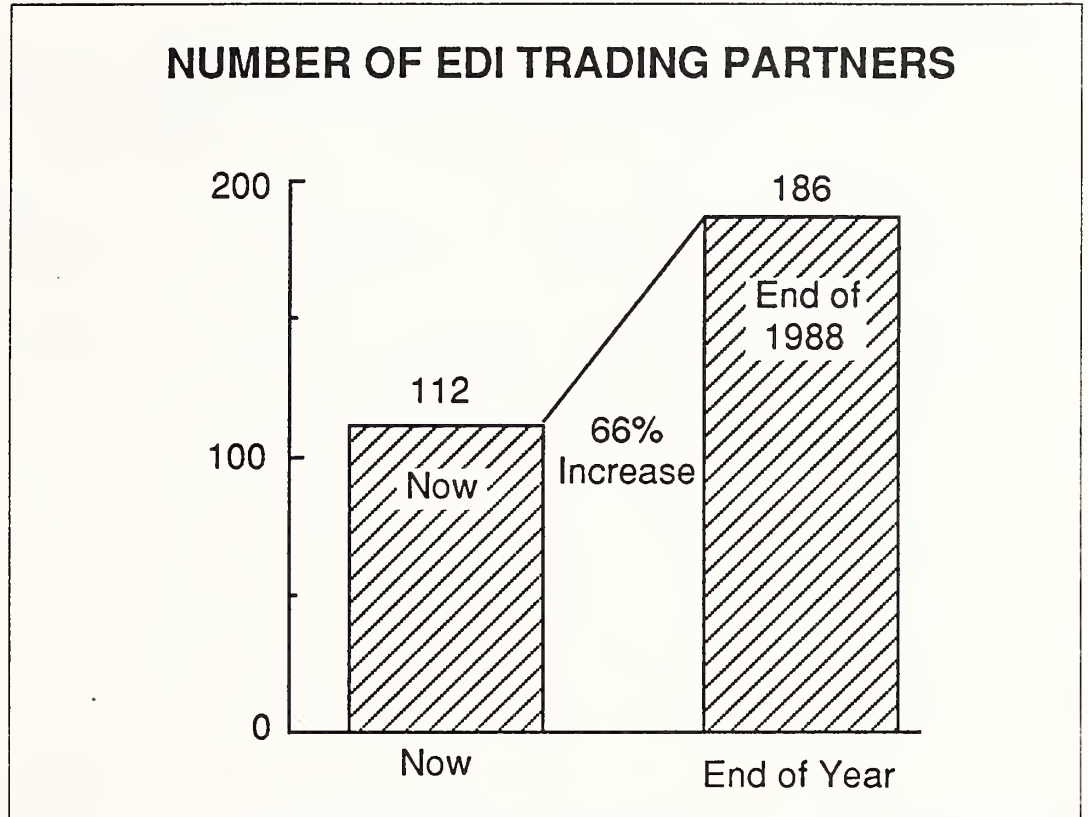
**F****Vertical Industry EDI Potentials—Mainline**

Exhibit III-23 shows INPUT's sizing of current EDI use by the 14 industry categories INPUT tracks.

Exhibit III-24 shows INPUT's forecast for how these industries will account for EDI end user expenditures at the end of the forecast period.

Exhibit III-25 presents this information in tabular form.

Several factors were taken into account in developing these sizings:

- Each vertical industry's current end user expenditure level for information services and products
 - This data has been developed in support of other INPUT research programs.
 - It considers annual sales (or, in the case of government and education, annual budget), census data regarding the number of companies and the number of employees in each industry and trends and directions regarding information technology use.
 - Federal government information has been derived from agency budget requests analyses.

EXHIBIT III-23

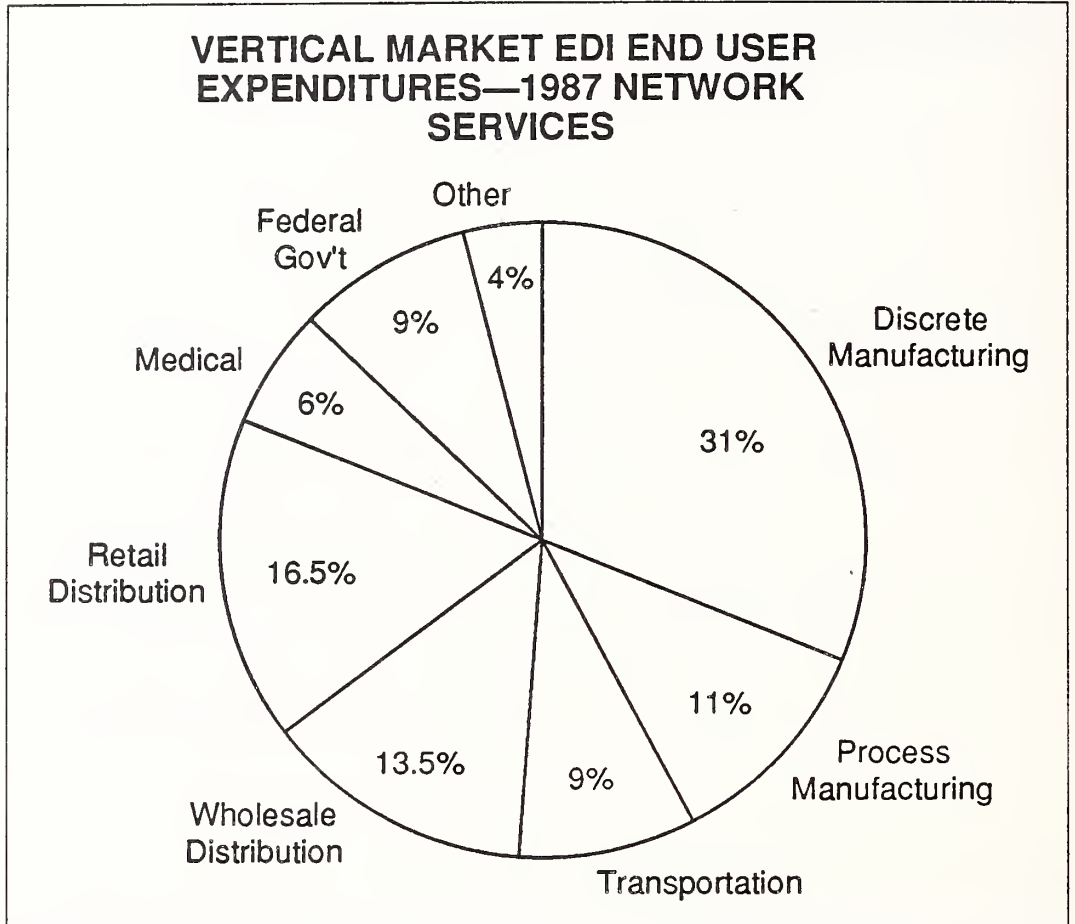


EXHIBIT III-24

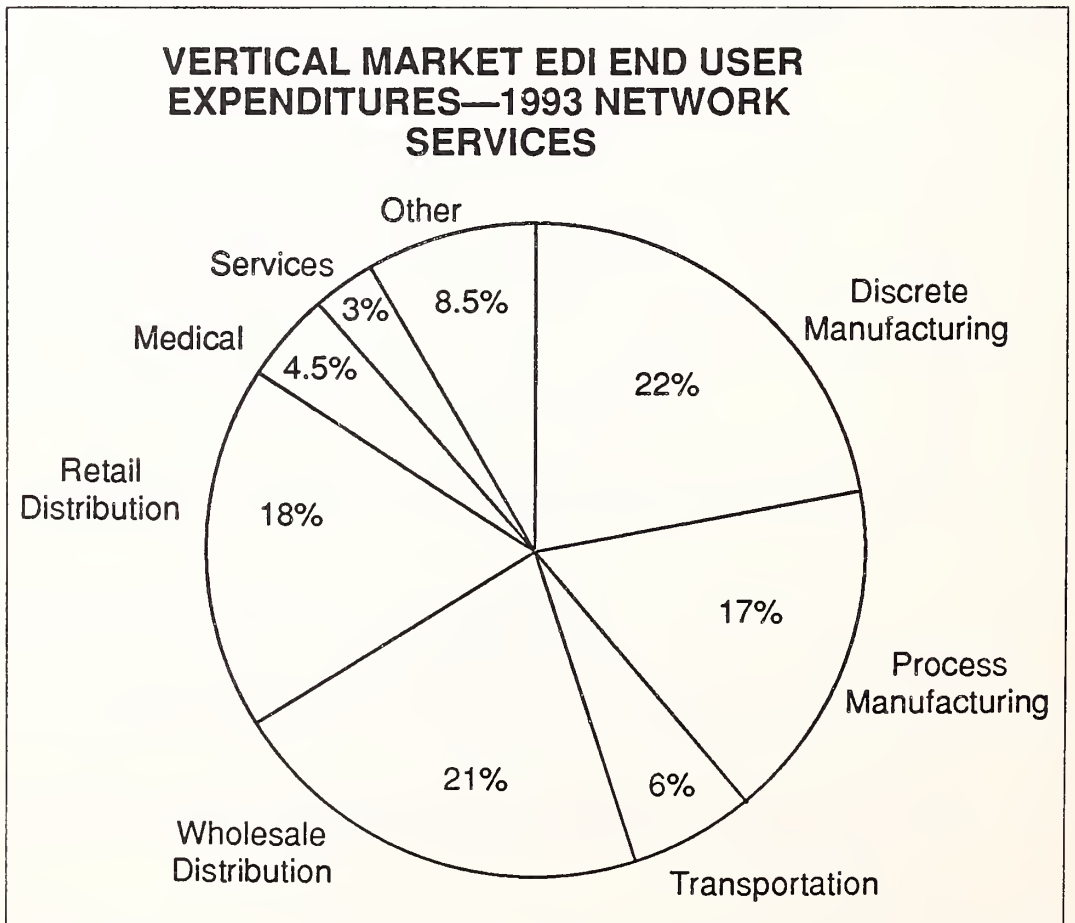


EXHIBIT III-25

VERTICAL MARKET END USER EXPENDITURES

1987 Percent of Market	1987 Network Services \$ Million	Vertical Market	1993 Percent of Market	1993 Network Services \$ Million
31.00	17.02	Discrete Mfg.	22.00	356.75
11.25	6.18	Process Mfg.	17.00	275.67
8.70	4.78	Transportation	6.00	97.30
0.14	0.08	Utilities	1.00	16.22
1.00	0.55	Telecommunications	1.00	16.22
13.50	7.41	Wholesale Distribution	21.00	340.54
16.50	9.06	Retail Distribution	18.00	291.89
0.15	0.08	Banking/Finance Svc.	0.50	8.11
0.10	0.05	Insurance*	0.50	8.11
6.30	3.46	Medical*	4.50	72.97
0.00	0.00	Education	0.50	8.11
0.10	0.05	Services	3.00	48.65
9.10	5.00	Fed Gov't	0.75	12.16
0.10	0.05	S & L Gov't	1.00	16.22
2.06	1.02	Other	3.25	56.10
100.00	54.79	Total*	100.00	1,726.30
Non-Mainline EDI				
-	1.50	Batch Insurance Interface	-	9.75
-	12.00	Electronic Medical Claims	-	77.91

**"Mainline" EDI only

- Evidence of present EDI activity in each of the industries studied, and an evaluated estimate regarding how quickly, and how widely, EDI will be adopted in specific industries
- Consideration of private network and customer service EDI implementations that will tend to reduce end user expenditures for EDI networking, but perhaps will not substantially impact EDI software or professional service expenditures.

Aggregate expenditures are forecast for each industry. These expenditures include network services, X12 EDI software, and professional services.

- While there may be different dynamics found for each of these elements within the different industries studied, these differences will not significantly change the overall findings.
- EDI software and professional services are likely to remain a relatively small portion of the entire market relative to network services.
- With certain exceptions, applying the individual market sizings to INPUT's EDI software and professional services forecasts should result in a sufficiently reliable calculation for planning purposes.

It should be noted that software supporting the Electronic Medical Claims and Insurance Interface varieties of EDI are specifically excluded from the aggregate forecast. Forecasts for these industries are divided into expenditures for "mainline" EDI, and for their industry-unique EDI applications, as shown on Exhibit III-25.

G

EDI-Driven User Expenditures—The "Shadow" Market

Users were asked to provide information on their internal activities and expenses in support of EDI systems, and on their expenditures for "EDI-stimulated" development.

Systems that were impacted by EDI implementation included accounting, order entry, distribution, bar coding, invoicing, and related business systems.

In many cases, EDI "stimulated" work surpassed actual EDI project costs. Internal costs, estimated by users in actual expenditures or in man-days of effort, are not directly available as revenue to the marketplace vendors. However, there may be occasions when some of these internal expenditures could be converted by vendors into market available revenues.

As Exhibit III-26 shows, users reported an average \$44,000 or ten man-months of effort on EDI stimulated projects, with some reporting up to \$250,000 in such activities.

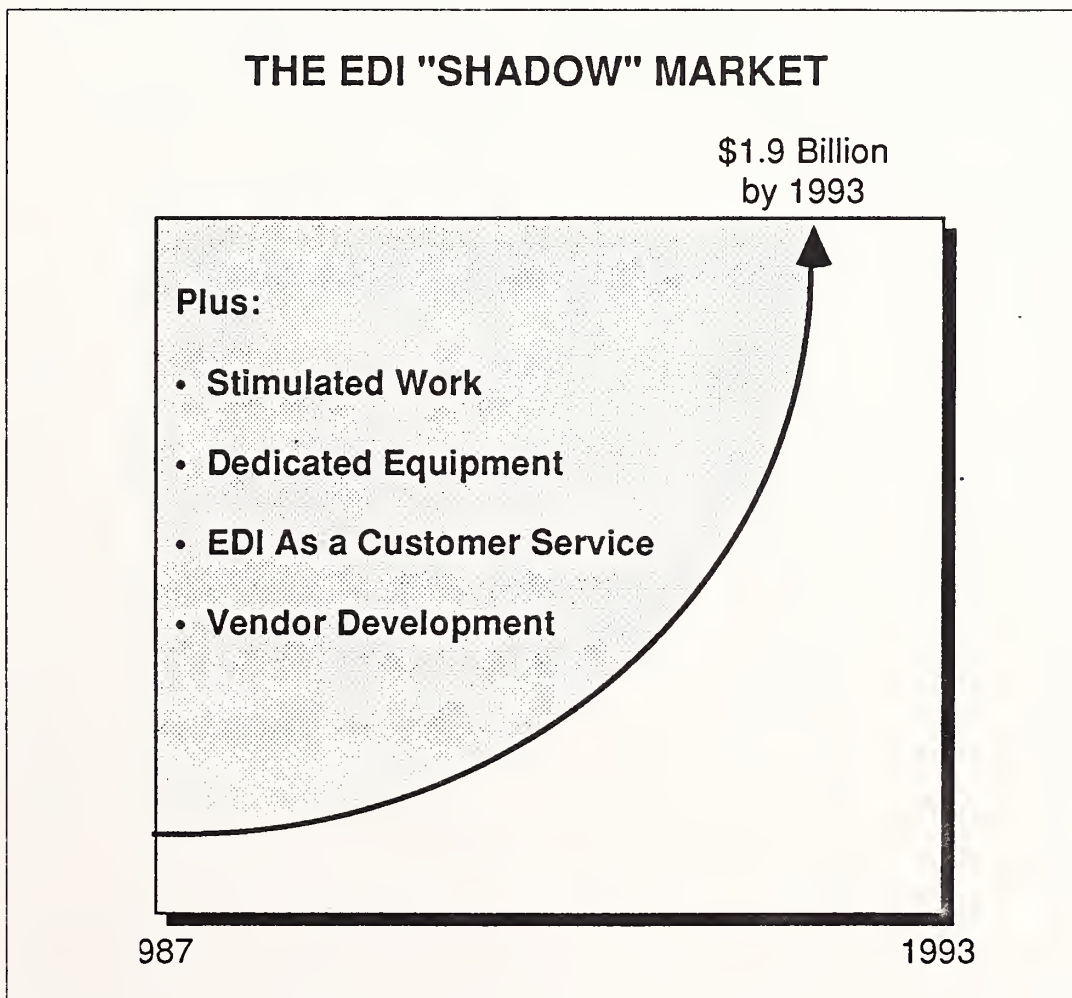
EXHIBIT III-26

EDI-STIMULATED DEVELOPMENT	
Average	Range
\$ 44,000	\$3,000—\$250,000
10 Months	2 Weeks—3 Years

- The professional services component of the market forecast is an estimate of EDI development-related end user expenditures, but excludes EDI stimulated development.
- Also excluded in the market forecast are expenses by EDI service and software providers in developing their offerings and EDI offered as a customer service by firms such as transportation carriers.

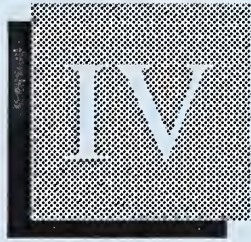
Exhibit III-27 illustrates this “shadow” EDI market, representing internal development costs for both EDI and EDI-stimulated end user developments and the other expenditures described.

EXHIBIT III-27

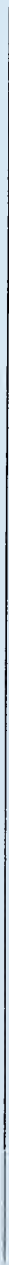


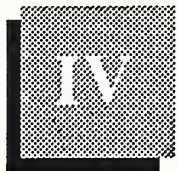
The relationship between EDI, EDI “stimulated” projects and professional services will be further examined in an upcoming report, *EDI and Professional Services*.

The next chapter begins an examination of EDI activities, trends and potentials in a wide range of industry sectors.



Discrete Manufacturing EDI Directions





Discrete Manufacturing EDI Directions

The American manufacturer's primary concern is improving productivity to become more competitive in domestic and worldwide markets.

This concern is complicated by complex economic issues including the balance of trade, potential tax increases, possible trade protection legislation, needs to reduce the U.S. budget deficit, and the potential of a recession.

Despite these complexities, many manufacturers view EDI as a means to address productivity and competitiveness issues. As shown in Exhibit IV-1, 65% of companies surveyed indicated that they are either actively planning and implementing EDI, or are currently using it, with 20% reporting initial EDI investigations.

A

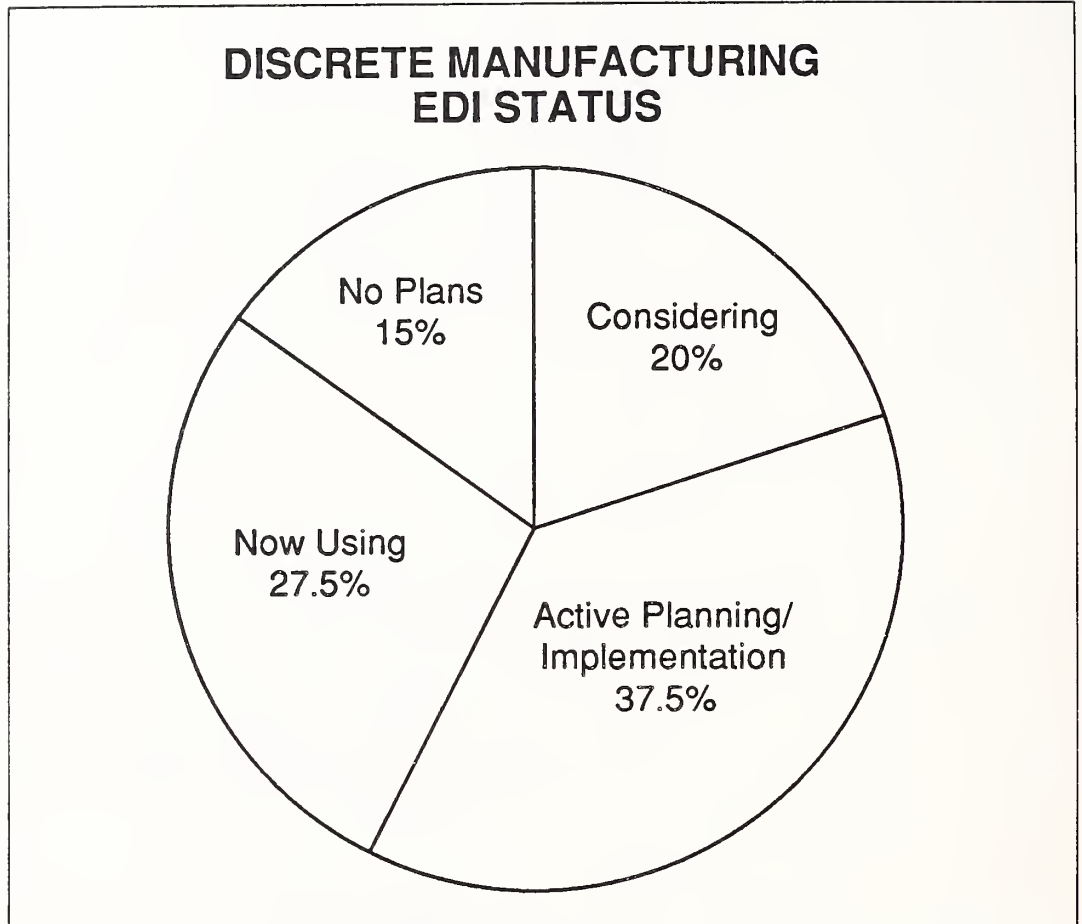
Aerospace

EDI in aerospace industries will likely be accelerated by Department of Defense requirements for improved efficiencies, in addition to the cost and control benefits EDI brings to complex manufacturing operations. Users are proceeding to work with government and military agencies to design EDI requirements cooperatively with those agencies.

The Aerospace Industry Association's X12 group started its EDI activity in early 1987, and currently has approximately 40 members, most of whom are designing EDI systems, or using EDI in production or pilot phases.

Douglas Aircraft Company (Long Beach, CA) initiated pilot testing in late 1987 with a few suppliers and expected to have 50 electronic trading partners by the end of the year. The company is using McDonnell Douglas' EDI*Net service.

EXHIBIT IV-1



Another active aerospace EDI user is LTV Aircraft Products.

EDI activities in support of electronics, and air transportation companies and federal EDI initiatives that have a bearing on aerospace companies are described in other sections of this report.

B

Automobile Manufacturing

1. Autos

The auto industry is the largest U.S. manufacturing industry. It is also one of the most visible, and perhaps the most active user of EDI techniques. Its involvement began as part of a program to recover from losses due to competition from off-shore (principally Japanese) auto makers. Now, EDI is being used to maintain industry and company improvements. EDI is also being used by Japanese automakers that are manufacturing in the U.S.

Auto industry EDI use is particularly important since its estimated 25,000-35,000 suppliers represent virtually every industrial segment.

- However, EDI use by many suppliers is often in response to customer demands. When a major customer, such as General Motors requires a supplier to use EDI, the supplier usually complies.

- According to industry surveys, the supplier base has not recognized or realized the benefits of EDI other than maintaining good relationships with key accounts. Few companies have integrated EDI functionality with other applications and many remain wedded to paper-based systems, only now, the paper is generated from an EDI transmission.

This finding implies that there is opportunity for third party providers and professional service firms to help suppliers optimize their EDI use through integration with applications.

The auto industry's first EDI implementations were built on proprietary and largely incompatible systems linking suppliers to the major auto-makers. These activities began over ten years ago.

U.S. automakers are requiring their suppliers to use EDI or EDI-like systems thus creating broader market use. Some manufacturers issued deadlines for supplier compliance to EDI. Sometimes, these deadlines passed without the goal being reached, but progress has been made.

- Chrysler Corporation has established June, 1989 as the date for complete migration to EDI methods. As of late 1988, approximately 900 Chrysler suppliers were using EDI, leaving over 1,000 on paper-based systems.
- Weekly, Chrysler's Procurement and Supply Group mails over 30,000 releases to its suppliers. The company, the smallest of the "Big Three" automakers, depends on its suppliers the most. Chrysler's suppliers produce 70% of its parts.
- Chrysler expects to save itself and its suppliers 2,500 weekly hours of work via complete adoption of EDI. Its just-in-time policies have reduced inventory levels by \$1 billion worth of parts and further efficiencies are expected.

While there may be no corporate policies enforcing EDI use, units of some auto manufacturers have "desourced" suppliers who have failed to comply with requests for EDI capability.

The requirement that suppliers use EDI (and other factors) is leading to sourcing consolidation. Individual components are being pieced together into assemblies, which are then sold to the customer. Also, suppliers are merging and/or seeking other markets for their products and services.

As in other equipment manufacturing, EDI is coupled to Just-In-Time (JIT) inventory management techniques and, as such, becomes a potent cost reduction tool. JIT describes parts manufactured and delivered immediately prior to need, thus reducing inventory costs. It requires suppliers to quickly implement production changes and EDI supports such speedy changes.

Anecdotally, EDI is credited with reducing the manufacturing costs of an automobile by \$100-200. When coupled to other productivity measures such as JIT, standardized bar coding, reusable plastic containers, and stabilized scheduling, manufacturing costs have reportedly been reduced an estimated \$500 per car.

The industry advocate and coordinator for using technology is the Automobile Industry Action Group (AIAG), a non-profit trade association representing U.S. and Canadian suppliers and manufacturers.

AIAG officials expect auto industry documentation to become largely paperless within the next few years, and is working to reduce the hundreds of forms auto companies now use to order, ship, and confirm to only a few.

While individual automakers have used electronic means to transmit releases to their largest suppliers for over a decade, these systems use unique formats. Accordingly, problems remain to be addressed.

- The current standards are based on the requirements of the largest automakers, resulting in redundancies and some lack of uniformity, even between divisions of the same automaker.
- The AIAG established its own EDI standards but then brought these standards into compliance with X12 standards.

Future automotive industry EDI enhancements will support the interchange of engineering drawings between automobile designers and suppliers, an application also of interest in the aerospace industry.

There has also been discussion of "interactive EDI" in the auto industry.

- EDI is by definition application-to-application processing and therefore batch oriented. However, certain circumstances suggest a need for interactivity between applications.
- In this sense, interactive EDI does not mean a reversion to on-line order entry, but refers to active cooperation between two systems at the time of data interchange.
- The availability of both EDI and terminal to host interactive processing through one network is often desirable.

Interactive EDI is useful in situations such as querying stock level data bases prior to ordering and gathering multiple quotes for products or services and in just-in-time environments where shipping errors cannot be tolerated.

Many of the EDI network service firms target companies working in this environment. EDS, a wholly owned subsidiary of General Motors, operates I Share as the EDS Supplier Information System for small suppliers to GM through the Demand Systems Division (Warren, MI).

- The system works on an interactive basis, supplying form-fill in screens to small suppliers. The data entered then becomes EDI data, formatted to GM standards, and is batch distributed to the appropriate GM applications.
- The system handles materials releases, advanced shipping notices and E-mail. It works on a sub-network of EDS Net called PacketPlus, essentially as a node on the GM network.

EDS was also believed involved in working to harmonize GM's approach to EDI, which has been termed "piecemeal."

Ford Motor Company has used forms of EDI since 1972, originally for material control and logistics.

- As of early 1988, the company had 2,000 EDI trading partners, primarily with the Body and Assembly operations division, and an additional 250 electronic trading partners in Europe.
- In 1988, Ford indicated a major commitment to X12-based EDI (rather than proprietary formats) and related technologies as part of its Common Manufacturing Management Systems (CMMS). CMMS is related to the company's Supply On-Line Management Information System (SOLMIS) and is being developed by the Geometric Resources Institute, a wholly owned Ford subsidiary.
 - As the name implies, the CMMS approach provides a uniform implementation across divisions and plants.
 - CMMS will be implemented in nine divisions during 1988-1989.
 - Suppliers were notified that X12 EDI capabilities were expected by January, 1989.
 - Communications will be largely handled on a dial-up basis, although the use of third-party networks is possible.
- The new system requires suppliers to receive a weekly planning schedule and a daily shipping schedule. Each supplier is being required to send an EDI advanced ship notice when a truck leaves their shipping document and to use bar code scanning to create electronic transactions.

- Since Ford intends to develop global EDI systems, one issue facing the firm is adapting to differences in EDI formats. For example, while the auto industry in the U.S. is moving towards X12, the European auto industry uses ODETTE standards. ODETTE stands for Organization for Data Exchange by Tele-transmission in Europe.

Wagner Data Systems (Milwaukee, WI), which sells to the automaking industry, has positioned its products as "Electronic Kanban."

- Kanban is the Japanese-developed method for supporting JIT and uses inventory control cards. In the electronic version, the cards are bar coded and scanned to create electronic purchasing transactions that are sent to suppliers via EDI.
- The system integrates with inventory and other applications and reconciles discrepancies.

Companies that developed EDI translation software for the auto industry have since expanded their scope to broader markets. Examples include Supply Tech, Birmingham Computer Group, and American Business Computers.

Banks are starting to take interest in EDI with the major manufacturers.

- The First National Bank of Chicago is the lead bank in an eight-bank network serving General Motors in its electronic payments program.
- The process, called Evaluated Receipts Settlements, uses ANSI X12 820 (payment/remittance advice) transactions and obviates the need for invoices since accounts payable are authorized from verified shipping documents.
- In late 1988, the Toronto Dominion Bank announced piloting a similar service with an undisclosed major manufacturer and several of its suppliers. The hub company is believed to be General Motors of Canada.

2. Truck Manufacturing

Related to auto making is truck manufacturing, although the issues this subsector face are unique.

An organized, industry-wide EDI approach began in February 1987 when company representatives formed the AIAG's Truck Advisory Group (TAG) to address common concerns in a cooperative forum.

Since truck manufacturers make fewer units than an auto maker, relationships with suppliers can be more critical.

- Suppliers may sell to more than one manufacturer, meaning contention and confidentiality issues may arise.
- Accurate forecasting of the required components is necessary since errors are more dramatic than in large unit operations.

Also, truck manufacturers often sell their products to trucking companies, firms using the vehicles to produce income. Many of these fleet buyers have their own specifications for features desired, which affect vehicle fabrication.

TAG has adopted AIAG-X12 compatible formats for its EDI implementations. Companies participating include: Ford Kentucky Truck Plant, Freightliner, Mack, Navistar, PACCAR, and Volvo-GM.

3. Auto Parts

This industry can be characterized by its geographical reach, spanning original equipment manufacturers (OEMs), secondary suppliers, and used parts dealers operating on an international basis.

Auto parts stores, their distributors, wholesalers (jobbers), repair shops and the manufacturers, are using EDI on both direct and third-party service bases.

Parts stores have large inventory requirements. The ability to service a particular customer need is a key selling point. Accordingly, rapid delivery from distributors is required, and electronic catalogs are quickly becoming a necessity.

Transnet is one of the first electronic ordering systems. It was started by five companies in the automotive parts after-market but is now operated by the Motor and Equipment Manufacturing Association (MEMA) through its for-profit, taxable subsidiary, the Management Information Systems Group. Originally using proprietary formats, Transnet has added ANSI X12 support.

A number of turnkey systems companies (notably, Triad Systems) have been licensed to incorporate Transnet's capabilities into their ordering systems. Triad Systems is discussed below.

Approximately 100 manufacturers, representing most automotive after-market suppliers, plus 6,000 wholesalers and retailers, representing 80% of the largest distributors, use the Transnet system.

Among Transnet's users are: AC Delco Division, General Motors, Champion Spark Plug Company, Purolator, Goodyear Tire and Rubber Products, and Timken.

Transnet enjoys several industry association endorsements: the Automotive Industries Association for use in Canada, the Bearing Specialist's Association, and the Automotive Warehouse Distributor's Association, representing large automotive replacement part wholesalers that send products to distributors and volume retailers.

In 1987, Transnet processed approximately 70 million line items representing approximately 500,000 monthly orders. It anticipates a 20% growth in transactions in 1988.

As noted, turnkey systems vendors have a role in EDI use within this sector. Triad Systems (Livermore, CA) is perhaps the best example.

- Every Triad system sold to wholesalers in the automotive parts after-market has communications software allowing users to exchange purchase orders and pricing and inventory information with suppliers, warehouses, and in some cases, customers.
- Triad offers two data base services to wholesalers and retailers: telepricing for updates and an Electronic Catalog for over 1,250 product lines and five million parts.
 - The catalog can be used for a given repair to identify all required parts and their prices and inventory levels.
 - The catalog then prompts the wholesaler to recommend related parts that the customer may also need.
- Triad also has a terminal-based system called TelePart that allows repair shops to order parts electronically from a wholesaler using a Triad system. The systems are sold through the wholesalers.

C

Electrical Supplies

The electrical industry has adapted X12 into its "EDX" standard. EDX is sponsored and managed by the National Electrical Manufacturers Association, the National Association of Electrical Distributors, and the National Electrical Manufacturer's Representatives Associations.

ANSI X12 formats were chosen rather than an industry-specific standard because the industry trades with other industry groups, such as construction services.

Westinghouse Electric Supply Company has implemented an X12-based EDI system to connect customers with over 50 of its manufacturing operations, 100 warehouses, and 100 field sales offices. Additionally, an interactive system called Speedline allows customer access to stock availability and order status information. The company has indicated intention to enter the EDI network service market.

D**Electronics**

The first instance of an industry-wide EDI approach in this industry was Escort, a system promoted by an industry group, and managed by Control Data. It fell into disuse because it was cumbersome to use and electronics distributors, not manufacturers or customers, were involved in its design.

The electronics industry's current EDI effort is coordinated through the Electronics Industry Data Exchange Association. Its variation of the X12 standard is called EIDX. The American Electronics Association serves as EIDX Secretariat.

Approximately 50 companies were active in EIDX by the middle of 1988, with 50 more expected to join by the end of the year. Members include: Hewlett-Packard, National Semiconductor, Signetics, Advanced Micro Devices, IBM, Intel, RCA, Schweber Electronics, Northern Telecom, and Compaq Computer.

Separately, the American Electronics Association has been planning AEALink, a multifaceted network service providing E-mail, data bases, and EDI services for AEA members. Several network vendors were evaluated and IBM's Information Network was chosen—however the arrangement has not been finalized and the concept does not appear to be favored by many members.

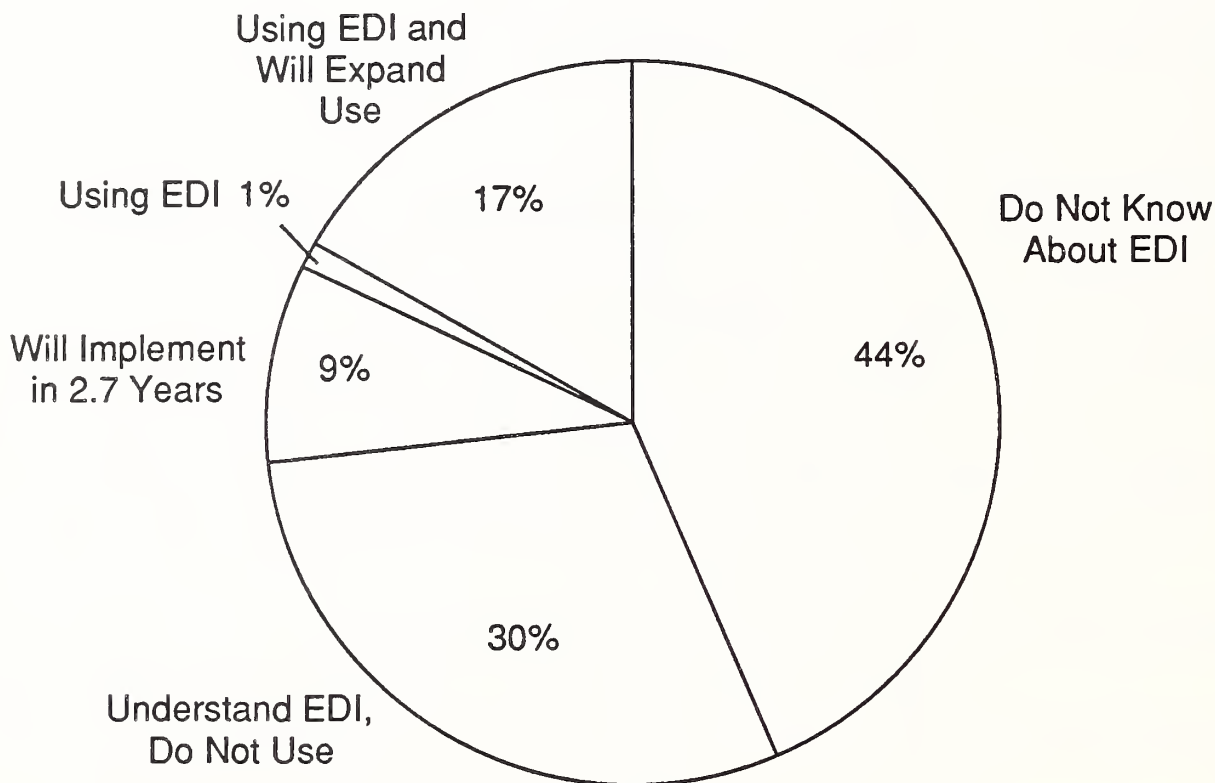
A survey of senior executives in the electronics industry commissioned by the AEA found that 44% did not know about EDI, as shown in Exhibit IV-2. While this is perhaps surprising for managers in a "high-tech" industry, this finding is probably not unique to this industry.

There are a number of private EDI implementations found in the electronics industry:

- GTE Supply (Salt Lake City, UT), one of the nations largest distributors of telecommunications and data communications products, uses its Express System (based in Sacramento, CA) to support national order entry. Express is an integrated business system that handles orders, tracks inventory, and maintains pricing. It is networked to seven warehouses. The private network processes approximately 60,000 daily transactions.
- Motorola operates the Motorola Information Management System (MIMS) primarily for its semiconductor division. The private network operates worldwide, with major service centers in Phoenix (AZ) and Munich, West Germany. MIMS was first developed in 1978 and now uses X12 formats for paperless transactions with over 50 suppliers. The company had been using Tandem computers as front-ends to IBM mainframes for its EDI implementation.

EXHIBIT IV-2

ELECTRONICS INDUSTRY EXECUTIVES EDI SURVEY



Source: Pittiglio Rabin Todd & McGrath, KPMG Peat Marwick

- Texas Instruments started using EDI in 1969 and began participating in industry standard committees as they were formed. Implemented on its private network, TI's system can also be accessed through third-party services. As of mid-1988, approximately 600 vendors representing 43% of the company's line items were using EDI with Texas Instruments
- IBM intends to use its Information Network to implement EDI with over 2,000 of its largest suppliers, representing over 80% of the company's production. This is projected to save the company over \$60 million over the next five years.
- Thomson Consumer Electronics (an RCA/General Electric company) offers its customers direct or third-party network access to its X12-based EDI system called EDGE (for Electronic Data Generation and Exchange).

E**Telecommunications
Equipment**

The Telecommunications Industry Forum (TCIF), representing a subsegment of the electronics industry (i.e. equipment rather than services), is working to gain industry acceptance of X12 standards to overcome the problems associated with nonstandard formats and to permit inter-industry communications. (EDI use associated with telecommunications services is discussed in Chapter VI.)

TCIF's activities follow several company's use of private formats for EDI applications. AT&T is one of the more influential users of EDI within the industry, trading electronically with approximately 50 of its suppliers, and using EDI in its relationships with the Regional Bell Operating Companies.

Bar coding use is also being promoted by the TCIF to facilitate provisioning, procurement, and use of telecommunications equipment.

Approximately 200 telephone companies and equipment manufacturers are members of TCIF, which is administered by the Exchange Carriers Standards Association.

Unique aspects of the electronics industry include a practice called ship from stock and debit.

- Under this routine, distributors sell products below their cost. When certain sales levels are reached, the distributor renegotiates his costs.
- With EDI implemented in this environment, manufacturers will be able to receive purchase orders from distributors electronically to accelerate the ship and stock process.

F**An Electronics
Industry Case Study**

Hewlett-Packard is a major international designer and manufacturer of electronic products and systems. The company had revenues of over \$8 billion in 1987.

Hewlett-Packard emphasizes customer needs and works closely with them to provide high-quality solutions to complex problems. The company's culture and systems are dedicated to building strong and permanent alliances with its customers and suppliers.

HP has always been a decentralized, entrepreneurial company but there was little synergy between different business units serving the same customer. A 1984 reorganization allowed the company to improve its overall customer service.

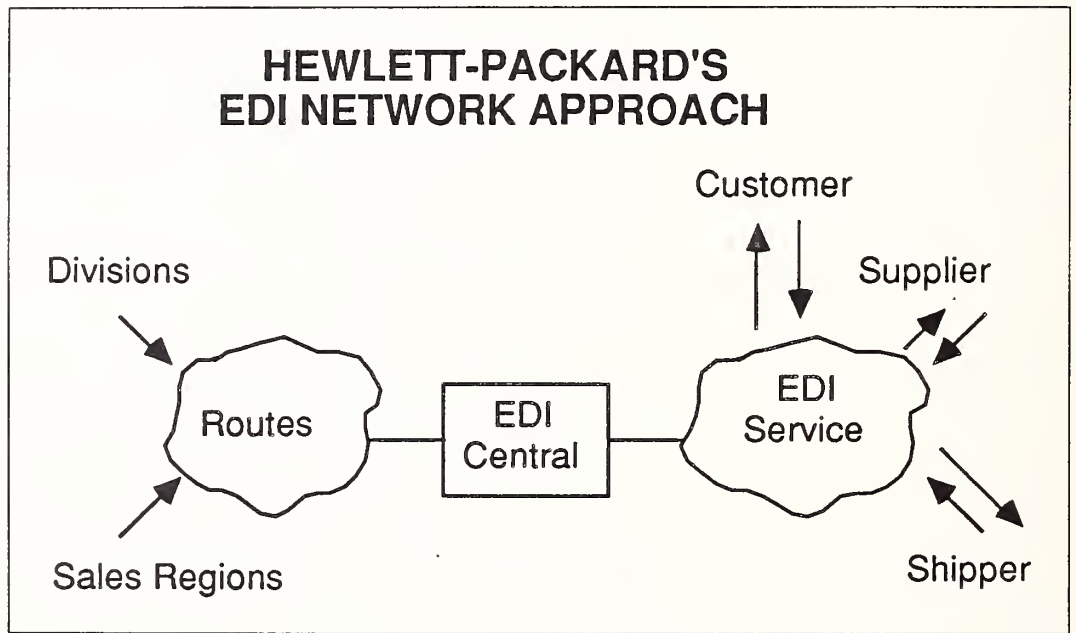
Before the reorganization, HP's administrative support functions were highly decentralized. Many locations and divisions had their own home-grown systems for basic applications such as order entry, inventory,

invoicing, etc., and there were over 100 different forms of purchase orders.

Although HP's information systems are complex and decentralized, they are all linked together through ROUTS, the worldwide HP data network. EDI is viewed as a mechanism for converting this connectivity into effective integration of various information systems.

"EDI Central" (EDIC) is the technical arm of HP's EDI effort. EDIC deals with all transmissions, serving as the one connection to ROUTS and the outside world. It manages all the operational aspects of communication, security, and control. Exhibit IV-3 illustrates HP's EDI networking approach.

EXHIBIT IV-3



HP is involved in EDI activities with its suppliers, customers, and some transportation carriers. It is starting on EDI/EFT exchanges.

The primary factor motivating HP's entry into EDI was to improve its partner relationships. The costs and benefits were never separately analyzed or justified; rather, they were simply a part of the overall strategy of strengthening relationships.

During the early 1980s, when demand for computer chips exceeded supply, the industry operated in "allocation mode." Therefore, in 1983, the Materials Procurement Department (MPD) started on a program to improve supplier relationships. HP recognized that EDI could help its suppliers shift production targets more effectively, thus assuring HP of the parts it needed. In fact, some HP divisions had already started their own EDI programs.

Within the overall process of improving relationships, HP also focused on creating a one-company image. EDI could clearly help the decentralized company here.

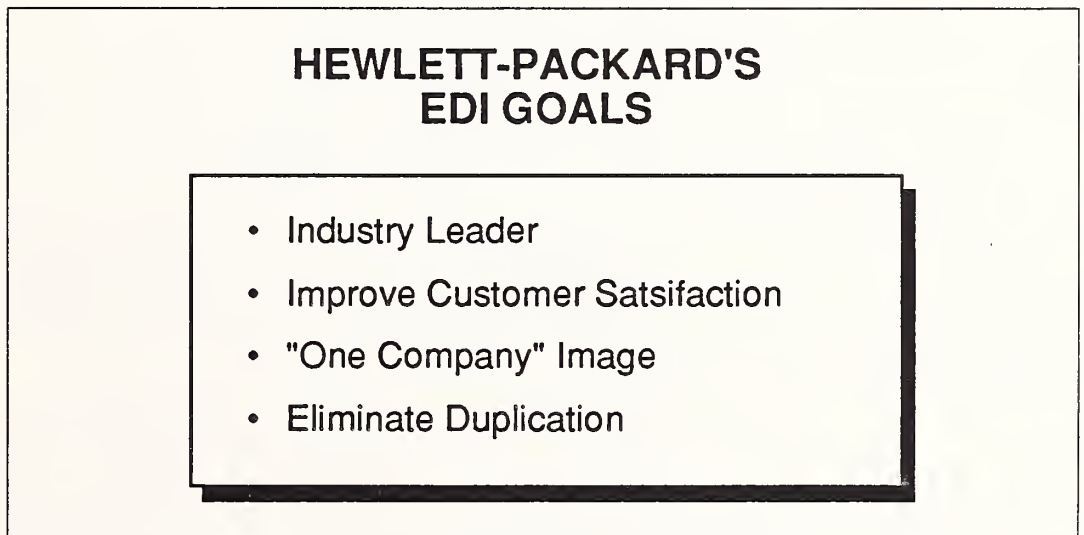
A Steering Committee of division representatives was formed to define strategies, policies, and goals and to establish priorities for the EDI project. Top-level corporate approval of EDI was assured. This coordinating committee approach is a normal part of HP's corporate culture and was accepted.

The EDI steering committee's goals were:

- Be among the industry leaders in implementing EDI.
- Increase customer satisfaction through electronic order processing.
- Present a "one company" image to customers/suppliers via a common EDI interface.
- Eliminate data entry duplication.

These goals are summarized in Exhibit IV-4.

EXHIBIT IV-4



While the costs and benefits of EDI were not separately monitored, the overall program was. Also, it was recognized that the lack of standard systems and solutions was creating unnecessary administrative overhead costs. While each unit might still have to maintain systems related to its unique product line, a standard EDI process could eliminate waste.

HP's corporate culture required that very few people be dedicated to EDI. The necessary support was each area's responsibility, and these responsibilities were integrated via the Steering Committee. However, a small EDI Administration Group was created to provide the business units with

non-partisan corporate support and day-to-day assistance. Training, documentation, and maintenance of the standards were among the Administration Group's primary functions.

The Steering Committee divided EDI responsibilities into three main areas: strategic, technical, and business issues.

Strategic issues remained the responsibility of the Steering Committee.

EDI Central became the technical arm, developing and maintaining the core software and operating the communications gateways. Individual business units were assigned the tasks of establishing unit EDI strategies and integrating EDI into their operations. They also managed their own relationships with trading partners.

HP was an early and active member of EDI standards committees and is a strong supporter of the ANSI X12 standard. All areas of HP have participated in ANSI's work.

As a computer manufacturer, HP is using its own equipment (HP 3000 series) for EDI. The basic EDI translator was purchased and enhanced by HP staff. At present, HP uses two third-party network services for EDI mailboxing.

EDI Central is responsible for reviewing/changing these choices as EDI evolves. While HP is open to using other networks, EDIC prefers to deal with as few vendors as possible.

The way HP assigned responsibilities for implementation assured that the project would be a success. The Steering Committee was successful in anticipating problems and issues that might arise and was able to keep them from derailing the project.

The development of EDI was originally a mutual undertaking between HP and several of its major vendors. Now, some customers are asking to start an EDI relationship. Unlike the major auto companies, HP will not lean on anybody—supplier or customer—to embrace EDI. Nor will it force its own standards on its trading partners.

HP was very open in sharing its technology and plans. The philosophy was "educate everyone—spread the gospel," both internally and externally. HP's partners learned how they would benefit from EDI, and no other incentives were necessary.

Further details on Hewlett-Packard's EDI experience can be found in INPUT's study, *EDI Implementation Case Studies*.

G

Apparel/Textiles

Many aspects of the apparel and textile industry applies to both the process and discrete manufacturing sectors. These industries are using EDI to exchange data with their own suppliers in petrochemicals (dyes and man-made fabric raw materials), equipment (sewing machines, mills, etc.), and services (transportation, laundries, job shops).

While not excluding some of this discussion, the focus of this section is on these industry's EDI activity within retail environments.

According to industry research, the annual profit potential of the apparel industry is \$100 billion, but 25% of this potential is lost due to unplanned retail markdowns, with 17% of the loss found at the retail level. If retailers do not achieve the anticipated level of sales immediately, markdowns are taken.

- Contributing to this loss is a traditionally long ordering, manufacturing, and delivery cycle.
- Overseas suppliers may take as long as six months to fill orders.
- This time lag means buying decisions may be difficult due to customer style and taste changes.
- Conversely, if the ordering/delivery cycle is reduced, manufacturers can quickly respond to retail outlets' needs for in-demand items.

U. S. apparel manufacturers believe that due to their location, "quick response" can be a competitive advantage over foreign suppliers. Manufacturers see EDI as helping reduce the cycle to as much as 4-6 weeks, supporting reordering of fast-selling products.

- The apparel industry's trade group "Crafted with Pride" is chartered to promote "Made in America" and "quick response" techniques. Quick response is the industry name given to Just-In-Time.
- In order for quick response to be accomplished, product sales data needs to be collected at the retail level and sent to apparel manufacturers and ultimately textile manufacturers for clothing fabrication and distribution.

Since textile companies provide material for apparel, automobile, and other industrial manufacturers and for floor covering, standardization of electronic formats is needed. Several industry groups have been working on standardization.

- The Textile/Apparel Linkage Council (TALC) has approved a subset of X12 for the industry called Textile Apparel Manufacturer's Communications Standards (TAMCS). As part of its standards development,

TALC has created data segments for communicating product descriptions about fabrics between cutters and suppliers, covering widths, shading, and other details.

- The Voluntary Inter-Industry Communications Standards (VICS) is working on communications standards between manufacturers and retailers.
- FASLINC is the Fabric and Supplier Linkage Council, with members in the textile and nonwoven industries and suppliers such as fiber, dyes, chemical, and others. The group is developing standards for EDI as well as other industry-specific needs to reduce order cycles, shipping errors, and inventories.
- SAFLINC is the Sundries and Apparel Findings Linkage Council with members in sundries and findings (ornaments). It is taking a similar approach to EDI.
- Additionally, Universal Product Code bar codings are being used to handle goods identification, simplifying data input to an EDI system.

While purchase orders and invoices are important to the industry's EDI initiatives, shipping notification is the most important transaction.

- Since it may take several days for a shipment of fabric to be delivered to an apparel manufacturer, having detailed information regarding color and size of en route material helps optimize use of supplies, reduces inventory, and improves cash flow management.

Most large apparel and textile companies are involved in EDI.

- Milliken & Company is a leading EDI user. Its Milliken Information Data Access System (MIDAS) allows customers to retrieve information on product status, shipping schedules, invoicing, and other data.
- Haggard (Dallas, TX) offers the Haggard Order Transmission system (HOT), supporting rapid delivery of products to retailers. Over 2,300 retailers are on the system, with participants increasing sales on average 27% with inventory reductions of 25%

Working as an GE Information Services EDI agent, ACS Network Systems (Concord, CA), a software, turnkey systems, and data base vendor, is selling EDI*Express services.

- Founded in 1978, ACS offers software for IBM System/36 and System/38 computers. It was founded by the president of Apparel Computer Systems, Inc. of New York.

- In Spring, 1987, the company introduced EDI software for these processors.
- The company offers the Apparelnet online industry-specific data base, with 19,000 suppliers of fabric, trims, equipment, supplies, and services listed, as well as 3,100 sewing contractors. It also has E-mail capabilities.
- ACS handles sales, training, installation, and support of GE's EDI services to a major portion of the apparel manufacturing industry.

Computer-Assisted Design and Manufacturing (CAD/CAM) methods are being applied in this industry to apparel and schiffel (lace and embroidery).

- A new GE Information Services service called Design*Express which carries graphics data is being resold by Dallas-based Microdynamics that sells CAD/CAM systems especially designed for the industry.
- The intent is that cutting designs can be sent with purchase orders to domestic and off-shore manufacturers that may then directly use the data in automated cutting machines.

H

An Apparel Manufacturing Case Study

Levi Strauss & Co. (San Francisco, CA) is one of the world's largest apparel manufacturers.

Levi's has built its reputation on the consistency in design, style, and quality of its merchandise and on the sales and merchandising services it provides its retailers. Anything Levi's can do to improve its customers' sales helps Levi's sales; and anything that Levi's can do to improve its customers' inventory management helps Levi's with its own inventory management and production planning.

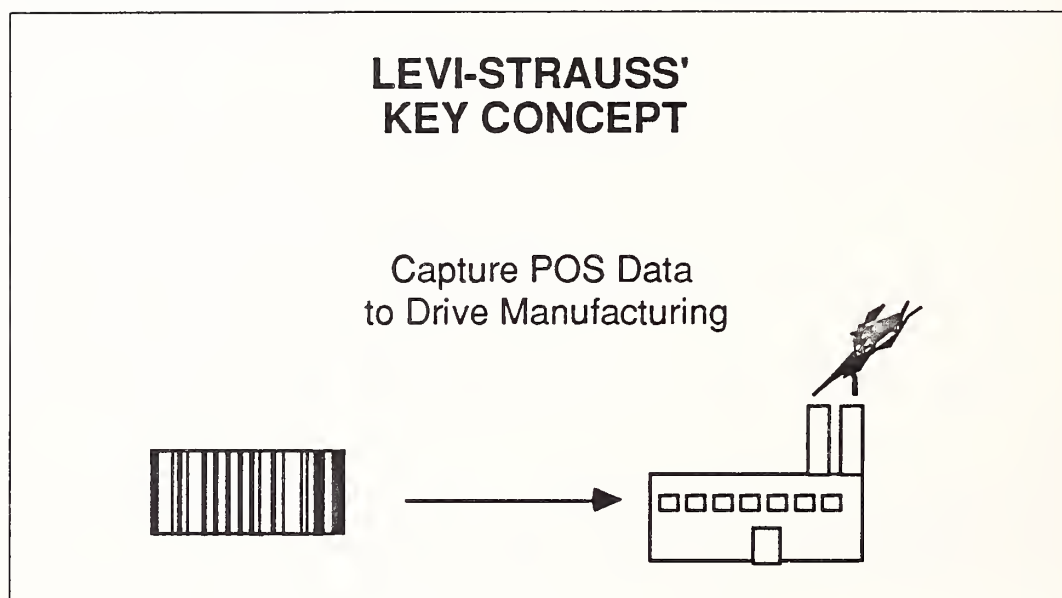
While the sales side of its operation is complex, the buy side is relatively simple. Levi's purchases large volumes of material (fabric, buttons, zippers, etc.) from a small number of vendors. Since most of Levi's products are staples, there is little danger that its raw materials inventory will become obsolete. The problem of dealing with suppliers is much less than the problems of dealing with the customer base.

Inventory control can be difficult in this industry, providing a significant opportunity for improvements through EDI. The key for keeping inventory records is the SKU (stockkeeping unit), each of which represents a style, color, and size. Manufacturing orders must be given by SKU, and finished goods inventory is also maintained by SKU.

For manufacturers to optimize production planning, it needs to know retail inventories and how well merchandise is moving at the point-of-sale (POS). However, most retailers, particularly smaller ones, are not able to provide this data.

The large retail outlets have generally adopted POS technology such as scanners and electronic cash registers to enable sales and inventory recordkeeping at the SKU level. These stores can create more frequent and fine-tuned purchase orders. The next step is to transmit orders electronically, and some of the largest retailers developed own proprietary EDI systems. This concept is illustrated by Exhibit IV-5.

EXHIBIT IV-5



Since these retailers dealt with many vendors, they were unwilling to accept multiple vendor-specific EDI systems.

- Vendors were often told that use of the retailer's EDI system was a requirement for continuing the business relationship and firms such as Levi's were forced into developing a variety of incompatible EDI interfaces.
- As the major retailers had the upper hand, there was little initial push for standards. Most manufacturers were so busy keeping up with their large customers that they had little time to consider standard solution development and acceptance by the industry as a whole.

Manufacturers saw three advantages to working with retailers on EDI and they quickly decided that the advantages outweighed the costs of supporting multiple systems.

- By reducing out-of-stocks, retailers and manufacturers realized higher sales and higher inventory turnover rates that made shelf space more profitable.

- In turn, higher shelf space profitability leads retailers to increase space allotted to a vendor, further increasing a manufacturer's sales.
- For the manufacturer, this translates into higher sales and market share.

As smaller retailers adopted POS technologies, they too could realize many of these benefits. The main benefits of adding EDI are faster order entry and reduced paper handling, meaning lower costs.

After years of supporting proprietary formats, in 1985 Levi's considered the problems of developing and selling to its retailers a standard EDI approach. An overall concept was developed that specified the benefits such a system might offer. A marketing approach was developed; the plan outlined Levi's benefits if its customers adopted a standardized EDI approach.

Levi's did an extensive survey of its customers, asking them what problems they had and what features they wanted from an EDI system. One of the primary benefits Levi's attempted to quantify and sell was an increase in inventory turns from eliminating overstocks and out-of-stocks.

EDI was one of the requests that came out of the survey. Levi's was also asked to handle preticketing of items with retailer-specific vendor marking. This reinforced the notion that industry standards were needed not only for EDI, but for SKU-level product identification.

After the surveys, Levi's assembled senior managers to develop a standard EDI system. In justifying the proposed system, all costs and benefits were included, with an indication of how accurate the estimates might be. The completed analysis and plan were documented and presented to the CEO/COO. The plan was approved and specific strategic direction was given by the CEO/COO.

As an extension of Levi's tradition of service to its customers, the new system (called LeviLink) was to be aggressively promoted to those customers who could benefit the most. Levi's staff were encouraged to participate in standards-setting groups and to take high-profile public positions on all relevant issues. The basic goal was to move the industry in the direction of standards.

Since this was basically an issue of relationships with customers, an EDI support group was created within the marketing area. This unit, Retail Electronic Services (RES), was staffed with five senior managers and chartered to improve customer relations and develop EDI partnerships with retail accounts. It was also given the responsibility for overall strategic direction of EDI projects.

tages such as the ability to present a single image to the retailer. Interfacing with the proprietary systems of large customers meant that each of these customers required specialized individual support, while smaller customers were left out in the cold. With a standard system, Levi's could adopt consistent support procedures that would benefit the entire retailer base.

A second major advantage was that these EDI-based services could be expanded as retailers became more sophisticated. By acting as both a product developer and service provider, Levi's could stay close to the changing needs of its customers.

A third advantage was that a standard system is easier than a proprietary system to sell to new and/or smaller users because they would eventually be able to use it with other vendors, thus spreading the cost of acquisition over a larger base of business.

A range of services and systems was offered. Related to EDI were Electronic Purchase Orders, Packing Slips/Bar Coded Carton Tags, Invoicing, and the Retailer Electronic Data Interchange Package (REDI)—a complete inventory control/financial analysis and reporting system.

Additionally, Levi's provided a remote computing service called Sell Through Analysis and Reporting System (STARS) which analyzes POS data to compute product profitability and identify fast and slow moving items by product, store, region, etc.

A recent major addition to LeviLink is the RIVET system. RIVET (Retailers Inventory Valuation and EDI Transmission) is a package developed by an independent software house that was modified for and endorsed by Levi's. It extends the capabilities of REDI to multiple stores, larger computers, and direct interface with a wide variety of equipment. A complete package of equipment, software, and an EDI network linkage (if desired), is marketed by AT&T in conjunction with Levi's.

As of mid-1987, Levi's was receiving over 20,000 purchase orders a month in proprietary EDI formats and between 500-1000 in standard format. The retailers involved represented approximately one-third of Levi's business.

Indications are that Levi's will continue to have success in shifting its largest retailers away from their proprietary formats. Standard EDI traffic is growing as more retailers hear about LeviLink.

Levi's sees EDI as a way to provide significantly better levels of service. By adopting a strong leadership role, it hopes to drive the market and be favorably measured against its competitors.

In an environment with few standards and many large proprietary systems, there is sometimes a tendency for people to accept what is easy rather than what is best for the long term.

As part of its leadership posture, Levi's has been willing to go counter to industry standards if it thinks the industry is taking the wrong approach to a specific issue. However, most of its effort is spent on getting others to adopt the concept of standards rather than pushing for the adoption of a specific Levi's approach.

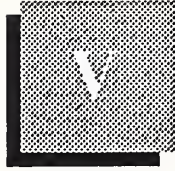
More detail on Levi's approach to EDI can be found in the INPUT report *EDI Implementation Case Studies*.

The next chapter examines EDI in process manufacturing industries.



Process Manufacturing EDI Directions





Process Manufacturing EDI Directions

Processing manufacturing consists of a diverse group of subindustries including oil and gas exploration and processing, food processing, chemicals, primary metals production, printing, and forest products.

All these industries have similar characteristics:

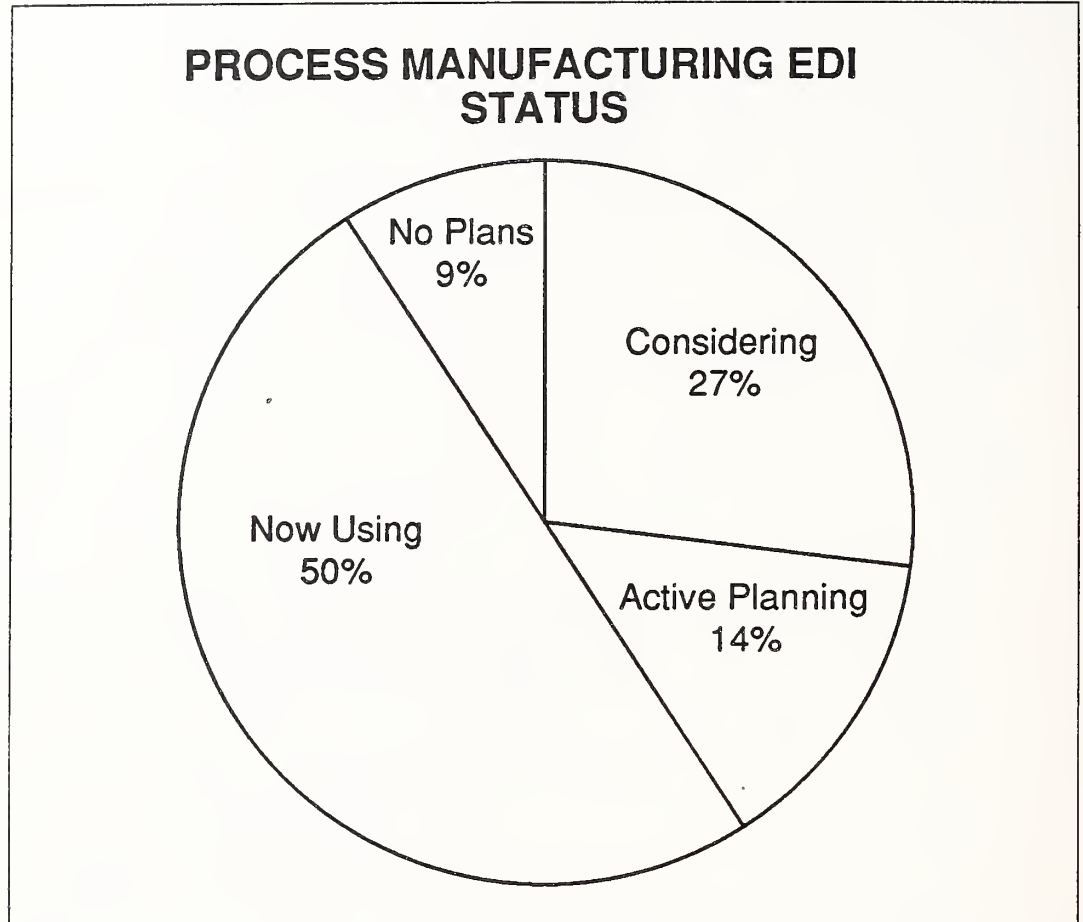
- They manufacture products in bulk processes where it is difficult to discriminate one end unit of the process from another.
- They use continuous-flow processes that involve several highly integrated technical steps in the conversion of raw materials to finished goods.
- They manufacture using very high-volume, highly automated production runs.

Information technology in process manufacturing has been primarily applied to managing the process and only secondarily to the management systems common in other industries.

There has only recently been application of information technologies to strategic purposes as is common in banking, insurance, and medical industries.

As shown in Exhibit V-1, 64% of the companies INPUT surveyed are actively planning and implementing EDI, or are now using EDI. Another 27% report they are in the initial stages of evaluating their EDI options.

EXHIBIT V-1



A

Chemicals

Chemical companies represent a prime industry that supplies products to other industries and to consumer markets.

- Other industries that rely on chemicals include petrochemicals, plastics, textiles, explosives, and agricultural products.
- Consumer products derived from chemicals include household cleaning solutions and pharmaceuticals.

The chemical industry is also a large consumer of goods and services. Given its involvement in multiple industries, a broad outlook on how EDI is being implemented has been required.

The chemical industry's scale of international operations has led to adoption of electronic trading as an important aspect of industry development. Additionally, the competitive nature of the global chemical industry, as well as government requirements and demands from customers, have encouraged this sector to improve efficiencies by applying information technologies.

The chemical industry in both the U.S. and Europe has been involved in EDI in an organized way since the 1984 formation of an industry-focused EDI planning group.

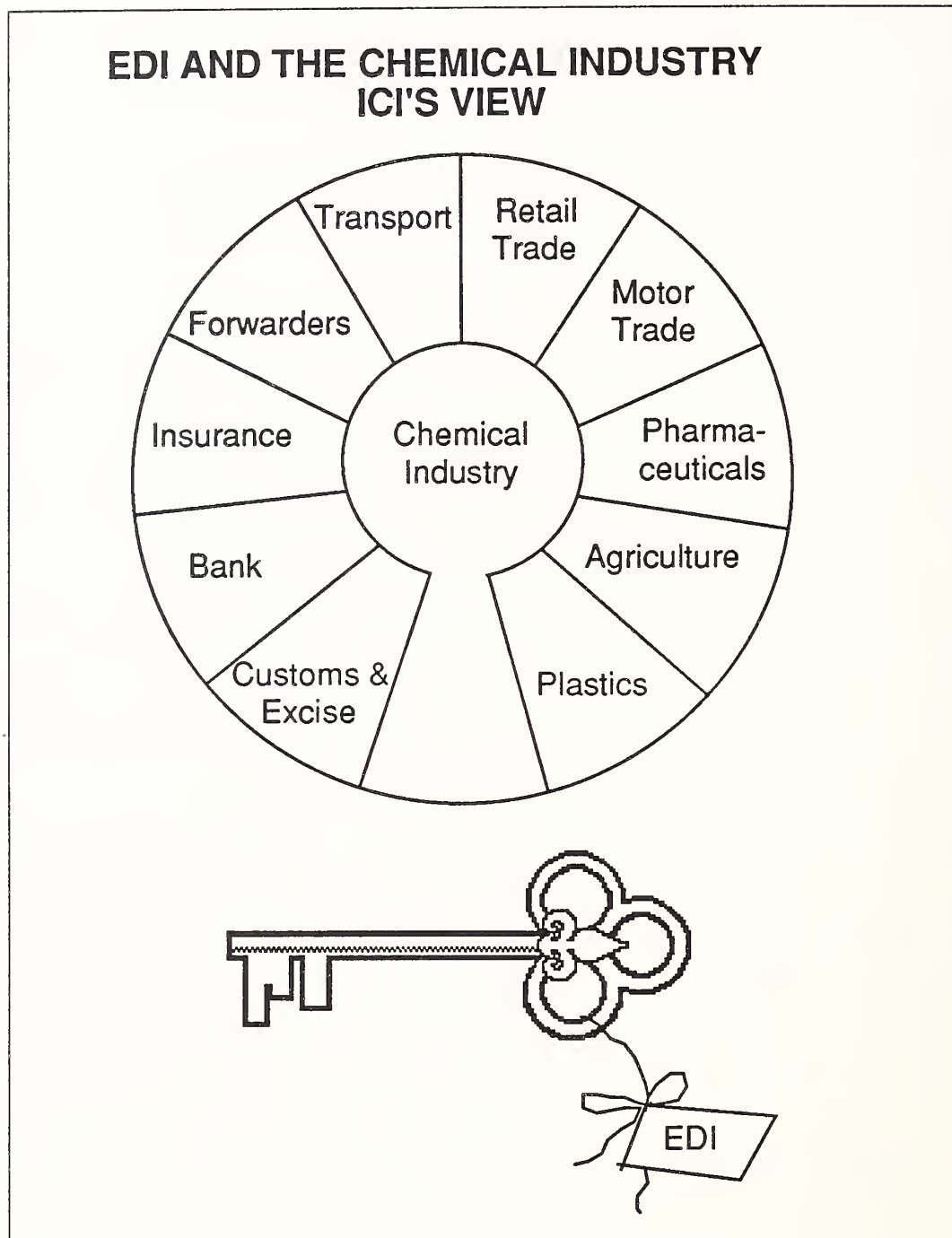
- In the U.S. the Chemical Industry Data Exchange (CIDX) format was originally pilot tested by approximately 20 members of the Chemical Process Directors Group, using X12 and TDCC standards for several transactions.
- Currently, over 40 chemical companies are involved in EDI, with increasing volume and additional transaction set usage reported.

The European chemical industry has also been EDI active. The multinational Imperial Chemical Industries (ICI—London) deals with over 35,000 trading partners, creating in excess of six million incoming and outgoing transactions annually.

- ICI operates approximately 200 manufacturing facilities in 40 countries and owns 300 subsidiaries and associated companies.
- The company became an early participant in EDI by adopting the Tradacoms standard for use in its pharmaceuticals, agricultural chemicals, and paints divisions.
- ICI participated with other manufacturers and wholesalers in a trial of Pharmanet, which was later merged into the Tradanet services provided by ICL, a U.K. computer services company.
- ICI's EDI use grew to include transactions with shipping lines and international links to its U.S and Canadian subsidiaries. The plan is to expand EDI trading to over 100 of its largest trading partners by 1989.

ICI's view of EDI as a key ingredient in its trading relationships is illustrated in Exhibit V-2.

EXHIBIT V-2



ICI is not alone in embracing European EDI. Following the CIDX approach to U.S. EDI, European chemical companies launched a pan-European EDI project through the Council of Chemical Manufacturers' Federations (CEFIC—Brussels) in coordination with the European Economic Commission.

- CEFIC members include AKZO, Bayer, Ciba-Ceigy, Dow Chemical, DSM, Dupont, ERT, Exxon, ICI, Monsanto, Montedison, and Shell.
- The CEFIC team developed a proposal for an international EDI approach uniquely designed for the chemical industry's needs.

- The resulting proposal specified that the X.400 message handling standard be used, initially for European communications, but likely for international links as well. This is said to be the first major implementation to use both EDIFACT and X.400 standard.
- In September 1987, GE Information Services was selected as the clearinghouse for EDI trials in Europe. GE is also providing professional services to each company participating in CEFIC.

Unique industry requirements being addressed by both CIDX and CEFIC are industry-specific documents such as Certificate of Analysis (COA) and Certificate of Compliance, which are related to quality control test data. There are also electronic transactions covering special shipping needs such as the Material Safety Data Sheets. These documents change frequently due to changes in chemical composition and are legally required and widely used by transportation carriers, shippers, and internally by chemical companies themselves.

Due to hazardous materials requirements, a chemical company may ship acid diluted to 50% concentration, but charge for the product at 100% concentration. This is another industry-specific transaction called Percent Solution Billing.

A Chemical Industry Payments Group is addressing EDI/EFT issues within the industry, and bar code scanning in association with EDI is being implemented.

Because the CEFIC organization has several responsibilities, including the gathering statistical information, the collection of data from EDI transactions for an industry-wide data base is likely.

In addition to those chemical companies named above, also involved in EDI are various units of Kodak, Chemical Leaman, Union Carbide, Sun Refining, and Air Products and Chemicals.

B

Coal

In the U.S., the coal industry's adoption of EDI is linked closely to other industries use: to the rail industry (and barge transportation industry), due to the coal industry's reliance on these forms of transportation, and to the utilities industry, which uses coal to fuel power plants. This is in addition to a coal company's potential EDI use for routine supplies, equipment, and services purchasing.

At this time, however, most EDI use in the U.S. coal industry is for electronic bills of lading and other logistics data.

Among the needs being addressed in logistics data for the industry is the elimination of mine tags, a system using colored paper to differentiate coal grades and quantity.

Because most coal shipments are similar, repetitive electronic waybills and other documents can be used with very low character counts, resulting in significant savings over paper documents.

Since the industry consists of a relative few companies, EDI use in this segment can proceed quickly. The National Coal Association has formed a subcommittee to address industry issues in adopting EDI.

In the United Kingdom, British Coal's adoption of EDI has received significant attention. The company planned to have approximately 150 of its suppliers using EDI by the end of 1988, with a projection of 300 by the end of 1989. This would represent one of the largest EDI trading communities in Europe.

- As a measure of ultimate potential for this company alone, British Coal has approximately 12,000 suppliers, although 80% of all purchases are made from approximately 2,500 suppliers working under nationally negotiated contracts.
- British Coal requires some 350,000 different stocked items, and centrally issues 500,000 purchase orders annually. These purchases results in 1.8 million received invoices which are reconciled against purchase orders through both manual, and increasingly, automated techniques.

Larger suppliers are linked directly with British Coal, with others connected through ISTEEL's EDICT service.

Suppliers are predominantly general engineering firms, but are also electrical equipment manufacturers, chemical suppliers, laundries, and distributors of various commodities.

British Coal plans to add its own customers to its EDI implementation in the near term.

C

Metals

1. Background

The metals industry is populated by over 500 metal producers and approximately 800 distributors.

Industry companies are rebounding from several years of unfavorable business conditions. The major steelmakers have reorganized and reduced costs while increasing productivity. Off-shore competition has been limited by trade bills.

Newly competing with the large steel companies such as USX, Bethlehem, and LTV are "minimills" that make steel from scrap instead of from coal and ore. Minimills have increased their U.S. market share to

22%, and their adoption of EDI will be necessary for provide competitive parity with the major steel manufacturers that are using EDI.

The industry's use of EDI is synergistic with EDI's adoption in diverse industries such as automaking, aerospace, canning, appliance manufacturing, gears, and motors.

2. Iron, Steel, and Aluminum

Beginning in the late 1960s, iron and steel manufacturers were being required to use proprietary communications systems developed by the largest metal-consuming industries.

In response to this situation, metal industry representatives joined the ANSI X12 committee upon its formation in 1980 to work towards a single national standard. However, work on EDI communications formats was actually started earlier by the American Iron and Steel Institute's Committee (AISI) on Systems Communications.

- AISI developed a mainframe-based customer communications system called COMPORD (for computer ordering).
- In 1983, funding for a PC version of the software was provided with the intent of supporting communications with distributors and warehouses that also provide "outside processing" services for coating, slitting, and storing of steel products before shipment to customers. These logistical needs demanded an EDI solution.
- Due to its complexity, COMPORD had not been accepted by many in the industry.
- With the formation of ANSI X12, the uniform nomenclature and tables describing steel product characteristics under the COMPORD system, were revised, expanded, and adapted to ANSI X12 formats.

While COMPORD was based on a mainframe implementation, in 1987 microcomputer EDI software was introduced by Can/Am Tech Inc. (Hamilton, Ontario and Pittsburgh, PA). Called E-Z Order, the software is reportedly the only industry-specific EDI translator available. E-Z Order is being adopted by Steel Service Center Institute (Cleveland, OH) members. Can/Am Tech is an EDI agent for GE Information Services.

The AISI has established ANSI X12-approved formats for steel industry products, and aluminum product codes were added. Metal industry products are described by chemistry, dimension, and finish as well as by more traditional descriptors.

The Canadian Steel Service Institute is also supporting EDI efforts.

In 1987, Joseph T. Ryerson & Son, Inc., a subsidiary of Inland Steel Industries (Chicago, IL) notified key suppliers that it expected them to implement EDI. This "big stick" approach has been used with mixed success in the auto industry.

Bethlehem Steel has installed an X12-based EDI order processing system (developed with help from a professional services firm) allowing it to deliver its products in 2-3 weeks while Japanese competitors may take several months.

- The company's EDI system is fully integrated with its marketing control system, allowing orders to be fully processed from entry through shipment to invoicing and payment, with each transaction using the same data.
- Although customers were first offered access to the system, transportation carriers and steel company suppliers are being added.
- Among Bethlehem's EDI system users are major automotive manufacturers, which account for approximately 25% of the company's business.
 - For sales to these customers, bar codes are used to identify shipped materials, which are scanned by the automaker.
 - The scanned data is routed into accounts payable applications, initiating an EDI/EFT payment.
 - This form of EDI/EFT, called Evaluated Receipts Settlement, obviates the need for invoicing, as bills are paid from shipping documentation.
- Bethlehem offers its trading partner assistance in implementing EDI.

Among other iron and steel companies using EDI are Armco, LTV, and National Steel, along with steel industry service centers.

Academic research on the industry's use of EDI and other information technologies is being done by Northwestern University's Steel Resource Center, under AISI sponsorship.

The aluminum industry's EDI development parallels that of the iron and steel industry. Through the Aluminum Association, development work adapting ANSI X12 formats was applied to industry needs, leading to the creation of the Aluminum Customer Communications System (ACCS or "Access").

Industry-wide EDI coordination is handled through the Joint Committee of the Metals Industry, formed by the Aluminum Association and the American Iron and Steel Institute.

Transactions developed for the metals industry include the Report of Test Results, similar to the chemical industry's Certificate of Analysis, which reports inspection information and statistical process control measurements, and certificates of test or compliance results. These transactions are required to satisfy a customer's product specification or process requirement.

Missing from EDI metals industry development work are the copper and brass industries. Observers believe this is due to the relative lack of strong industry associations able to shepherd individual company participation in EDI developments.

D

Oil and Gas

Impacted by lowering oil prices and facing competition from lower cost off-shore producers, the North American petrochemical industry has been seeking ways to mitigate losses and improve efficiency.

The petroleum industry has an established EDI base, having used EDI techniques since approximately 1974. Only recently has there been a coordinated, industry-wide approach to EDI.

The leaders of petrochemical's EDI activities appear quite energetic. INPUT feels the industry will adopt EDI broadly, and will reinforce EDI use in other industries.

The Council on Petroleum Accounting Standards (COPAS), working with a network service vendor, developed the joint interest billing exchange (JIBE) format, as well as de facto standards on codes describing equipment used in oil production and formats for joint audit exchange (JAEX or JADE) to audit joint producing properties.

- There are approximately 500 jointly owned oil industry operations that could use JIBE and related formats.
- As of mid-1988, seven U.S. and six Canadian petrochemical firms were testing JIBE formats. One issue arising from the experimental program is that the formats lack the detail that was previously provided on paper joint billings.

The industry has a substantial amount of intercompany exchanges. For example, the Joint Interest Billing (JIB) is routed between partners in a producing property. Another shared transaction is the operating expense statement. In their paper formats, these are large documents; however one oil company reported reducing its staff by 37% by moving to an EDI solution for processing JIBs.

There were two EDI task groups within the American Petroleum Institute. One, formed in late 1987, is dealing with general issues and promotion, and the other is working on a pilot project called PipeNet. The focal point for EDI activities in the industry now moves to the Petroleum Industry Data Exchange (PIDX) group, formed in May 1988 to promote EDI. There are 38 corporate members of PIDX.

Under development for four years, the PipeNet pipeline pilot will test industry-specific transactions, such as nominations (similar to a request for quotation), shippers schedules, meter and gauge "ticket" readings, inventory notices, and invoices, largely by adopting X12 transaction sets. Trading partners will include pipeline carriers, shippers, suppliers, and consignees.

GE Information Services, through its PetroDex offering, supports a suite of industry-specific remote computing services including PetroEx.

- PetroDex is used by approximately 200 oil industry companies, exchanging nearly 2 million records monthly
- PetroEx is an EDI application that uses a format developed prior to the creation of the X12 standard. However, for JIBE and JADE, X12 structures are being used.

In addition to intraindustry and industry-specific exchanges, petroleum companies are involved, or becoming involved, in EDI generally as buyers, suppliers, and shippers. Further, most petroleum companies are suppliers to the chemical industry or have a corporate component that is part of that industry. Therefore, they may be participating in CIDX (U.S.) or CEFIC (Europe) EDI projects.

Future developments planned in oil industry EDI are exchanges between companies of drilling information, production histories, and test information reports, and sending EDI information with EFT value for federal, state, and local tax payments.

- Geologic Data Exchange describes characteristics of drilling mud for exploration purposes.
- Well-logging information exchange will cover information routinely exchanged between companies in the industry. It covers such diverse readings as pressure, natural radioactivity, porousness, and depth.

Oil companies have high requirements for security. Since their transactions are so large, errors can be particularly damaging, both in decimal point moves and delays. Security issues have been heightened by recent news stories regarding computer "viruses" and Trojan Horse programs that can cause damage to data bases and programs.

Another oil company concern regarding security is fear of exposure in law suits. Oil companies do not want to be accused of having viewed or altered a competitor's or other company's data. There is fear of exposure in lawsuits. Users report that subpoenas have been issued for archived data and memos in oil company litigations, data that could have been altered.

Industry representatives are marketing EDI concepts to gain additional industry participation, and some express disappointment at the level of participation to date. Oil companies involved in EDI include Shell, Chevron, Colonial Pipeline, Atlantic Richfield, Amoco, Exxon, and BP America.

Because of their size, oil companies are making substantial investments in EDI and EDI "stimulated" projects. One company told INPUT they spent an estimated \$2 million on their EDI activities; another indicated expenditures of \$10 million, with the majority spent on internal development.

E

Paper and Pulp (Forest) Products

The forest products industry, and particularly the paper and pulp segments of the industry, have been resistant to the change implied by EDI, in part because it faces a fundamental philosophical dilemma: EDI's purpose is to reduce paperwork.

The industry has also been resistant to EDI due to perceived and real complexities, some of which it has partially created itself.

There are EDI activities in this segment, which include paper, newsprint, pulp, business forms, envelopes, cartons, containers, paperboard packaging, and building materials.

Because of its nature, the industry extends into other sub-industries such as consumer paper goods (distributed through groceries), resins and other chemical extracts, real estate (source of the raw materials), transportation, warehousing, machinery (used for harvesting), printing and publishing firms, construction services, home center retail outlets, furniture manufacturers, and others.

Industry use of EDI is slowly increasing. As of early 1988, paper companies using EDI were only handling under 5% of their business electronically.

The EMBARC (Electronic Manifesting and Bar Coding) specification for order tracking was developed several years ago for paper industry specific needs. It applies EDI and bar coding towards manifests that describe shipments in terms of quantity and quality and provides billing information.

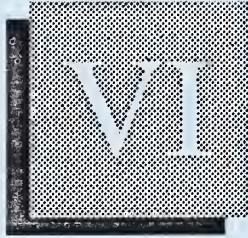
- EMBARC uses an industry-unique data format that inhibits interindustry EDI trading. A move to change to an X12-based format was not successful. EMBARC is used by approximately 30 companies in this segment.
- GE Information Services was endorsed in 1986 by several paper industry associations as the industry's service provider for the EM-LINK service, although companies may use other networks.
- Companies involved in distributing building materials to home centers and hardware stores often use the Eagle service provided by Sterling Software's Ordernet Division, using an industry-specific format.
- Weyerhaeuser Information Systems, a subsidiary of the natural resources holding company (Tacoma, WA), has been establishing EDI capabilities through centralized facilities for Weyerhaeuser companies, using ANSI X12 formats whenever possible.
- As of early 1988 Champion International was issuing approximately 2,000 monthly manifests to its customers and interchanging purchasing documents with its own suppliers, including transportation services.
- Westvaco has implemented EDI through its Westrac customer service applications as a differentiation strategy to lower the customer's costs of using its products.
- MacMillan Bloedel, a large Canadian natural resources company, is implementing EDI through CNCP Telecommunications' EDI Access service. As of late 1988, five suppliers, mostly representing equipment vendors, were taking part in the pilot test: Acklands Ltd, Auto Marine Electric, Gough Electric, Fleck Brothers (first aid and medical supplies), and Malkin & Pincton (heavy equipment).

Despite these activities several firms, such as Boise-Cascade (Portland, OR), have implemented proprietary customer inquiry and order entry systems, although these may run in tandem with true EDI systems.

A difficulty in adopting EDI to forest products is the lack of a universally accepted product coding scheme, as is found in other industries such as metals.

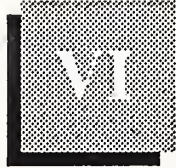
- This is due in part to the relative weaknesses of industry-wide forest products organizations and the presence of many smaller milling and processing operations.
- However, the American Paper Institute is coordinating EDI implementation in its sector and addressing standards requirements for transactions covering test results and other specific needs.

The next chapter examines EDI directions in the transportation sector.



Transportation Industry EDI Directions





Transportation Industry EDI Directions

A

Background

The transportation industry is subsegmented into motor, rail, air, and ocean carriers. Overnight courier services are also considered part of this marketplace. Multimodal carriers acting as full service transportation and/or distribution management firms are active across several methods of transportation.

Deregulation is causing rapid obsolescence of existing systems. To remain viable in the new environment, transportation firms are placing increasing emphasis on computerized systems to improve their competitive positions and improve customer services.

While transportation companies are certainly buyers of goods and services, and therefore candidates and in many cases users of purchasing-oriented EDI services, this section focuses on how carriers use EDI as a customer service. This variety of EDI is called logistics data interchange (LDI).

The transportation industry is information intensive. A large amount of data is required at virtually every point in the cargo's journey. The carrier of record must generate and process many documents, especially in international transportation. Much of the information in each document duplicates that on other documents pertaining to the same shipment.

Not all of the industry's EDI system and service developments fall into the third-party, external environment. Several transportation service companies offer EDI and EDI-like customer services for shipment status, equipment ordering, and other functions. In several cases, PC software supporting these functions, but limited to the specific carrier's systems, is provided free to customers.

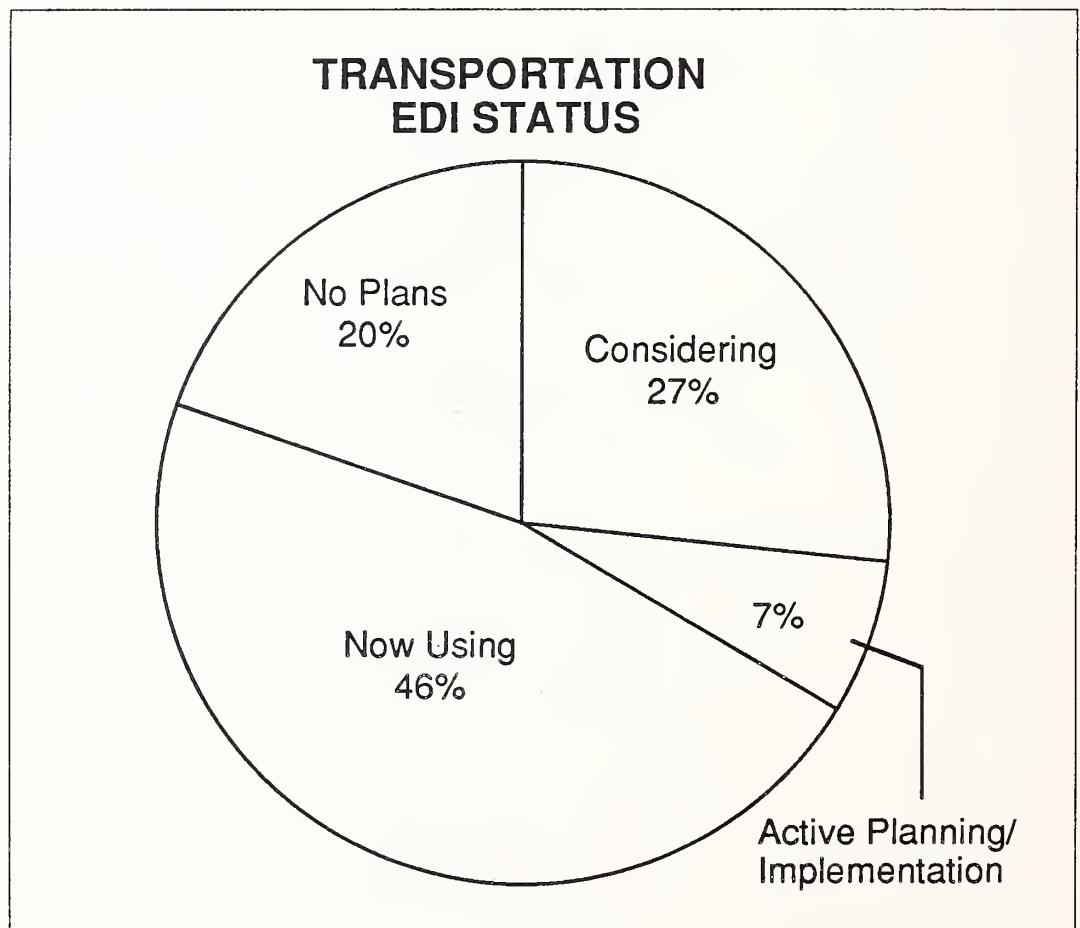
EDI methods applied to freight bill payments represent a significant potential source of EDI services in the transportation segment, due in part to Interstate Commerce Commission regulations requiring freight bills be

paid within three days of receipt. To date, however, EDI methods are applied to less than 10% of freight bills processed through third-party services, primarily because payers do not wish to lose float.

Freight bill audit services provided by several firms (such as Numerax and the First National Bank of Boston) using a combination of manual and computerized methods that are not necessarily in the EDI domain.

As shown in Exhibit VI-1, nearly half (47%) of those firms interviewed by INPUT say they are now using EDI, mostly for billing customers. Only 7% say they are actively planning and/or implementing EDI, while 27% are investigating their options.

EXHIBIT VI-1



B

Railroads

Railroads are facing revenue declines and are using technology as one way to reducing costs.

Railways were one of the first industries to use EDI as a customer service in their marketing strategies, and are also becoming significant users of the application for their own purchasing.

- Individual companies have access to the technology due to their size relative to other industries.

- Every major rail company has extensive computer and communications facilities and has excess capacity. This means they are often able to handle processing for companies outside the industry. For example, Union Pacific Technologies has indicated intention to participate in the broader EDI marketplace.

Major railroads are encouraging the EDI market by requiring shippers (particularly high-volume users and freight consolidators) to use electronic bills of lading or by discounting shipping charges for EDI users. The bill of lading is considered one of the more accurate documents used in transportation services, and the data contained therein forms the basis for other transactions, such as freight bills.

The industry is also moving to convert waybills, identifying cargo carried, and "consists" to electronic versions. Consists are the lists that identify a railcar's location in a train, its destination, and its ownership and note if it is carrying hazardous materials.

The anticipated increase in volume as rail documentation moves to electronic versions has caused the primary third-party vendor in the industry (Railinc—a subsidiary of the American Association of Railroads) to consider operational and technical improvements. Other companies supporting EDI services to the rail industry are McDonnell Douglas' EDI*Net and Kleinschmidt.

An early railroad customer service EDI strategy, giving customers free EDI software that works only with that railroad's computers, is being supplanted as the rails (and other industries) recognize that customers do not want to be locked-in to one choice. New software that communicates with several rail carrier computers is becoming available.

The railroads are also using EDI for their own needs. In 1987 Norfolk Southern used EDI to issue half of its own purchase orders, representing 70% of its purchasing dollars.

- This was scheduled to increase by an additional 50% in 1988. However, the potential is great in terms of trading partner interfaces; the target for 1988 only represents fewer than 100 of the company's present 5,000 vendors.
- Companies that receive 400 annual purchase orders from the railroad will be targeted for EDI.

From a customer service perspective:

- Norfolk Southern is sending EDI freight bills to approximately 10% of its customers but plans to increase that to 50% within the next five years.

- Burlington Northern (BN) has implemented its Electronic Business Network for all its business transactions (including EDI).
 - BN uses various query devices, such as touch-tone telephones, terminals, and PCs in addition to providing bills of lading, freight bills, equipment ordering, EFT freight payments, logistics information, and purchase orders via EDI applications.
 - The company has established an EDI management team with representation from accounting, operations, marketing, IS, and purchasing for setting up internal EDI policies and standards.
 - BN is considering opening its large private network to local dial-in access by its customers or providing access through third-party network service providers.
 - BN is installing a front end system capable of receiving and distributing any EDI transaction for appropriate action.
 - As an EDI user, BN has the Electronic Purchase Order system, which handled 54,000 transactions with 73 vendors in 1986.
- Union Pacific offers the "Streamliner" EDI service to customers through its Transportation Control System, a customer service installation used by service representatives, but which is also accessible by customers' computers for certain applications.
 - Services supported through the Streamliner service include Autobill (for bills of lading covering frequent shipments to regular destinations), FRTBill (which transmits bills and statements), Corporate Trade Payments (which authorizes a shipper's bank to pay bills), and logistics information.
 - The company provides UPINFO PC software, which has a fleet car tracing capability. Other features are being added.

EDI development in the rail industry is apparently needed at the depot level where service companies provide leasing firms with Equipment Interchange Receipts (EIRs). Currently, multiple paper formats are used in this function. Also, coding for shipment damages and handling information is suitable for EDI solutions.

C

Trucking

The trucking sector is the most fragmented in the transportation industry. Its thousands of firms vary from single owner/operator shops to nationwide, long-haul carriers.

Severe competition and business failures have resulted from the 1980 deregulation under the Congressional Motor Carrier Act. The act abolished minimum rates for shipping. The largest nationwide trucking companies have used low pricing to drive smaller companies out of business.

Trucking sector revenue growth has also been eroded by price-cutting competition between union and nonunion carriers.

Many unionized carriers have established nonunion subsidiaries to compete for "less than truckload" business, creating needs for complex billing, tracing, and detail operations. When linked to EDI applications, these operations create needed efficiencies.

Although the transportation industry pioneered EDI, trucking companies have been slow to use it, due to financial constraints and a lack of computerization. This is being overcome with less expensive computer systems.

According to an early 1988 American Trucking Association survey, approximately 70 trucking firms have EDI capabilities within their information systems. While representing a small growth from the previous year's survey, these firms account for the majority of long distance and LTL (less than truckload) volume in the U.S.

Another survey conducted by the federal government-affiliated Logistics Management Institute found approximately 17 of the top 25 carriers used by the Department of Defense were EDI capable. These carriers account for about 80% of the department's truck transportation needs. In all, DOD uses approximately 2,000 trucking firms.

Trucking companies have implemented EDI and other technology applications as market differentiators that improve customer service. Others are implementing EDI in response to major customer requirements. These customers include federal government agencies, retail distribution operations and major manufacturers (such as auto makers) that require frequent, daily shipments of small lots of parts, components, and assemblies to support Just-in-Time operations. In this later case, the trucking/distribution "pipeline" replaces inventory holding requirements.

In the case of the federal government, the Department of Defense alone buys approximately \$7 billion in transportation services from the private sector annually.

The Military Traffic Management Command has asked for assistance from the government supported Logistics Management Institute to develop EDI formats for government services tender-bids from carriers to provide specific services.

- The intention is to develop a common transaction set for the approximately 30,000 tenders received each year to allow evaluation.
- The electronic tender format will assist in pre-audit procedures.
- The proposed tender will be generic in that it can be used by both motor and rail carriers.

PIE Nationwide (Jacksonville, FL) supports mainframe-to-mainframe EDI access through its Shipment Tracking and Reporting - Total Responsibility and Control (STAR-TRAC) system. Billings, payments, claims, and adjustment information can be exchanged through the system.

Consolidated Freightways has been using EDI for approximately eight years, through its Portland, OR data center.

Coles Express (Bangor, ME) has EDI capabilities in its Motor Carrier Information System, which can additionally provide access through a voice response system.

ABF Freight Systems (Fort Smith, AR) uses EDI with fewer than 100 of its customers, but sees the method as putting the company on the leading technology edge—a market differentiator.

Other firms active in trucking EDI are: Carolina Freight Carriers, North American Van Lines, Overland Express, St. Johnsbury Trucking, TNT Canada, CP Trucks (Canada), and Yellow Freight System.

TranSettlements is the leading third-party EDI network service provider to the motor transportation subsegment and shippers using trucking services. The principal transaction sets used in the industry are shipment information, freight details/invoice, and shipment status messages.

Capacity Exchange Inc. (CAPEX, Grand Rapids, MI) is offering an electronic trading service for spot-market generic truckload services. Using a system modeled after a commodity exchange, motor carriers can bid on truckload shipments as required by shippers.

Shipnet Systems Inc. (Glen Ellyn, IL) has been offering an EDI-like service since 1985. Shipnet is a shipping management application that matches shippers, receivers, and trucking carriers and encompasses the tender process, load definition, acceptance, and status tracking. Additionally, freight bills can be handled electronically.

A project team sponsored by the American Trucking Association is working to develop an EDI transaction set, based on TDCC formats, for the electronic exchange of motor carrier freight tariffs.

D**Ocean Shipping**

Most of the paperwork in this industry is transferred between shippers and forwarders.

Many shipping companies provide on-line services for rate quotes, manifests, tracing, and billing. Some support data analyses for management reports.

Shippers have not generally been aggressive advocates for EDI, but carriers are beginning to recognize that the benefits are worth pursuing. Additionally, as the U.S. Customs Service promotes electronic exchanges, parties in international ocean trade are adopting EDI techniques. Customs controls cargo movement through U.S. ports. The agency's activities in EDI are further discussed in Chapter XI, "Government EDI Directions."

Automated port systems (discussed in Chapter X, "Services") are also leading to increasing use of EDI techniques in this sector.

The U.S. Federal Maritime Commission's Automatic Tariff Filing and Information System, known as ATFI, has EDI attributes. It will allow carriers, freight forwarders, and others to file tariffs electronically. Value-added services, such as searches and analytical reports, will be provided by third-party services.

E**Air Transportation/
Air Freight**

Needs for logistics-oriented EDI by shippers using air freight services are seen as less critical than land-based EDI because of the rapid delivery air transportation services provide. They are much quicker, arguably less prone to error, and therefore shipment status is often less relevant to production control. Accordingly, the industry has not been quick to adopt EDI.

The EDI services that do exist in this segment are provided by the carriers themselves as a customer service, largely obviating needs and opportunities for third-party services.

- For example, Northern Air Freight (Seattle, WA) offers its largest customers access to its Pulse cargo tracking system through their own microcomputers or through Scanset terminals provided by Northern. The primary application is shipment status. However, Pulse is integrated with Northern's accounting system and can issue electronic invoices.

As an industry with its own purchasing requirements, there is some EDI activity.

The Washington D.C.-based Air Transport Association of America administers Specification 2000 (commonly called Spec 2000), an EDI service for supply transactions in the air transportation industry.

Processing and networking is provided by Aeronautical Radio Inc. (ARINC) of Annapolis (MD), and access is also available through the Societe International de Telecommunications Aeronautiques (SITA) network and via Telex. Additionally, participation is possible through the exchange of magnetic tapes.

As of mid-1988 approximately 6,000 entities, representing 123 participants and including 25 international airlines, were using the system, which is not yet fully operational. This is believed to represent 2% of the potential market. Other users include aircraft material suppliers, the Federal Aviation Administration, airline food service companies, credit card companies, and services.

Spec 2000 evolved from a predecessor called Spec 200, which was developed in the late 1950s for provisioning, order placement, and shipment information. It used punch cards and formats that were (and remain) industry-specific.

In 1984, a joint airline/supplier task force was formed to review the future direction of EDI in the industry, and Spec 2000 was created.

The service supports:

- Provisioning, the selection and procurement of parts, equipment, and support materiel for operating and repairing aircraft or of special equipment.
- Procurement planning, which provides data on parts for sale and supports a quotation process. An on-line data base of parts and equipment numbers, prices, and lead time data is maintained, providing one-stop shopping for users.
- Order administration, covering order placement, inquiries, order status reports, exception reporting, and shipment advisories. Bar coded shipping labels are supported in this process.

Spec 2000 also offers PC-based software called the Order Forwarding System for data entry and communications, adhering to Spec 2000 formats.

The Spec 2000 standards are maintained by a task force consisting of both domestic and international airlines and suppliers. There have been discussions with the Aerospace Industry Association, comparing Spec 2000 formats and ANSI X12, to resolve variances so that companies involved in aircraft maintenance will not need to manage dual standards.

Separately, ARINC's Data Network Service (ADNS) will be used for electronic messaging for technical queries regarding interface designs to

the Custom Service's Automated Manifest System (AMS), a module of the Automated Commercial System (ACS) that allows members of the import/export community to file required documents with the agency.

F

Courier Services

Several overnight package delivery firms have installed EDI and EDI-like systems to improve customer service.

Federal Express offers high-volume customers terminals linked into its mainframes for package tracing, electronic billing, and other EDI-like functions.

Airborne Express has a similar system and also offers computer-to-computer billing services.

Union Pacific ExpressAir (formerly Missouri Pacific Airfreight) uses EDI as part of the "Sky-Track" systems that provide logistics information and other services.

Emery Worldwide provides electronic billing and remittance (EBR), a paperless and centralized process for invoice handling and accounts payable transactions. EBR is also designed for high-volume users. It uses TDCC air-industry standards or customized formats for electronic billing and ANSI X12, Automated Clearing House, and proprietary formats for remittance advise. Emery's EDI and other customer services are known collectively as Value-Plus.

G

A Transportation Company EDI Case Study

Logistics Management Company (LoManCo or LMC) is a pseudonym for a major international logistics management company divided into units handling ocean and overland (truck, rail, intermodal) transportation services.

LMC is a leader in transportation technologies that are coordinated through its computer and communications systems. Through these systems, information about the status of equipment and shipments can be updated and made available to both staff and customers.

LMC's EDI objective is rather broad: a one-time, automated input that passes information to the appropriate applications and data bases, with no further or duplicate input of the same data required.

Prior to EDI, the basic procedure had been to key data from source documents into a local computer at each point where new documents were to be produced. There was also some shipment of computer tapes and floppy disks between major centers, so that already existing data would not have to be manually reentered.

LMC had a number of EDI-related projects underway, but the company's participation in developing the U.S. Customs Automated Manifest System was one of the first driving thrusts in recognizing EDI as a separate concept requiring specific focus and management attention. Additionally, a large overseas manufacturer notified LMC that they could become the sole carrier for the firm's shipments of auto parts to the U.S. if LMC could provide an EDI capability.

LMC previously developed several methods of providing its customers with direct access to shipment data. These were not necessarily EDI under the strictest definition, but they were related to the concept. One allowed terminal and computer access to LMC computers for shipment inquiries, and the other is a highly promoted voice response inquiry system that operates from touchtone telephones.

The company's ultimate goal is to get its customers to use LMC as their own distribution department, doing their distribution processing on LMC systems and having LMC handle the routing and rerouting of their shipments in "real time." This will require a significant extension of LMC's data processing capabilities coupled with a greater formalization of its EDI efforts. Recognizing this, LMC developed a program to achieve the desired integration. Among the steps of the program are:

1. Evaluate EDI software packages and network services.
2. Evaluate standards either in place or proposed and determine which are required and/or likely to dominate.
3. Develop an architecture and process that will allow at least 80% of its transactions to be handled via EDI.

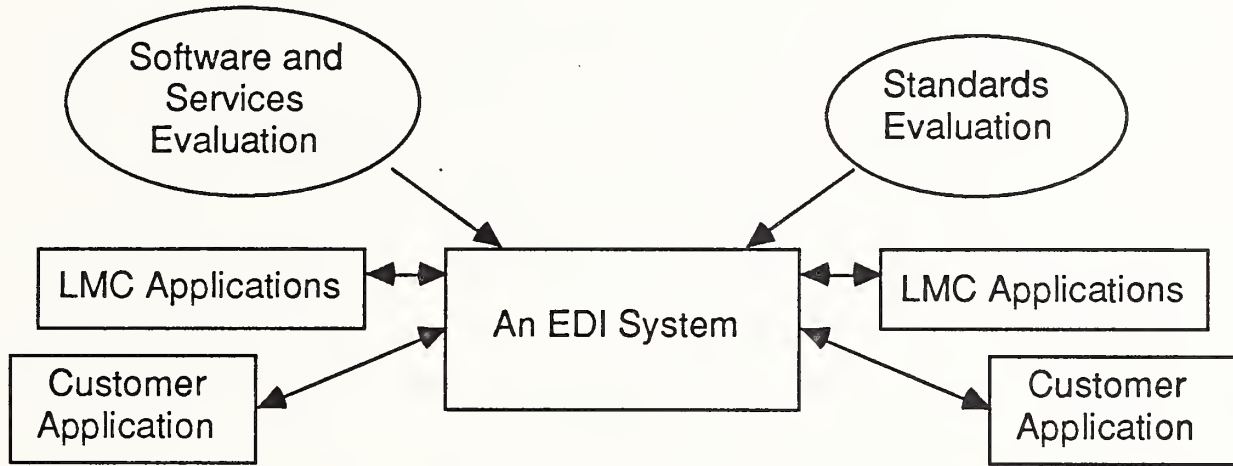
This approach is illustrated in Exhibit VI-2.

After having an apparently open information policy, LMC has become very sensitive to information about its EDI plans. This may have been related to recurring takeover rumors or concerns about maintaining a competitive edge in its technology applications. However company officials have indicated to INPUT that LMC's EDI implementation could have been made more "user friendly."

LMC's EDI improvement program is now being implemented. The objective is to create a highly flexible, table-driven EDI interface that can work with a wide variety of customer systems. In addition, current LMC applications will be moved to the new architecture. LMC plans to market this system as an "EDI core product" and will develop a methodology to help its trading partners get up on the system.

EXHIBIT VI-2

LMC'S EDI PLANS



- Goals: 1. Be Customer's Distribution Department
 2. 80 Percent Input/Output via EDI

Apparently, a professional services contract with an outside vendor will address this project, in addition to helping the company meet its goal of establishing 200 EDI relationships in the first two years of the program.

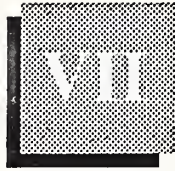
Further detail about this company's experience can be found in INPUT's report, *EDI Implementation Case Studies*.

The next chapter examines EDI directions in wholesale and retail distribution.



Wholesale and Retail Distribution EDI Directions





Wholesale and Retail Distribution EDI Directions

A

Wholesale Distribution

A major portion of manufactured goods are distributed through wholesalers, a market estimated at over \$1.4 trillion (1987). Virtually all manufacturing segments have an associated wholesale distribution function.

According to Commerce Department statistics, the largest wholesaling sectors are groceries and related products, machinery, equipment, and supplies. The fastest growing sectors are electrical goods, drugs, and paper products

The wholesale distribution industry can be divided into three parts: merchant wholesalers; manufacturers' sales branches; and agents, brokers, and commissioned sales merchants.

Merchant wholesalers account for nearly two-thirds of all wholesale sales.

Wholesalers generally buy products from a limited number of manufacturers and sell then to many customers such as retail chains and industrial, commercial, and institutional users. Wholesaling significantly lowers distribution and inventory management costs for manufacturers. It also eases selling to smaller customers who would not be efficiently serviced directly by manufacturers.

Industry consolidation has been occurring in several wholesale distribution areas. According to the publication *Mergers and Acquisitions*, in 1986, the industry was the third most active in this area with 233 separate transactions.

Wholesalers are increasingly adding functions to their basic distribution roles. These include maintaining inventories, offering credit, assembling orders, dividing bulk lots for distribution, and providing packaging, promotional and advertising services. Some of these additional functions are market differentiators—ways companies can add value to their services.

Information services are also being employed as differentiators. A distributor may apply its IS capabilities toward helping manufacturers evaluate market factors, assisting retailers in product selection, and providing inventory modeling programs.

B

Wholesale Distribution and EDI

Several information service tools are being adopted to manage the increasingly complicated roles of wholesale distributions. EDI is one of these.

EDI in this industry often takes the appearance of advanced electronic ordering systems that speed customer servicing.

EDI is often coupled to data base capabilities allowing larger firms to service customers with on-line accounting and payable systems, just-in-time inventory services, and marketing information. As these capabilities spread among the larger wholesalers, smaller firms will be increasingly less competitive, unless they find the means, individually or through third-party service providers, to offer similar customer services.

C

Retail/Wholesale Distribution

The distribution industry has contracted from approximately 180 firms in the 1970s to about 110 companies.

The industry is characterized with thin margins, often under 2%.

To reduce costs and gain competitive advantage, many large distributors, such as McKesson Corp. (San Francisco) have implemented private EDI-like systems for both their suppliers and customers.

- McKesson is nation's largest distributor of pharmaceuticals, health, and beauty aids. It sees its use of technology as a means to increase profits and market share, improve efficiency and lock in customers.
- The company maintains nearly 3,000 trucks delivering a 100,000 item product line supplied by nearly 6,000 manufacturers to two million customers from 135 distribution centers.
- Its Economost order entry system was first introduced in 1970 for the Drug and Health Care Group, with later modifications supporting other groups within the company.
- The company was able to reduce its order entry staff from approximately 700 to approximately 20.
- In late 1988, McKesson established a private very small aperture terminal (VSAT) satellite network to process and fill inventory orders from customers nationwide. The network, provided by Contel, links

McKesson's distribution centers with its Sacramento, California-based data center. The \$5 million VSAT network will consist of 85 sites, including distribution centers and network control centers, by late 1988.

K-Mart Corporation (Troy, MI) has been using EDI since 1976 and now has over 800 suppliers and transportation carriers on its system, using standards that predate X12. The company also supports UCS standards and will adopt X12 in the future.

K-Mart Apparel Group (North Bergen, NJ) is adopting the X12 standards in its relationships, rather than use the parent firm's proprietary formats. The first trading partners are some 60 firms in the hosiery industry.

- EDI will enable the company to receive shipments packaged for individual stores.
- Previously, K-Mart needed to order in bulk and break down shipments at its distribution centers. EDI will improve tracking and streamline the distribution function.

EDI use within distribution-intensive industries varies by segment, as discussed below.

D

Warehousing

The Warehouse Information Network Standard (WINS) was developed by the public warehouse industry, defining transactions to and from depositors such as frozen food manufacturers. WINS is similar to the UCS (grocery) standard and is administered by the same organization, the Uniform Code Council.

INPUT estimates that over 200 warehouse locations are using WINS transactions.

E

Grocery Industry

The industry has quickly adopted advances in technology right down to the checkstand as a way of optimizing profit margins that are usually measured in fractional percentages.

Industry buyers issue in excess of 15 million annual purchase orders. These documents trigger a like number of bills of lading and invoices, along with other documents such as adjustments, product announcements, allowances, and other information.

The total of this traffic is estimated in excess of 100 million messages between 2,000 distributors, 5,000 manufacturers, and 2,000 brokers. Accordingly, industry participants view the grocery and related distribution industries as prime candidates for EDI services.

Grocery companies have been adopting EDI since a consulting firm predicted in 1981 that the industry could save between \$196 million and \$324 million if only half of all transactions were done electronically. The gradual adoption has accelerated as current users start adopting additional transactions for the EDI treatment and as additional companies start using EDI to maintain competitive parity.

Grocery chains interviewed by INPUT indicated that less than 30% of their purchase orders are currently being handled via EDI with purchase orders, purchase order changes, and invoices representing the bulk of EDI exchanges. This means that expansion within the industry is likely.

The Uniform Product Council, the agency behind adoption of bar code standards, is the principal industry EDI coordinator through the Uniform Code Council (UCC). At the end of 1987, the UCS had 325 members, an increase from 187 members the year before. Similar growth was expected for 1988.

- The UCC's created the Uniform Communications Standard (UCS) for use in the grocery industry, which, like the TDCC standards on which they are based, predate the formation of the X12 standards committee.
- Companies participating in UCS buy communications identifications for a one-time charge ranging between \$500 and \$10,000, based on the company's annual revenues. The resulting funds are used for management and administrative services provided by the UCC.

New standards have been added supporting the industry's Direct Store Delivery, multi-point purchase orders, and other requirements.

- Direct Store Delivery (DSD), a concept developed by Arthur D. Little (which proposed the original UCS EDI implementation) began in early 1986.
- DSD applies a direct data exchange at the grocery's "back door" loading dock between a hand-held computer and/or a delivery truck computer to transfer shipment information which is then reconciled against the actual order. This is called DEX/UCS for Direct Exchange, as opposed to NEX/UCS for Network Exchange of UCS data.
- Reconciliation is necessary because suppliers often substitute products or ship products in addition to those ordered.

While administering the UCS standard, the UCC has expanded to also administering warehousing (WINS) standards, and newly, the X12-based Voluntary Interindustry Communications Standard (VICS), which is used in retailing.

- Since X12 is becoming used across industry boundaries, more and more grocery firms are supporting both the UCS and X12 formats.
- UCC's familiarity with X12 as the VICS secretariat will likely accelerate an eventual merger of the two standards.

Industry participants report that while most users send and receive electronic purchase orders, they print UCS invoices used for manual keying procedures. Although the optimal benefits of EDI are not realized, the use of tailored print formats does lead to productivity gains in keying operations.

UCS services are available through McDonnell Douglas' EDI*-Net, GEIS' EDI*Express, Sterling Software's Ordernet Division, and proprietary networks. Western Union has indicated it will target this industry with its EDI service.

Sterling Software's Ordernet was endorsed in 1984 by the National-American Wholesale Grocers Association (NAWGA) to support UCS. Grocery wholesalers typically use micros to send UCS formatted information to suppliers.

General Foods, which began with UCS in December 1982, now uses EDI with approximately 150 customers, representing 21% of its national case volume for dryline and frozen foods.

General Mills has set up an EDI network to link supermarkets with the company for invoicing.

- The company had a private network from its headquarters to plants and sales offices. However, this was deemed unsuitable for EDI and was later transferred to a third-party service.

Because of the relatively early implementation of EDI by the grocery industry, large users are often handling EDI communications with TDCC software. Further, due to the thin margins found in the industry, investments in new systems are often delayed, meaning that few transaction sets are used since other corporate departments that are likely candidates for EDI are not equipped for implementation.

One area where EDI has yet to be implemented is in the fresh products and produce areas. However, here is evidence of pre-EDI activity.

Fish Exchange (San Francisco) works as a bulletin board for buyers and sellers of ocean products. Users pay \$1 for each listing, \$1 to browse the system, and \$10 for any sales completed through the network. This pricing replaced the initial monthly subscription charge when potential users resisted. There are an estimated 5,000 U.S. fish distributors.

The Fish Exchange system has had difficulty attracting users. The industry is steeped in traditional business methods; however when volume increases, plans are to provide EDI-type services, including billing and banking for sales made through the network.

Fish Exchange hopes to allow access from commercial fishermen at sea who will then list their fresh catches. This will also let users know what is selling at the best prices so the ship can be rigged for a particular type of fish.

F

Office Products

EDI activity in this segment has likely doubled in the past year, but industry representatives acknowledge certain market inhibitors, and a relatively low number of EDI-ready companies. As of late 1988, approximately 80 manufacturers, dealers, and wholesalers are using EDI trading, doubling the number involved in 1987.

The Industry Committee on Office Product Standards (ICOPS) began as a joint project of the National Office Products Association and the Wholesale Stationers' Association. ICOPS started EDI research in 1983, and EDI piloting began in 1985 using GE Information Services and X12 standards.

The structure of the market is inhibiting EDI acceptance—it consists of a large number of mostly smaller businesses that tend to be adverse to technology.

Another inhibitor to true EDI use is the fact that many of the larger office product wholesalers have implemented and opened their proprietary order-entry systems to their customers, believing this approach helps build customer loyalty. They may in fact erroneously call such systems EDI.

- An example of such an implementation can be found at Quill Corporation (Lincolnshire, IL), which sells over 7,000 different office supply items,
- Quill's proprietary system is called Quill Service Link (QSL) designed for use by a broad customer base.
- The company provides communications software to its customers for accessing the system. Initially, a cluster of micros serve as front-end processors to Quill's mainframe, primarily for security reasons.
- Other features of QSL are an inventory model data base to assist customers in placing orders, electronic mail, and an electronic bulletin board.

Although wholesalers have tended to build this type of system for their customer trading relationships, many of the same firms are now piloting EDI with office product manufacturers.

Also providing impetus for EDI growth in this sector is the fact that major end users of office products (which includes virtually every industry), mass retailers, and government-sponsored electronic procurement programs, are putting pressure on the industry to support EDI.

- In 1987, the U.S. Government's General Services Administration (GSA) began a pilot project for EDI purchase orders to be issued to furniture suppliers. The action caused HON, a leading office furniture company, to accelerate its EDI development. Eventually, GSA hopes to expand to invoices and possibly payment authorizations, as well as moving on to other types of suppliers.
- Computer Aided Planning (Grand Rapids, MI) has started adding EDI capabilities to its electronic catalog of office products, which represents the wares of approximately 16 major manufacturers.
- The providers of custom built office furniture are using EDI to speed order fulfillment. Custom built furnishings are ordered using standardized codes describing fabrics, colors, textures, and wood finishes, as well as dimensions. EDI lends itself to quick customer response in this personalized area.

G

Book Sellers

1. Background

Industry sources estimate that the majority of business volume done by trade publishers involves electronic ordering. However, this includes Telex and facsimile-received orders, as well as computer tape submissions.

Moreover, the nation's major chains, such as Waldenbooks and B. Dalton, and the major wholesalers, such as Ingram, Baker & Taylor, likely represent the majority of electronic ordering.

Industry adoption of computerized inventory systems has been slower than in other retailing environments, such as pharmaceuticals. Competition among wholesalers for electronic ordering systems has accelerated industry interest in computerized systems as equipment and software prices moderate and as "user friendly" software appears.

2. The Bookseller Industry and EDI

Electronic ordering in the bookselling industry appears to have started with wholesaler Baker & Taylor, which implemented a system using

hand-held data entry terminals used to transmit orders via toll-free numbers to the company.

- The system, called BaTaPhone, was used by some 15,000 libraries but by virtually no bookstores. One of the failings of the system was the lack of order confirmation.
- In early 1986, Baker & Taylor then implemented a PC-based system called FIRSTcall, which did support order confirmation and was intended for bookstore use. Shipments followed within 24-hours.

Another wholesaler, Ingram, introduced a system called LaserSearch that combines a CD-ROM data base, accessed through a microcomputer, with electronic ordering capabilities. Ingram also offers an optional One Touch Electronic Ordering System that does not provide the data base and is provided free of charge.

Ideally, bookseller electronic ordering systems interface with inventory systems such as Ingram's own Invoy and systems provided by IDS (Abington, MA) and IBID (San Francisco, CA).

More recently created is Pubnet, sponsored by the National Association of College Stores and the Association of American Publishers. Pubnet is targeting college bookstores.

As of early 1988, some 160 bookstores were using Pubnet (out of a universe of 2,500 college stores) to order from 20 publishers (which cover 85% of the college textbook market).

- This represents approximately 20% of these publisher's dollar volume.
- Pubnet's managers believe that when as few as 500 bookstores are on the system as much as 80% of the textbook market will have been shifted to EDI.

Bookstores are charged a flat \$50 a month fee to belong to Pubnet. Transaction fees are negotiated between stores and publishers, with publishers typically paying all communications costs for orders. The system also offers data base access, and publishers typically pay only half these costs.

Pubnet is a hybrid system in that it allows interactive books searches against the data base of titles, prices, and availability information.

- The data is in the Book Industry System's Action Committee (BISAC) format and resides on the GE Information Service network. It allows buyers to identify product prior to initiating an electronic purchase.

- Electronic orders are sent directly to publishers or stored in their EDI mailboxes until requested. Functional acknowledgements are issued when the order is received.
- Delivery instructions are sent to publisher's warehouses, and the customer's billing files are automatically updated.

While Pubnet is currently available only to university bookstores, the plan is to adapt the system to the commercial bookstore environment. However, it will meet entrenched competition from the several proprietary systems described above and one service offered by a subsidiary of the industry trade association. This service consolidates orders for group buying discounts.

The American Booksellers Association system called Booksellers Order Service (BOS) allows electronic ordering from a range of publishers. It was first operational in mid-1984.

- BOS works over the Telenet network. Orders are consolidated weekly, and participating publishers apply discounts to the total order, allowing booksellers to optimize discounts for any size order placed.
- The BOS organization is billed by the publishers for orders and BOS then bills the participating bookstores.
- Publisher sales representatives still receive credit for orders transmitted through the BOS system.

Electronic ordering/EDI systems are found overseas as well. In some countries, the book distribution system functions as a cartel, with titles stocked, shipped, and billed from a central location, facilitating EDI.

- The Canadian system, called Telebook, is owned by publishers and booksellers through their trade associations.
- The British system is called Teleordering. It is 60% owned by Thorne-EMI, an information and entertainment conglomerate, with other partners being the publisher of the *British Books in Print* (which maintains a book data base) and the U.K.'s largest book retailer.

H

A Retailer Case Study

Dayton Hudson Corporation (DHC) is a growth-oriented retailing firm with nearly 500 stores in 34 states. One of DHC's subsidiaries is Mervyn's, a highly promotional, popular-priced, value-oriented chain that operates over 200 stores.

To deliver value and service in a growth environment, Mervyn's and DHC believe they must stay on the leading edge of retailing technology,

while maintaining a stable and consistent approach to managing a large and dispersed store network.

Mervyn's views EDI as an important aspect of nearly all of its computer applications and systems. Mervyn's management considers logistics to be one of the most important things a retailer should concentrate on to gain value from its activities. In a world of highly volatile trend and fashion merchandise, rapid and extensive information sharing can significantly improve both trading parties' logistics management. However, the information sharing associated with EDI creates a strong mutual dependency between the trading partners—essentially requiring them to bare their hearts and souls to each other.

Mervyn's was aggressive in spurring its trading partners to adopt EDI. The initial approach was a demonstration of the advantages both parties would receive through extensive information sharing. This pitch was reinforced by Mervyn's strong culture of relationship building and the large reservoir of understanding and trust that it had built up with its suppliers.

Although it sometimes took a bit of effort to get suppliers on board, they were usually convinced by the fact that if they made the investment with Mervyn's, the system could also be used with other retailers. Mervyn's also felt that it was achieving a competitive advantage with its suppliers by helping them develop a new, leading-edge capability.

Managing Mervyn's internal logistics was the other primary justification for EDI. Instead of the traditional pre-distribution system in which a buyer designates per-store shipment quantities when an order is placed, Mervyn's has adopted a post-distribution strategy.

- The buyer designates a total quantity of items to be produced.
- Several weeks before the manufacturer's shipping date, an analyst specifies how the order is to be allocated among four Distribution Centers (DC).
- After the merchandise is received by the DC, the analyst reviews store inventory levels and stock turnover rates and determines how much to send to each store.

While this system provides savings through tighter inventory control, it is only feasible with large and sophisticated DCs, supported by an extensive data base maintained on a current basis through EDI.

Mervyn's saw that standards would be required if the EDI technology was to fulfill its potential. Although the issue of standards first caught the attention of MIS staff—largely because of their technical bent—the

importance of standards was soon appreciated by Mervyn's management. Also, the parent firm encouraged the subsidiaries to participate in standards-setting activities and company representatives became active participants in the Voluntary Interindustry Communications Standards (VICS) group and ANSI X12.

Mervyn's also worked hard selling its suppliers on the importance of a standard approach to EDI. However, it often found more resistance to EDI itself than the adoption of specific technology standards.

- The vendors' greatest concern was that EDI would let computers bypass the salesmen, thereby diminishing their control of the account relationship. Mervyn's countered that the salesman is now only an order writer, but with EDI he would provide better service, spend more time addressing problems, and have fewer headaches in the process.
- Vendor reluctance to change the salesmen's role may have been motivated more by salesman fears of lost commissions than by concern with trading partner relationships. The hardest industry standards to change have revolved around people, not technology.

Since EDI capabilities were a basic part of the applications architecture, EDI never had a separate, formal justification or steering committee. Instead, EDI (and other applications) were justified by their contribution to the overall strategy of relationship building and improving logistics.

Mervyn's decided that it would be hard to stay on the leading edge of EDI if it tied itself to software vendors whose basic priority was to support plain vanilla capabilities for a broad spectrum of users. It therefore decided to develop its own EDI systems.

Mervyn's views technology as a tool in the operation of its business—as a competitive weapon. Therefore, management's focus is on business issues rather than technology. There is a conscious effort to demystify IS and other technologies and all top executives can discuss the company's IS strategy fluently.

Because systems planning and implementation is strongly user-driven, there has been no internal resistance to EDI. In addition, a major aspect of the corporate culture is that Mervyn's never misses its commitments and works to maintain a high level of credibility with its trading partners. Fighting EDI would impact these commitments and would run counter to the firm's culture.

In addition to getting its own user management involved in EDI projects, Mervyn's believes that it is equally important to get the top management of its trading partners involved in any joint project. Mervyn's hosts

several conferences each year to help educate its trading partners on EDI. These conferences last several days and feature guest speakers from other firms who are involved in EDI—either as service providers (mailboxes, software, etc.) or as users.

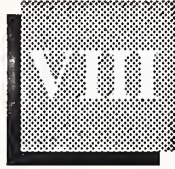
In addition to these high-level conferences, Mervyn's technical staff is available to help the partners address specific implementation problems. Its approach is to combine education and leverage to convince its partners that they should get involved in EDI.

Mervyn's takes the position that EDI is an important part of its business strategy, and its partners must follow this strategy in order to maintain the relationship.

The next chapter examines EDI directions in utilities and telecommunications industries.



Utilities and
Telecommunications
EDI Directions



Utilities and Telecommunications EDI Directions

A

Utilities

Due to existing networks and substantial computer resources, utility companies have been using EDI and EDI-like systems for some time.

Formed in 1978, the New York Power Pool uses a computer-assisted economic dispatch and automated control system that monitors regional demand for power and routes the least expensive power as needed. Real-time data is collected from power generating plants in the Midwest, Atlantic states, New England, and Canada.

Several utility companies, led by George Power (Atlanta), have instituted ways of invoicing large customers and purchasing supplies and services using EDI. Other utilities examining EDI are:

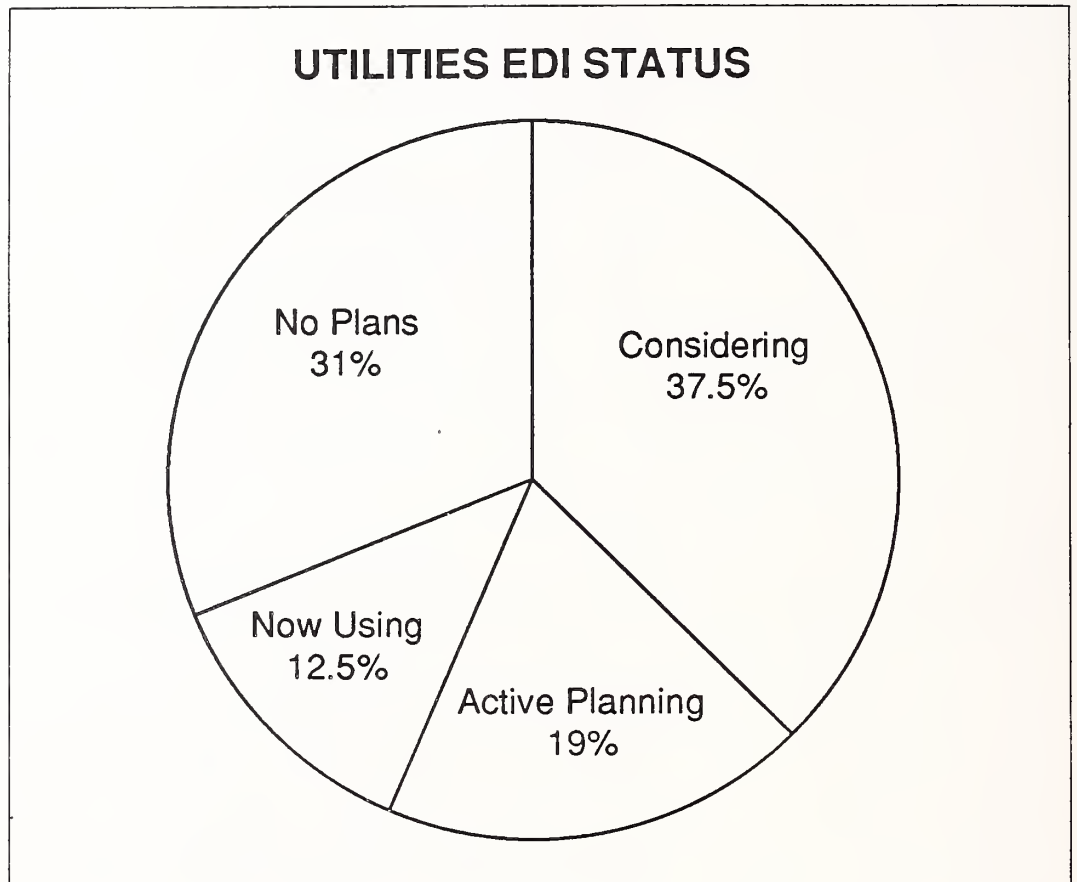
- Consumers Power (Jackson, MS) uses EDI for invoicing and for EDI/EFT invoice payments, particularly with railroads which are large, multi-point electricity users that normally receive thousands of monthly bills.
- American Electric Power Company (Columbus, OH) is using EDI in purchasing operations.

Utility companies have formed an EDI user's group that meets under the aegis of the ANSI X12 committee.

EDI is being viewed as a way of connecting independent power companies to power pools. These arrangements will increase due to deregulatory trends instituted by the Federal Energy Regulatory Commission, which encourages competitive bidding among power generators. EDI would be used for the competitive bidding process.

As Exhibit VIII-1 shows, approximately 30% of those interviewed by INPUT indicated they are actively planning or now using EDI, while an equal number have made no EDI plans. A higher percentage are considering their EDI options.

EXHIBIT VIII-1



B

Telecommunications

The Telecommunications Industry Forum (TCIF), representing a subsegment of the electronics industry (i.e. equipment rather than services) is working to gain industry acceptance of X12 standards to overcome the problems associated with nonstandard formats and to permit inter-industry communications. Bar coding use is also being promoted by the group. This is further discussed in Chapter IV, Section E, on telecommunications equipment.

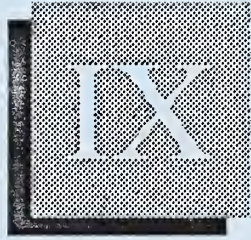
There is interest by telephone companies in using EDI to bill large telephone service users in a manner similar to that planned by utility companies.

- Texas Instruments and Southwestern Bell initiated a one-year trial program of EDI telephone billing, using PC-based systems, in Summer 1988. If successful, the telephone company will market the service throughout its five-state region. Other customers, including Sears, Roebuck and Co, Monsanto, and the Union Pacific Railroad, have reported express interest in being billed through EDI methods.
- Georgia Power and Southern Bell are also working on a similar application, although testing has not been announced.

NYNEX and other telephone companies are providing a computer-tape based form of this application.

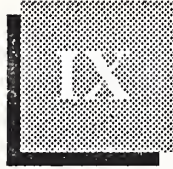
- Called Magnetic Tape Summary Billing, the NYNEX service summarizes a large user's bill in a telephone company Revenue Accounting Office, allowing the user to consolidate multiple accounts under a single special billing number.
- Each month, the customer receives a magnetic tape for analysis and processing for departmental charge-backs. The monthly service charge is \$250.

The next chapter examines EDI directions in financial services.



Financial Services EDI Directions





Financial Services EDI Directions

A

Banks

While a growing number of banks are offering EDI and EDI/EFT services, the focus of this study is on vertical market potentials for EDI products and services. The market segment end user expenditures given in Chapter III reflect banks' use of EDI for their own operations, as opposed to those provided as services.

Information on bank EDI services will be found in the sections on automotive manufacturing and trade services. Additional information will be found in the INPUT report *North American EDI Service Provider Profiles*.

1. Banks as Purchasers

Banks are consumers of goods and services, just as other firms. However, their adoption of EDI services for their own use has, to date, been triggered by a desire to understand EDI as a platform for offering EDI services of one type or another.

Although Security Pacific (Los Angeles, CA) piloted EDI with at least one of its suppliers in preparation for provide EDI services, the best, and most visible example of a bank using EDI is the First National Bank of Chicago, the tenth largest bank in the U.S. with assets of \$44.2 billion and revenues (1987) of \$4.26 billion.

First Chicago established EDI relationships with its suppliers, evaluating (and commissioning) software and network services options from a consumer perspective, and it established networking relationships to support EDI (and other) payment services.

The bank's EDI effort began in 1985 after a statement by the bank's president that the company would embrace EDI for its own procurement functions and to learn about the technique as a potential service provider.

The company had difficulties related to being an early EDI practitioner and the first in the services sector.

- None of the bank's suppliers were ready for EDI. To encourage them, the bank "loaned" software (to be sold at a discount later if the partner liked the product). It also underwrote communications and mailboxing costs and gave away training and installation services. First Chicago's EDI managers wanted their vendors to suffer no cash outlay, and they wanted to prove that it worked.
- A return on investment analysis indicated it would cost more to do EDI, not less, due to the need for dual systems, one paper and one electronic, and because of the costs of computer equipment and software at that time. These later costs have since moderated.

Elaborate 25-point software and network service comparisons were done, and documentation for technical staff and managers was created. As many as 65 people worked on the project during start-up.

In the first year, 1200 transactions were handled electronically. In 1987 this grew to 4800 transactions. In 1988, the banks was expecting to handle 20,000 electronic transactions, as shown on Exhibit IX-1.

EXHIBIT IX-1

FIRST CHICAGO'S EDI TRANSACTIONS		
	Electronic	Paper
1986	1,200	1 million
1987	4,800	↓
1988	20,000	50,000

Since paper processing costs are so much higher, a gradually successful move to EDI is leading to a savings of approximately \$2.5 million per year, not through staff layoffs, but by attrition, and in other savings attributed to EDI's benefits.

Today, the bank's purchasing department keeps few paper files; it has moved from 1 million paper-based procurement transactions to 200 thousand in 1987, and expects that through consolidation of the number of transactions handled electronically only 50 thousand paper transactions associated with purchasing will be processed in 1988.

Another benefit of EDI has been control and monitoring. "It's like sending everything by registered mail" says the bank's purchasing manager. EDI has enabled rapid file retrieval and is obviating the cliché excuse "it's in the mail."

The bank's EDI experiences have provided credibility for its EDI services. Currently, First Chicago offers EDI professional services and a number of payment, collection, and advising services. For example, the bank is the lead bank of an eight-member consortium serving General Motors in its electronic payments program. Most of the interbank traffic is carried on a direct basis. First Chicago's EDI benefits are summarized in Exhibit IX-2.

EXHIBIT IX-2**FIRST CHICAGO'S EDI BENEFITS**

- \$2.5 Million in Annual Savings
- Enhanced Control/Monitoring—
"Everything by Registered Mail"
- Experience Applied to EDI Services

First Chicago has demonstrated a willingness to experiment with EDI services, often through alliances. However, several of these experiments were short-lived, in part due to circumstances affecting the bank as a whole and not necessarily related to the EDI experience. Examples of discontinued operations are a process to accelerate international trade payments, a media conversion center for EDI data (paper to electronic and back), and a transportation services subsidiary (since sold).

Despite these failed and abandoned ventures, First Chicago sees EDI as a strategy for expanding its wholesale banking financial services and believes financial institutions will play a major role in processing payment information, as well as handling their traditional banking functions. They see substantial benefits to integrating and automating these functions.

The bank has created some of the most EDI-aware individuals. Through its early work as an EDI user, it has gained a respectable store of institutional knowledge that it is now applying to its services.

2. Mortgage Banking

The mortgage banking subset is starting to adopt EDI to its documentary needs. However, computerized systems currently used by companies that provide real estate loans suffer from the same flaws that other industries have found.

- A computer may be used to prepare a document but that document is usually sent to another company or agency where the data is rekeyed.
- Various paper formats for industry-specific needs are used.
- Errors are made in this process, not only in rekeying mistakes, but also in the manual handling of paper.

Acknowledging that the mortgage approval process has become unnecessarily complicated, two of the largest mortgage intermediary agencies, Freddie Mac and Fannie Mae, working several Federal agencies including the Federal Housing Authority and the Veterans Administration, have established a task force to standardize and simplify the mortgage application process. EDI development is an extension of this effort.

There are some pre-EDI services within the industry:

- There is E-mail use. Churchill Communications (New York) converts incoming voice messages for loan delinquency reporting into Telenet E-mail for the Federal National Mortgage Association in the Fannie Mae loan program. This application is transmitted on an industry service called Mornet.
- Mortgage Banking Service Corporation (Washington) offers a range of EDI-like applications through its Echo 1 communications network. Services include an electronic mortgage insurance premium application, developed with the Federal Housing Administration.
- There are Computerized Loan Origination (CLO) services. Shelternet, from the First Bank of Boston, was the first. Another is CompuFund, a new addition is Rennie Mac from American Financial Systems. These CLO services act as bulletin boards that provide realtors, and their buyers, access to many lenders offering several options for mortgages. Traditional mortgage bankers have been concerned that such CLO services could bypass their local franchise.

While computerized applications, these services do not fit the model of "true" EDI. However, X12-based EDI is being developed, spearheaded by an EDI Task Force that is meeting under the aegis of the Mortgage Banking Association (MBA). The MBA consists of local lenders. Task force committees are converting various real estate-related documents

into EDI transaction sets, following the X12 formats. Among these transactions are:

- Universal Loan Application
- Appraisal Report
- Title Insurance Application
- Mortgage Insurance Application
- Credit Report Requests and Credit Reports

Two-thirds of all mortgages are resold into what is called “the secondary market” consisting of investor groups, although there may be intermediaries in this reselling process.

- Currently, documents required for tracking and servicing individual real estate loans and portfolios of loans in the secondary market must often be converted into a format used by the ultimate mortgage purchaser.
- Thus EDI methods are seen as a natural fit to industry-specific needs.

B

Insurance

EDI in the insurance industry is known as Interface. There is also an insurance variety of EDI known as Electronic Medical Claims Submissions (EMCS) that deals with medical EDI applications (EMCS is discussed in Chapter X).

Since insurance companies often require motor vehicle reports (MVRs) from state agencies or through services such as those supported by Equifax (Atlanta, GA), there is some potential for further EDI links with state and local governments.

For the most part, Insurance Interface is used in the property and casualty insurance segments. Most traffic is handled through proprietary systems established by the insurance carriers for communications with independent and/or company-operated agents. An increasing amount of traffic is going through third-party services.

Examples of proprietary Interface systems are:

- New York Life’s General Office Agent Linkage System (GOALS)
- The Travelers’ Interactive Agency Company Computer System (inter-ACS)
- Aetna’s GEMINI system

The best known example of an EDI third-party service for property and casualty insurance underwriting (and until recently, the only such service) is provided through IBM's Information Network by the Insurance Value Added Network Service, Inc. (IVANS, Greenwich, CT).

IVANS is a separate, non-profit company formerly associated with the Insurance Institute for Research/Agent Company for Research and Development (IIR/ACORD, White Plains, NY), two industry groups that were joined several years ago. The association developed the IIR/ACORD formats for both paper and electronic documents.

In 1987, Western Union announced an adaptation of its EasyLink E-mail, called InsLink, targeted to companies wanting to use Interface with generally smaller agents.

- By using IIR/ACORD formats, agents using Western Union's proposed service can send data to multiple insurance carriers and receive competitive price quotes. Other functions are also supported.
- Translation from the IIR/ACORD standards to the insurance carrier's data formats, if necessary, would be done by WU's on-network processors.

IVANS and Western Union are profiled in a companion volume from INPUT's EDI Planning Service, *EDI Service Provider Profiles*.

Contrasting with EDI for purchase orders and invoices, insurance Interface is oriented more towards textual than numerical information. The goal of independent agents advocating standardized Interface is to have single entry/multi-carrier capabilities; multiple quotes can be received through a single format.

However, there have been problems in developing independent insurance agents as Interface users.

- Independent agents are less likely to be computerized. Accordingly, mid- to large-size companies would be best candidates, at least in the near term.
- There are technological and training issues to overcome, in part due to the geographic distribution of independent agents.
- Procedures and standards among insurance companies are not standardized.

Despite increasing automation in insurance agencies (these systems are called Agency Management Systems or AMS), interface has not been widely received. However, there is continuing movement towards its adoption.

- According to 1987 research by ACORD, only 47% of those agencies with an AMS are using interfacing. Larger agencies are more likely to Interface than smaller ones.
- Approximately 40% of interfaced transactions are for personal auto insurance and home owners insurance, with only 15% of commercial business handled in this way.
- However the ACORD research finds that most agencies claim to be ready for Interface, but they believe the companies they represent are not ready. Indeed, as in other industries, installing EDI often requires system improvements to handle the increased demands.

Agents attitudes about Interfacing are show in Exhibit IX-3.

Reasons agents have given for not Interfacing are shown in Exhibit IX-4.

The IIR/ACORD organization is addressing industry issues by working to develop improved electronic technical interfaces between independent agencies and multiple insurance companies. This research and development project is called Project Impact.

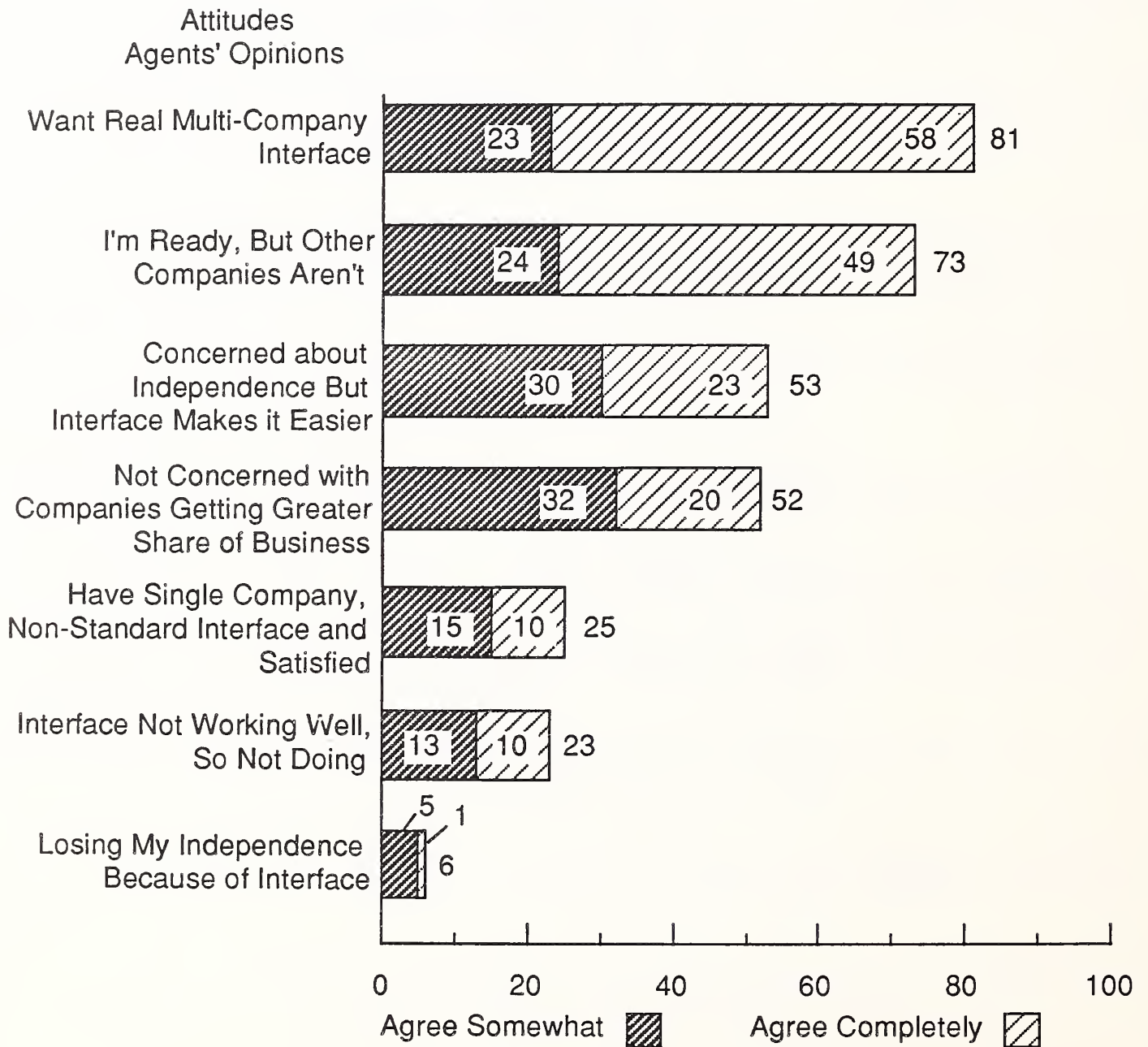
It should be noted that most Interface does not fit the strictest definition of EDI in that most is accomplished via interactive methods, as shown in Exhibit IX-5.

- Over half interfaced agencies are using interactive methods, while only 17% use batch methods.
- Batch Interface does fit the definition of EDI in that it is the application-to-application exchange of business data in a standard format.

Also note that the majority of both types of insurance Interface are being done with a single company, as shown in Exhibit IX-6.

EXHIBIT IX-3

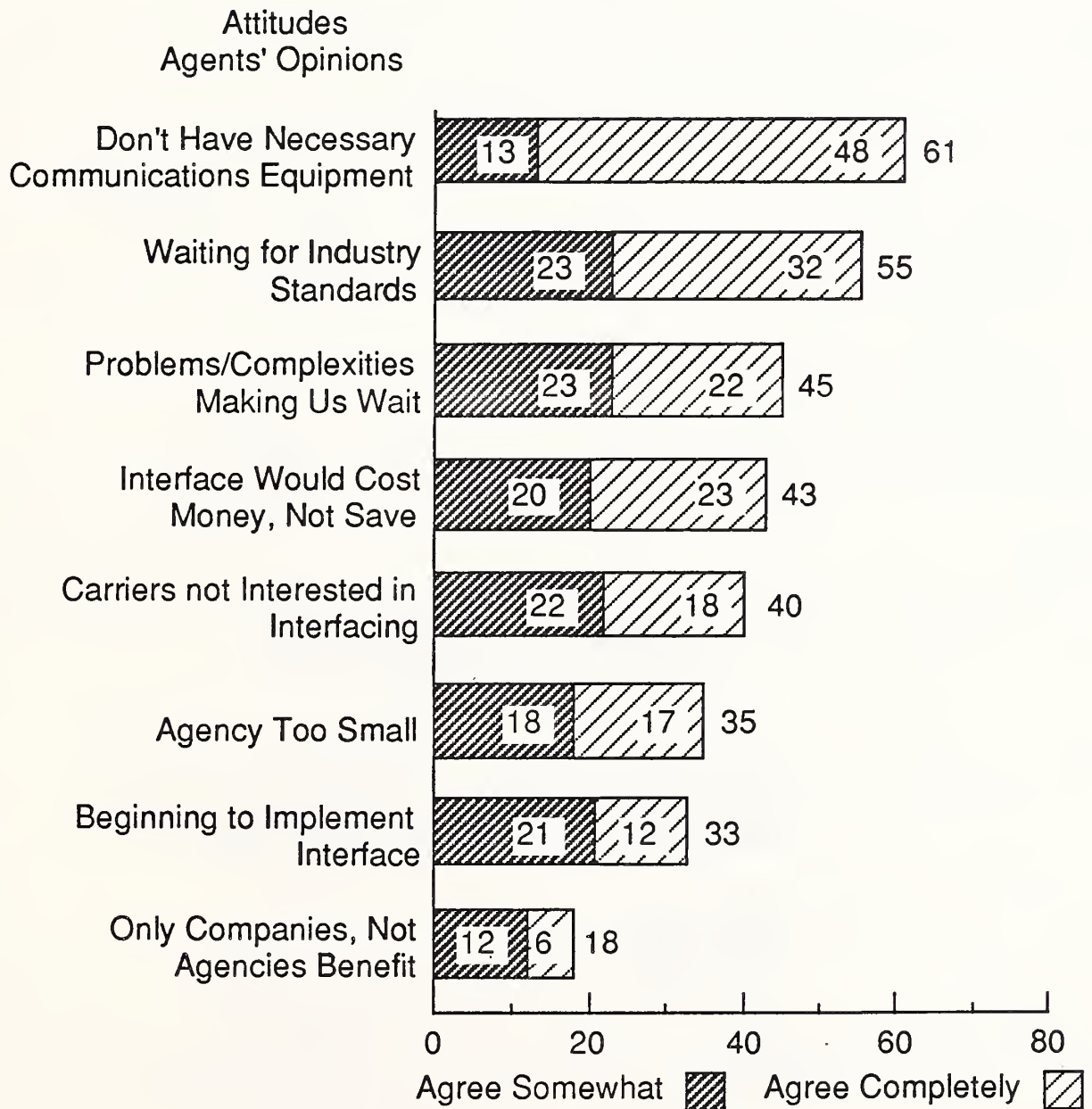
ABOUT INSURANCE INTERFACING (Percent)



Source: ACORD Corp.

EXHIBIT IX-4

ABOUT REASONS FOR NOT INTERFACING (Percent)



Source: ACORD Corp.

EXHIBIT IX-5

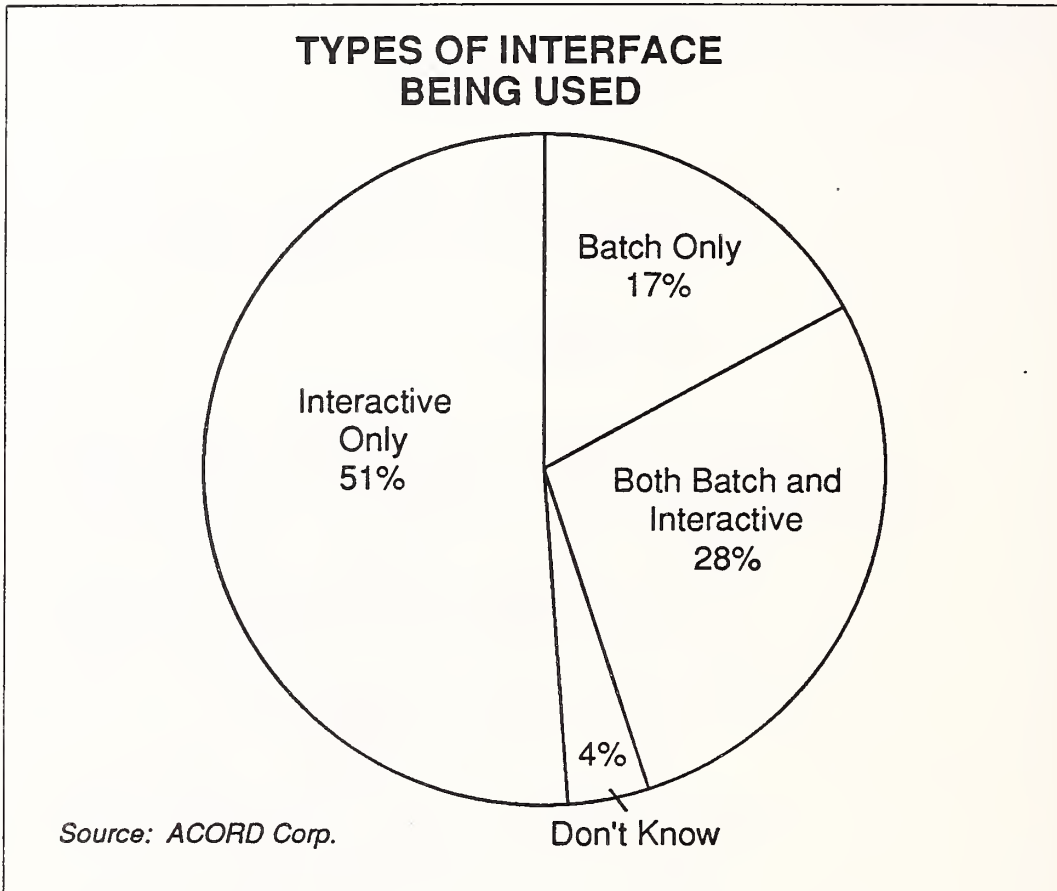
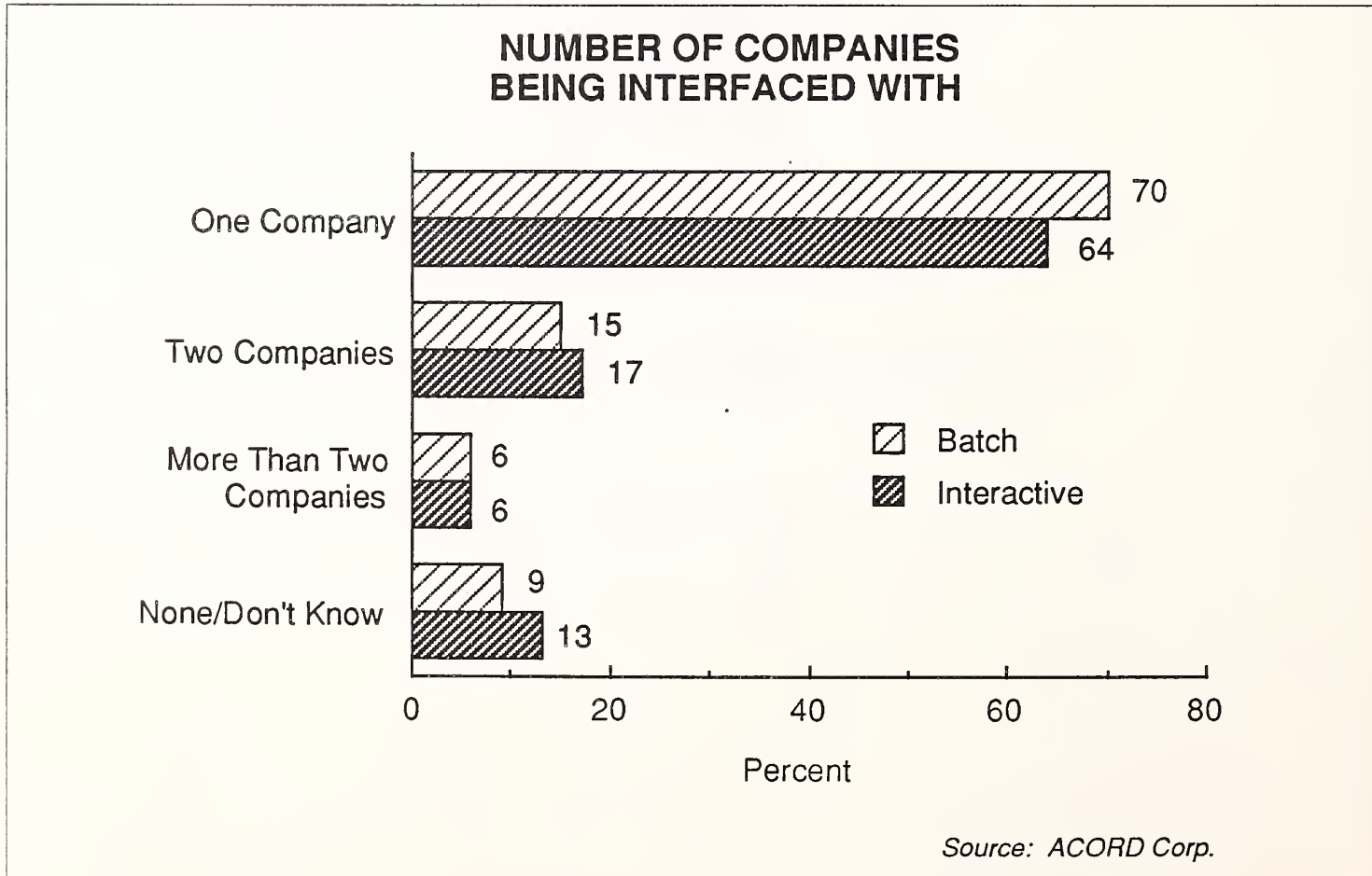


EXHIBIT IX-6



In 1988, industry associations such as the Independent Insurance Agents of America and the National Association of Professional Insurance Agents began an organized campaign to address industry standards to the insurance interface. The IIA described a model for interface to:

- Provide agencies with the ability to do business with several companies through common formats
- Reuse data automatically to eliminate multiple data entry requirements by agents
- Produce sufficient client and policy detail to satisfy the needs of agencies and carriers

The INS (U.K.) service known as Brokernet, using proprietary standards based on the Trade Data Interchange protocol, is used to exchange auto insurance details among major British insurance companies.

Another European project, called RINET or Reinsurance and Insurance Network, aims to support the massive paperwork requirements of companies that underwrite and share insurance risks. This project will reportedly use the EDIFACT standard. IBM has been awarded the RINET contract.

C

Tax Preparation Services

In 1986, the Internal Revenue Service initiated a test of an electronic filing system designed to reduce the paperwork involved in filing personal tax returns. Business returns were added to the test in 1987.

- The test program for personal returns is called Study of the Utility of Processing Electronic Returns (SUPER) and is handled through the IRS' Cincinnati (OH) Service Center.
- SUPERB (for business returns) is being run through the Andover (MA) service center, processing forms 1041s and 1065s.

Initially, six tax preparation firms served as hubs, providing bisynch communications and software linking into the IRS' communications processor supplied by Mitron Systems Corporation (Columbia, MD). Independent agents file electronic returns to the hub firms that act as collection points. Personal electronic return filing has been limited to taxpayers with fairly simple returns.

For business returns, several tax services, banks, and accounting firms transmit to the IRS as agents for corporations. Business filers can ship magnetic tape to the Andover processing center or use electronic transmission into the IRS' MITRON network. The method depends on the number of attachments. Some companies attach up to 500,000 forms, which would not be cost effective to transmit electronically.

Approximately 26,000 personal returns were filed in 1986, with a substantially lower error rate reported than for paper-filed returns. In 1987, this grew to 78,000 and for 1988 600,000 returns were filed in this way. Additionally, the IRS added pension plan returns to the program in 1988.

Also being tested is direct deposit of tax refund checks into taxpayer's designated bank accounts, to enhance the benefit, and popularity, of electronic filing.

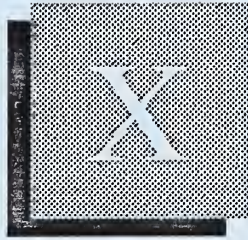
H&R Block is participating with a commercialized service called Rapid Refund, introduced in 1986. It is available to taxpayers regardless of who prepared the return.

Other firms serving as hubs for electronic personal returns filing include Speed-S Electronic Delivery Company (Minneapolis, MN), FastTax (Carrollton, TX), Beneficial Management Services (Peapack, NJ), Char-tain Accountancy Corp (Belmont, CA), and Reliable Tax Service (Dayton, OH).

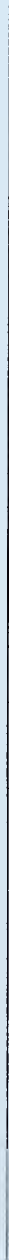
In the 1989 tax season, the IRS program is being expanded to 36 states, and all states should have electronic filing available in 1990.

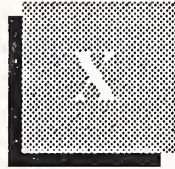
In the next 10 years, savings of over \$200 million taxpayer dollars are expected from the method, and by the early 1990s, as many as 40 percent of individual returns could be handled this way.

The next chapter examines EDI trends and directions in the medical, education, and services industries.



Medical, Education, and Services EDI Directions





Medical, Education, and Services EDI Directions

A

Medical

1. Pharmaceuticals

In the early 1970s, drug wholesalers began supplying retail pharmacists with hand-held terminals to collect and transmit orders.

- Currently, over 90% of drug wholesalers use this method; some even refuse to accept paper purchase orders due to their inherent inefficiencies.
- The best know example of this retail EDI application is McKesson's Economost, described in Chapter V. McKesson communicates with some 14,000 retail druggists in this manner. Bergen-Brunswig is another firm with such an approach.

Distinct from retailing, the drug wholesaling business traces its EDI involvement with manufacturers to 1972 when the National Wholesale Druggists' Association (NWDA) helped establish Ordernet services supplied by what was then Informatics General (now Sterling Software). Ordernet handles the electronic transmission of purchase orders to drug suppliers.

Due to the early date of its involvement, industry-specific standards, called Ordernet, were developed.

EDI activity has grown in the subsequent years, driven in part by the industry's complexity. Wholesalers may deal with over 1000 individual suppliers on a regular basis.

Today, approximately 80% of the purchase order dollar volume is handled electronically; however in terms of purchase order volume, only 20% are handled electronically.

The reasons for this relatively low penetration level are:

- Success with large wholesalers mitigated interest in involving small suppliers.
- Small suppliers are less likely to be computerized.
- Since pharmaceuticals are not central to their business, some suppliers do not support the Ordernet standards.

Starting in 1983, drug wholesalers started selling directly to hospital pharmacies in response to hospitals' needs to cut costs. One of the primary applications requiring an electronic solution was the chargeback mechanism, or rebates from drug manufacturers. Three chargeback electronic formats were developed:

- Bid award notification from manufacturers to drug wholesalers
- Chargebacks, or rebate claims from wholesalers to suppliers
- Chargeback reconciliation used by manufacturers to explain why certain claims are not being accepted

To date, only the first format is being used in volume.

In 1985, a major drug supplier required wholesalers to use electronic funds transfer as a condition of doing business.

- This mandate did not consider industry input to how EFT should be handled.
- In response, the NWDA, working with other health care associations, wholesalers and manufacturers, and experts in finance, information systems, marketing, and customer service, began investigating expansion of its EDI experience to cover other forms of business transactions.
- The goal is to develop a single EDI standard for the entire health care industry, not just for drug distributors.
- These activities are also important because drug distributors sell not only to health care industries, but to the grocery and mass-merchandising industries that have different EDI standards than the industry-specific approach taken by pharmaceutical concerns to date.

The task force approach is leading to ANSI X12 and UCS format support for future transactions, which Sterling Software will support. The Health Industry Distributors Association (HIDA) is also developing ANSI X12 formats to cover chargeback and contract awards association.

Additionally, the Health Industry Bar Code Council (HIBCC) is working to coordinate ANSI X12 formatted EDI use in the entire health care industry. The involvement of this council is similar to the bar code/EDI relationship found in the grocery industry, paper and office products, and automotive manufacturing.

The most active third-party EDI service providers in pharmaceuticals remain Sterling Software's Ordernet (claiming 80% of the wholesale industry's EDI transactions), McDonnell Douglas' EDI*Net, and GE's EDI*Express.

- GE has established a relationship with a start-up firm called Distribu*Net (Dania, FL) to distribute that company's data base of generic drug information to pharmacists and to provide buying and selling capabilities through the EDI service.

Wholesaler Bergen Brunswig receives most of its orders from customers via EDI, but as of mid-1988, of the 600 companies it buys from only 100 use EDI. Although these 100 suppliers represent 80% of its purchasing, the company is hoping to increase its efficiency for the remainder. Accordingly, it launched what it called the Electronic Partnership Program to encourage EDI use.

A consortium of mid-sized drug wholesalers, called Hospital Distributors of America (Chicago), is using EDI to act as a single entity to bid on large orders from hospital buying agents in competition with large wholesalers. The consortium works through the Ordernet service.

This industry is the only current example of where EDI transactions through a network are used to create a data base. Sterling Software Ordernet developed a data base of drug use through data capture and retrieval procedures applied to EDI traffic, as well as from data submitted by the participating companies.

- Called Medimetrik, the service reports aggregate data, protecting personal and proprietary information.
- Pharmaceutical companies can access the Medimetrik data base for market research and sales management purposes. For example, one application is to allow participants in the wholesaler's consortium described above to determine their participation in an individual contract.
- The technique is also being applied to veterinary medicine, and Ordernet is also involved in tracking drug purchases for mainland Chinese hospitals.

Some aspects of pharmaceutical distribution apply to the retail distribution sector, discussed in Chapter VII.

Several pharmaceutical companies have participated in pilot testing of electronic New Drug Applications (NDA). NDA documents are required by the Federal Food and Drug Administration prior to the agency's approval of new substances.

- Paper formats for these filings can be massive. There have been published reports of NDA applications stacking up to 270 feet, requiring a very time-consuming review process.
- Electronic NDAs reportedly cut medical report evaluation time up to 90% and statistical report evaluations up to 50%.

Speeding approval for new drugs not only has human consequences (for example, AIDS activists have protested delays in drug approvals), but can be commercially important for manufacturers. A delay in getting products to market reduces profits.

In late 1988, the FDA formalized new procedures to speed approval of new drugs for life-threatening diseases where no alternative therapy exists. This announcement apparently did not address electronic NDAs.

2. Medical/Surgical Supplies

The best known EDI implementations in electronic hospital purchasing are captive systems, but there are indications these are being opened by their owners to support multi-vendor purchasing.

The competitive advantage of being the first such system has now decreased with several electronic ordering systems in place, and at least one vendor is seeking to retain revenues by being a conductive agent for hospital ordering.

The classic captive system is operated by Baxter-Travenol, which purchased American Hospital Supply, a manufacturer and distributor of medical equipment.

- Baxter offers the ASAP (Analytical Systems Automated Purchasing) private EDI system, which allows customers to use terminals, touch-tone phones, portable terminals, bar code scanners, and processors of all sizes to enter orders.
- Over 500,000 products are available to some 6,300 customers. Messages and special requests can be sent to customer sales representatives.

- The system can translate between a customer's stock numbers and Baxter's order numbers, and can provide sorting and customized management reports.
- Optionally, the system can automate ordering with the ASAP computer, compiling a list of recommended purchases for electronic approval.

Exhibit X-1 provides statistics on the ASAP system published in late 1988.

EXHIBIT X-1

ASAP STATISTICS	
Number of Phone Lines Used	350
Number of ASAP Customers	6,300
Daily On-Line Transactions	100,000
Daily Processed Orders	6,200
Daily Line Items Processed	45,000
Transactions per Second	10
Daily Tape Mounts	98

Baxter-Travenol, working with GE Information Services, is opening this "closed" system to other suppliers, allowing purchasers to buy from multiple sources through the same conduit.

- The new service is called ASAP*Express, in keeping with GEIS' series of EDI*Express services.
- In most cases, orders are routed through Baxter's computer center and then placed in mailboxes on GEIS' network. To allay suppliers' fears that information might be used competitively by Baxter, the company commissioned an accounting firm to review system security. A resulting report is given to suppliers considering an affiliation with ASAP*Express.

Other network service vendors and medical/surgical suppliers are attempting to address this market with a variety of multi-vendor approaches.

- In 1988, McDonnell Douglas certified the medical industry's Material Management System as compatible with EDI*Net.
- Sterling Software's Ordernet division appears to have pulled back from its planned HOP (Hospital Ordering Program) development, although it has customers in this market segment.
- IBM has a relationship with Abbott Labs' QuickLink multi-supplier system, in an offering called the Corporate Alliance. Also participating is 3M Corporation, Standard Register, and several distributors. This approach supports direct connections to suppliers rather than a clear-house mailbox approach.
- Johnson & Johnson offers Cooperative Action (COACT) Plus, introduced in 1987. It too supports multi-vendor purchasing. Based on a study conducted by a consulting firm, COACT is credited with saving an average, 600-bed hospital over \$16,000 annually, mostly through reduced inventories and improved cash flow.

In addition to these competing, yet "open" systems, several suppliers are reportedly developing their own EDI systems: American Healthcare Systems, AmeriNet, and Adventist Health Systems. Hospital group SunHealth Corporation (Charlotte, N.C.) uses CompuServe's network for its Buyline hospital purchasing system, which links SunHealth to medical and office supply companies including AAroc, Unijax, AOA/CHICK, and Calgon/Vestal.

- Often, these suppliers' products are available through one or more of the other existing services.

This growing proliferation of multi-vendor systems (albeit replacing previously existing proprietary systems), had led to suggestions for a utility-ordering system sponsored by the industry to simplify the evolving complex situation and create industry-wide efficiencies. However, the utility concept has not been well-received by existing vendors.

3. Optometry

This healthcare sector shares common characteristics with retail distribution, but due to the professional nature of its practitioners, is included here.

Independent optometrists, facing market share decline to chain practices, are using the Total Ophthalmic Professional (TOP) network developed by a group of practitioners led by Associated Optical Laboratories (Dallas, TX).

With approximately 225 subscribers, TOP the system accepts eyeglass and contact lens orders for overnight delivery, competing with large chain delivery capabilities.

The network also provides additional professionally oriented applications:

- Patient records systems
- Accounting
- Customized newsletters, reminders, and promotional mailings
- A planned discount-buying service

These services will be provided to customers placing \$2000 in orders monthly.

Difficulties facing TOPS and similar on-line order entry systems being developed by other optical laboratories are resistance within the profession to computerization and cost concerns related to hardware purchasing and training. Also, since TOP is sponsored by an individual optical laboratory, there is reluctance to be dependent on one supplier.

TOPS is a captive on-line order entry system rather than an EDI implementation, but it illustrates how an interorganizational system can be used to address competitive issues within a specific industry.

4. Electronic Medical Insurance Claims

EDI techniques are used for submitting claims to health insurance carriers, using electronic versions of formats developed in support of Medicare claims processing. This variety of EDI is called EMCS for Electronic Media Claims Submissions.

INPUT plans extensive focused research on EMCS in 1989. This section serves as an overview of issues and trends in this area.

EMCS services are provided nationally by the National Electronic Information Corporation (NEIC—a clearinghouse for several insurance carriers), GTE Information Services, several Blue Cross/Blue Shield insurers, and several insurance carriers.

- There are also as many as 60 regional processing firms involved.
- Other companies that process health claims (although not necessarily EMCS) are EDS, Computer Sciences Corporation, and National Data Corporation.
- Several companies are working in the pharmaceutical claims area, such as PCS, Inc.

- Southern New England Telephone, working with Blue Cross/Blue Shield of Connecticut subsidiary ProMed, is supporting EMCS on SNET's ConnNet statewide packet network. Data bases are also available on the service called Connecticut Health Information Network (CHIN).

Among problems in developing this market are the third-party administrators (TPAs) that provide services to health insurance companies and self-insured users. Since most TPAs are small companies (under \$5 million), they may not have the resources necessary to implement EMCS. Further, in some cases EMCS services may tend to bypass their own functions, implying a threat to their business.

Other problems in gaining acceptance for EMCS are the needs for surgeon's reports attached to certain claims, the discipline required to accurately code diagnosis onto the EDI/EMC document, and the nature of medical review on certain types of claims that can negate any time benefits offered healthcare providers.

Despite these inhibitors (which can largely be addressed), the potential for health claims processing to become a major EDI application is significant. Already, over 30% of all Medicare Part B claims are handled through some form of electronic processing.

- The Catastrophic Health Care bill contains elements requiring electronic claim submission and processing.
- The healthcare industry is addressing cost containment in response to government, business, and consumer pressures.

There are social and economic reasons for wider use of EMCS.

- Health insurance continues to rise, and in 1988, Medicare premiums increased 38%. Annual healthcare spending as a whole is now approximately \$500 billion annually, and represents nearly 11% of the gross national product.
- In 1987, the average corporation spent \$1,985 per employee annually for health care and health care claims administration. This represents an increase of nearly 8% over 1986 when a 7.7% increase was reported over the previous year. In 1988, the average cost per worker is expected to rise to \$2,100.

According to one health claim auditing company survey, 97% of bills in excess of \$10,000 were found to have overcharges averaging \$1,300 - \$1,500.

- However, another hospital auditor claims the sample used for this survey was biased, that bills auditors examine have already been identified as overcharge prone.
- Another survey found undercharging of 2%.
- A Department of Health and Human Services study found that in over 60% of all Medicare claims, hospitals are overpaid.

Regardless of these various findings, one fact remains: mistakes are being made in paper-based health insurance claims, mostly due to human error; this situation is something EMCS can help to improve.

Losses reported by health insurance companies in 1987, over \$1.25 billion, were reported due to increasing hospital charges, high start-up costs for health maintenance organizations, and increasing use of out-patient facilities. Several insurance companies have abandoned health insurance as a result.

The potential for EMCS is great. An estimated three billion paper-based medical claims are mailed each year, involving over 500,000 physicians and hundreds of insurance carriers. These documents lead to additional transactions such as remittance advices and benefits coordination between multiple carriers.

In addition to physicians, there are over 100,000 dentists, 60,000 pharmacies, 6,000 hospitals, plus nursing homes, alternative health care providers, and suppliers of medical equipment which represent the potential user market. There is also a small market involved in veterinary medicine insurance.

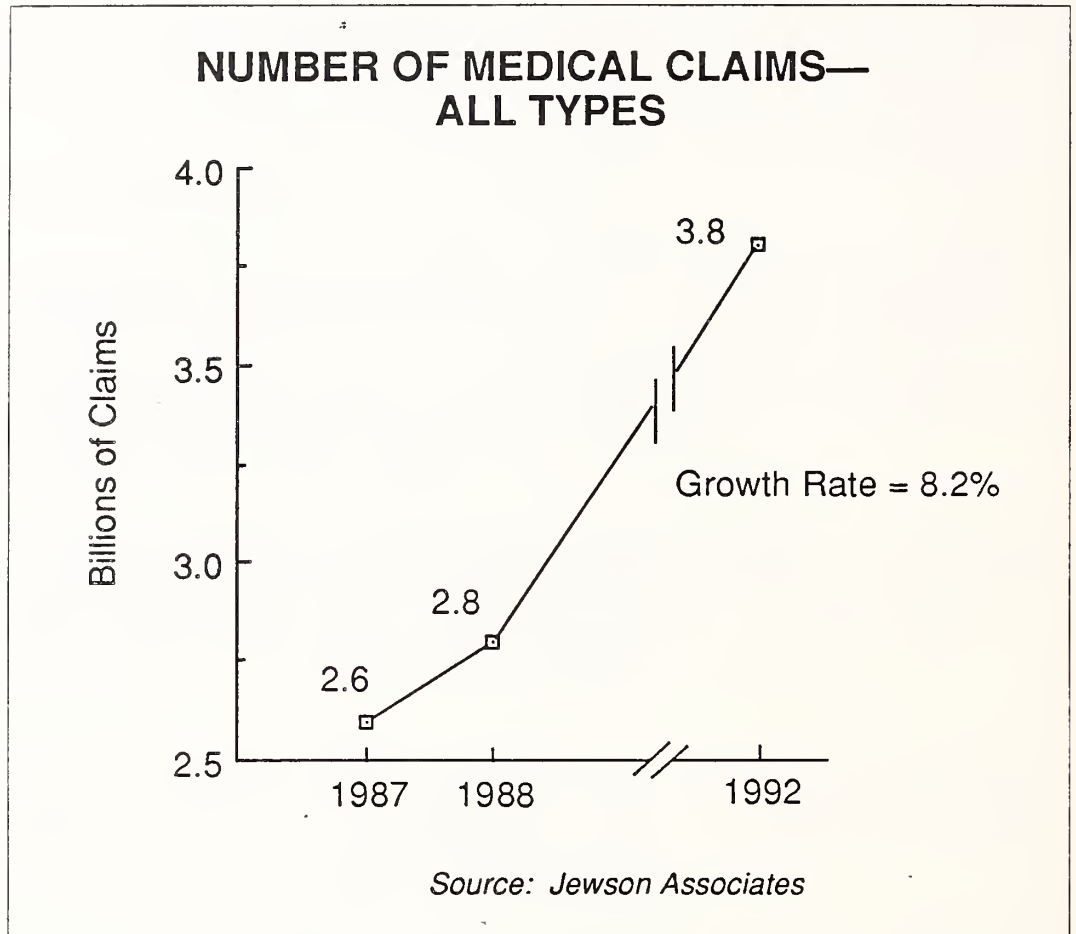
As shown by Exhibit X-2, all types of medical claims are expected to grow over 8% each year through 1992.

The Health Care Financing Administration (HCFA), which is responsible for the U.S. Medicare program, is working towards a 1990 goal of having half of all Medicare Part B claims processed electronically. Currently, approximately 30% are processed this way.

Factors working to increase the use of electronic claim filing are the availability and increasing acceptance of in-house turnkey hospital management systems and remote computing service vendors that automate bill processing and provide automatic links to insurance carriers.

Also contributing to segment growth is increasing acceptance of practice management systems by health care professionals such as physicians, dentists, pharmacists, and therapists.

EXHIBIT X-2



Firms providing such systems and often EMCS capabilities and/or services include Physician's Practice Management, with its ClaimsNet service (Indianapolis, IN); APS Systems (San Antonio, TX); ATT Micro Systems (Seattle, WA); Chen Information Systems (San Jose, CA); Cotton Banks, Inc. (Tulsa, OK); Fisher Business Systems (Atlanta, GA); Medaphis Corp. (Atlanta, GA); Micro-Medics Corp. (New Rochelle, NY); Ohio Medical Indemity Mutual Corp. (Worthington, OH); PC Healthcare (Eugene, OR); Systems Plus Corporation (Mountain View, CA); and Script Form, Inc. (Fort Lee, NJ).

Additionally, insurers such as Blue Shield have implemented micro-based EMCS turnkey systems.

More information on Electronic Medical Claims will be found in INPUT's 1989 research program.

B

Education

EDI use in education is covered in Chapter VII, specifically dealing with college bookstores, and in Chapter XI, specifically dealing with EDI applied to the exchange of college transcripts.

EDI Education Inc., (Oak Brook, IL) has promoted its ability to accept EDI transactions through its bank in registering attendees to its courses.

C

Services

1. Construction**a. Background**

After a decline of several years, engineering and construction companies are enjoying a rebound. Capital spending has increased as new plants, highways, and office buildings are required. City and state governments are starting to repair declining public facilities, and firms in the construction sector are anticipating work in toxic waste cleanup projects.

Additionally, new international construction approaches, such as the "built, operate, and transfer" (BOT) option may lead to increased off-shore work. BOT is a strategy whereby a large power plant (for example) is built by a firm which then operates it for profit. After the construction costs have been recovered, the plant is transferred to the hosting country. This shortcuts many political and legal obstacles to major projects.

Information flows with the construction industry are highly complex. Each major project can involve literally thousands of suppliers and contractors, and with each new project, the participants change. Efficiencies through coordinated activities are important.

b. Construction and EDI

EDI in the construction industry appears more advanced in Europe than it is in North America.

Some 40 U.K. construction companies have formed EDICON to promote EDI within the industry.

- Among members of EDICON are Balfour Beatty, Blue Circle, Trafalgar House, Wimpey, John Laing, and Redland.
- The project is running trials on Istel's EDICT, IBM's network, and INS' network, using EDIFACT standards.
- Suppliers to the industry are being encouraged to adopt the European Article Numbering scheme.

The European potential for EDI transactions in the construction services industry is substantial: 186 million purchase orders, 217 million invoices, and 38 million purchase inquiries are transacted yearly between some 10,000 suppliers and 200,000 customers.

The purpose of EDICON is to develop improved industry communications in financial applications, inventory control, and customer services. Since engineering design is an important part of any construction project, graphic EDI implementations can be expected.

In the U.S. a university-based Construction Industry Institute is looking at potential applications of EDI in the building industry on behalf of its corporate sponsors.

While the construction industry is well-populated, most firms are small. Accordingly, EDI implementations will likely be found first in larger companies.

For example, the Bechtel Group (San Francisco), as part of an overall application of information services to its business, is installing EDI and other types of communications links with its major suppliers and customers.

EDI developments in related industries, such as electrical, plastics, metals, and hardware, and in services used by construction firms such as transportation, insurance, and banking, all promise to provide operational improvements to the industry.

2. International Trade Services

EDI in support of international trade is the subject of a separate INPUT report.

Major international transportation companies are implementing EDI to provide customers with shipping information, replacing paper correspondence and telephone customer service. For example:

- Sea-Land (Port Elizabeth, NJ) offers Sea-Trac software for IBM-PCs and compatibles that allow users access to Sea-Land's computers for booking, scheduling inquiry, tracing, and bill of lading reporting.
- American President Companies (Oakland, CA) has been using its information services and telecommunications capabilities to add value to its basic transportation services, with analytical tools allowing customers to manage their logistical needs. It is implementing EDI arrangements with its major customers including a Japanese automaker (using APC's Pacific region network), allowing the manufacturer to manage "just-in-time" auto assembly at its U.S. plants.

In addition to transportation companies that support EDI as a customer service, several services and government agencies are involved in supporting international trade through EDI.

a. Bank Export Trading Companies

Prior to passage of the Export Trading Company (ETC) Act of 1982, federally regulated banks were prohibited from commercial activities.

- ETCs provide a variety of services related to international trade such as locating overseas distributors and buyers, credit checking, shipment consolidation, and handling freight forwarding and international trade documentation.
- The ETC Act seeks to increase U.S. exports by encouraging more efficient export trade services, improving trade finance, and removing antitrust concerns from export activities.
- Under the act, banks are able to invest in ETCs. Approximately 50 investments have been approved, mostly in wholly owned subsidiaries of bank holding companies, with money center banks accounting for the majority of the total investment. Most are located on the East and West coasts.

Banks provide a variety of services as part of their international trade activities, with letters of credit, a basic tool of international trade, an example. Banks find it attractive to offer fee-based services to their customers, not only for the income, but because these services can lead to other business.

Several banks are now offering EDI-compatible electronic letters of credit that are transmitted into the "back office" processors of international correspondent banks. Software supporting these services is provided by Integrated Cash Management Services (New York), American Management Systems (Arlington, VA), Micro Bank Automation (Atlanta), Kapiti (London), and others.

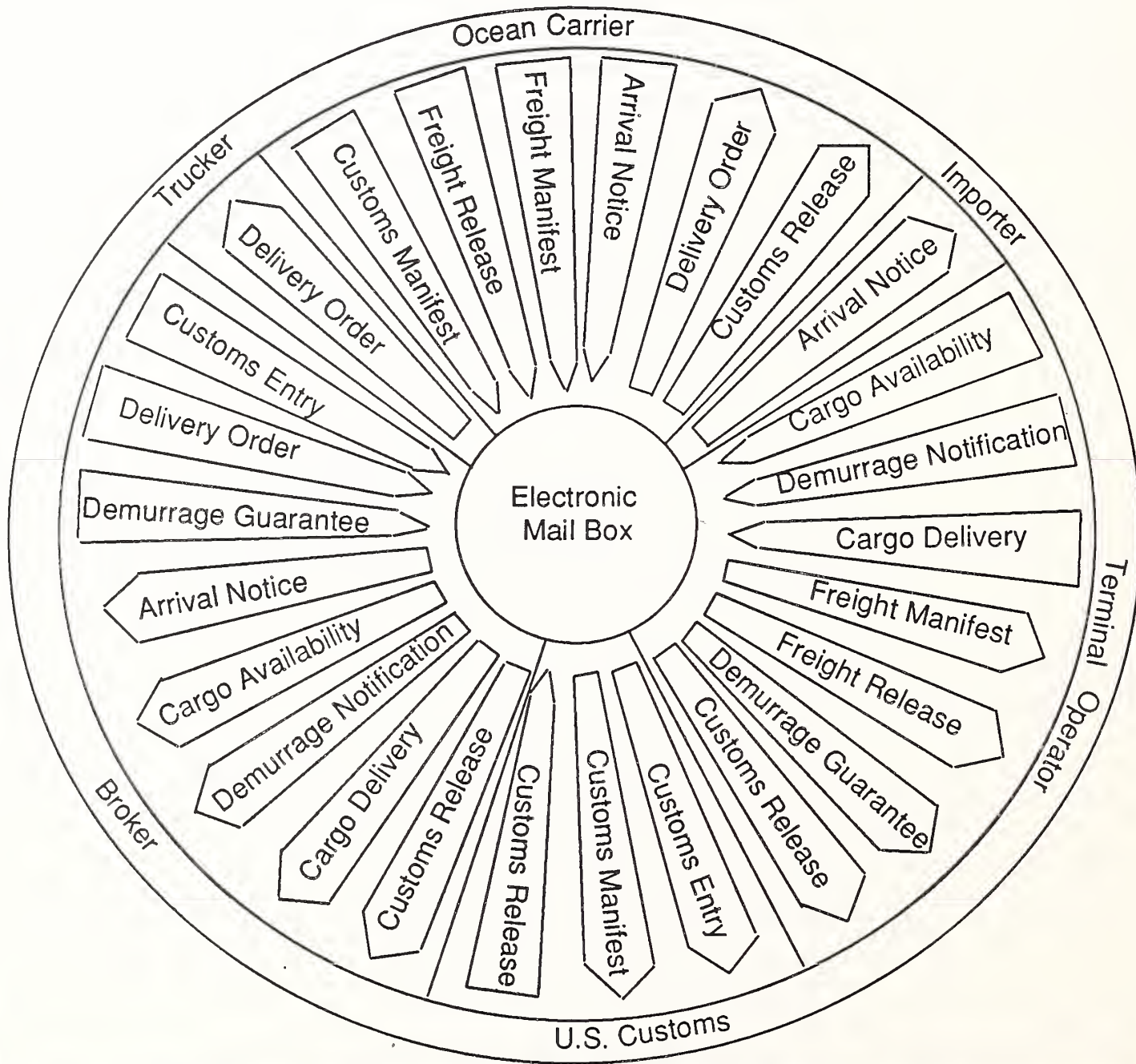
b. Computerized Port Services

To handle their functions, ports worldwide are automating, often engaging professional services firms in systems integration and often requiring follow-on facilities management contracts. Such systems incorporate automated cargo clearance systems. For example:

- Automated Cargo Expediting System (ACES) was developed, and will be operated by, GE Information Services for the Port Authority of New York and New Jersey. The Port Authority serves as a coordinating agency for the ocean shipping community. As Exhibit X-3 shows, the ACES system is described as an E-mail system.
- The Miami International Cargo System (MICS) is described as the first fully integrated cargo clearance system in the U.S. Similar systems are being implemented in England, France, and Australia, by Computer Sciences Corporation and the U.K.-based National Data Processing Service, creating a *de facto* standardized automated cargo clearance system.

EXHIBIT X-3

AUTOMATED CARGO EXPEDITING SYSTEM (ACES) Port of New York and New Jersey Electronic Mail System



- The Port of Baltimore has implemented the ACROSS service that links to the Customs Automated Manifest System and supports the Automated Broker Interface. Other functions are local cargo tracking, document generation, ship scheduling, statistical reporting, and electronic messaging. It is operated by Network Solutions (Vienna, VA) under subcontract with Arthur Andersen.

- The Port of New Orleans offers a series of computer services called CRESCENT (for Computer Reporting and Expediting of Shipments to Control Essential New Orleans Trade). CRESCENT provides interactive manifest preparations, customs forms creation, freight quotes, container tracking, statistics, and a services directory/data base. The system was developed by the Cyber Data Systems Division of McDonnell Douglas.
- In Europe, the Port of Antwerp is implementing Systems Electronic and Adapted Data Interchange (SEAGHA) for the port community with approximately 385 potential users. The project is being managed by a co-operative and will use international EDI standards.
- Several ports in the U.K are implementing a computerized customs clearance system called Customs Handling of Important and Export Freight (CHIEF).
- Marseilles is developing Procedures for the Handling of Information (PROTIS) and Rotterdam is developing the International Telecommunications and Information System (INTIS), designed to be total harbor information systems, linking the port with shippers, carriers, customs, and several other ports using X.400 and international EDI standards.

These activities, representative of automation initiatives worldwide, are summarized in Exhibit X-4.

EXHIBIT X-4

REPRESENTATIVE COMPUTERIZED PORTS	
Port System	Comments
Miami: International Cargo System (MICS)	Developed by CSC/NDPS. Similar Projects: England, France, Australia
Baltimore: ACROSS	Operated by Network Solutions/Arthur Andersen
New Orleans: CRESCENT	Developed by Cyber Data (MDC)
Antwerp: SEAGHA	Cooperative Development
New York: ACES	Development by GEIS in Process

c. U.S. Customs Service Automated Commercial System (ACS)

The goal of ACS is to speed clearance of routine shipments, often before arrival. There are two ACS modules:

- The Automated Broker Interface (ABI) allows brokers to electronically file necessary documentation. It promotes the key customer benefit the ability to move shipments through customs in hours rather than days.
- The Automated Manifest System (AMS) supports the traditional listing of all cargo transported by a carrier by its destination and other information needed by customs and port officials. The benefits to port authorities will be efficiencies in facility use and the competitive edge of automated ports over those maintaining paper processing.

This project is necessary because customs paperwork has increased exponentially while staffing levels have remained constant.

The U.S. Customs Service has initiated these programs under a cloud of controversy.

- Customs announced its support of the EDIFACT international EDI standard. While this forward-looking approach seems appropriate for an agency involved in international trade, members of the ANSI X12 standards-setting body have expressed concern since few are now using EDIFACT and few documents have been approved for use.
- Customs has called for a unique bill of lading number to identify shipments, a task shippers have had difficulty in accepting due to programming requirements and the structure of the proposed electronic document.
- There has also been concern about access to data bases to be maintained by Customs. Carriers fear that competitive information would be readily available, while others in the business of providing trade information on a commercial basis fear preemption by a "free" governmental service. This appears resolved, with Customs intending to provide basic data without the "value added" offered by commercial sources.

d. Customs Brokers

A customs broker works on behalf of shipper to clear shipments through U.S. Customs Service. Brokers are moving beyond their traditional role, to provide tracking and expediting services, to actually handling shipping arrangements.

While there are approximately 1,200 customs brokers, the 80/20 rule nearly applies: 80% of U.S. import entries are processed by approximately 250 firms.

There are approximately 25 national and international brokers, 200 regional firms, and over 1,000 brokers who work exclusively on a local level.

Although some ports authorities are cutting back on ancillary services for shippers, others are implementing port service centers that would compete directly with the services provided by customs brokers.

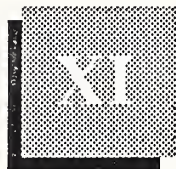
A group of customers brokers and freight forwards are proposing an industry-specific network with links to shippers in support of broker's activities.

The next chapter examines EDI trends and directions in Federal, State, and Local government environments.



Government EDI Directions





Government EDI Directions

A

Federal EDI— Background

In addition to the IRS' electronic income tax filing program (discussed in Chapter X) and the Health Care Finance Administration's role in establishing formats for medical claims submissions (also Chapter X), several federal Government agencies have initiated EDI and EDI-like projects. Some of these, related to transportation services, were referenced in Chapter VI.

The federal EDI market is growing from virtually nothing three years ago to a scattered series of EDI pilot projects. Agencies are proceeding towards EDI largely with industry participation.

Budget constraints affect different agencies in opposite ways, as limited funds hinder EDI exploration while funding cuts are driving some agencies to EDI as a viable, cost-cutting solution.

Various factors will cause a major expansion of EDI opportunities in the next few years:

- The Administration's Reform 88 initiatives, many of which have recently come on-line, require greater automation in funds transfers.
- The Department of Defense's (DoD) Computer-aided Acquisition and Logistics System (CALs—described below) program has fostered numerous pilot programs with defense contractors.
- Other agencies, including several in the Treasury and Justice Departments as well as the General Services Administration (GSA) and the Securities and Exchange Commission (SEC), have instituted EDI and EDI-like programs.

B**Federal Agency Needs**

In many respects, federal agency EDI needs parallel those in the private sector, but there are some unique considerations relating to the political process. In addition to wanting information that is directly usable by their computers, reduced turnaround time for transactions, and lower acquisition costs, agencies desire:

- A better service record to the public
- An improved reputation with the Congress, leading to more success in securing resources

The limited size of the current marketplace hinders the identification of EDI programs. Agencies report primarily on the big ticket items, causing the omission of many interesting but still-growing pilot and production programs. Below, the report describes some of the more visible programs.

C**Federal Application Areas**

The various government agencies surveyed utilize electronic data interchange systems for many different applications.

- In both DoD and civil agencies, the predominant applications for which EDI services are contracted are those associated with payments and procurement functions.
- Logistics and inventory applications comprise the next largest specific applications noted by the respondents.
- Other applications mentioned cover a range of functions and appear unique to the individual needs of the agency.

D**Federal Policy and Regulatory Trends**

In dealing with its employees and annuitants, federal policy has long encouraged the use of Electronic Funds Transfer (EFT) payments. In some cases, agencies have attempted to make this mandatory, but federal unions have thus far successfully blocked such initiatives.

- Federal agencies have proceeded more cautiously on paying suppliers through EDI; however INPUT does expect many agencies to mandate this form of payment, at least to large suppliers. In fact, the entire purchase order/invoice/payment process will likely migrate to EDI over the next five years. Electronic payment is the purpose of the General Services Administration's (GSA) Vendor Express EDI program.

Vendor Express, a Treasury Department program that automates government agencies' bill paying, is currently being used by the Treasury, as well as three other agencies (HUD, HCFA, and Education).

- The program was initiated in July, 1987 as a cost-cutting measure and also to encourage federal agencies to make more timely payments to vendors.
- The program utilizes the "Cash, Concentration, and Disbursement" format with one addendum record (CCD+1). This format is accepted by nearly all financial institutions and can be used to transfer funds through the Automated Clearing House (ACH).
- Due to its relative simplicity, over 14,000 institutions are involved in the Vendor Express program, and the number is expected to grow by the mid-1990s. Other government agencies, including the Postal Service and Department of Labor, are expected to use the Vendor Express methodology.

Through a variety of pilot programs, DoD is pursuing another EDI-like project, the Computer-aided Acquisition Logistics System (CALs) with close and continuing industry participation. DoD has developed a new technical standard to be used in implementing CALs for weapon system acquisition. The standard, called MIL-STD-1840A, covers the automated interchange of technical information.

Human resources represents another growth opportunity for federal EDI. For example, when an employee transfers from one agency to another, it may take six months or more to correctly transfer his or her leave records. Currently, the first agency uses its computer system to generate a paper document which it mails to the other agency which then re-enters the leave data into its own system. While it sounds simple enough, many things can, and often do, go wrong. EDI can readily solve this problem.

Similarly, when an employee retires, the Office of Personnel Management (OPM) must initiate a paper search of employment records at all agencies where the employee worked. OPM must both determine the length of service and the amount of the employee's contributions. Again, EDI would simplify things considerably.

Transportation represents another important EDI application. The shipment of goods and services to and from most agencies requires a long and complex paper trail. Again, most of this involves computer files, converted to hard copy formats, transferred between organizations, and then re-entered into a computer. EDI can make this process less expensive, faster, more efficient, and more responsive to the agencies involved.

Various agencies are implementing or planning unique EDI projects. For example, the Securities and Exchange Commission, with assistance from Arthur Anderson, is piloting the Electronic Data Gathering and Retrieval (EDGAR) system. EDGAR enables the SEC to receive annual reports, 10-K reports, and similar corporate documentation.

In 1987, GSA awarded a contract to Martin Marietta Data Systems (MMDS) for an EDI pilot project for EDI purchase orders to be issued to furniture suppliers. Eventually, GSA hopes to expand to invoices and possibly to payment authorizations, as well as moving on to other types of suppliers.

Other examples of federal EDI projects are:

- The Customs Service is using EDI to assess duties and collect payments from some of the largest importers, and facilitating cargo clearances through the Automated Commercial System (discussed in Chapter X).
- The Internal Revenue Service has a pair of pilot programs for electronically transmitting tax returns for individuals and businesses (discussed in Chapter X).

INPUT expects the federal EDI market to grow from the present limited pilot efforts to a number of networked systems. Growing confidence in technology, the evolution and greater acceptance of standards, and the need to make government more efficient and productive will likely overcome the impediments to EDI adoption by federal agencies.

As federal EDI pilots expand into full-fledged production systems, most large- and medium-sized suppliers will feel the impact. They must eventually invest in EDI technology. However, INPUT expects delays in this investment while the government refines its standards and presents a more uniform approach to industry.

While it is unlikely federal government agencies will require suppliers (especially smaller ones) to use EDI, it is expected that large contracts, particularly in defense and aerospace, will contain language suggesting EDI use as a means of controlling and monitoring costs.

The involvement of the federal government in EDI will be significant due to its influence across many industries segments, and because the federal government represents the largest single "user" of information services and systems.

E

State and Local Government EDI Directions

State and local government adoption of EDI, if it exists, is not very visible. Certainly, state procurement offices would benefit from electronic purchasing.

The North Texas Higher Education Association has implemented an EDI application for the electronic exchange of college transcripts.

- The application covers students transferring from junior to four-year colleges and migration among the area's junior colleges.

- Some 26 institutions are using the implementation.
- Using a proprietary format wrapped in a GE EDI “envelope,” the system was custom built for the association by GE Information Services and uses the GE network for mainframe-to-mainframe exchanges.

The next chapter evaluates several specific EDI opportunity areas and offers conclusions from this study of EDI vertical market directions.



EDI Vertical Industry
Opportunities,
Recommendations,
and Conclusions





EDI Vertical Industry Opportunities, Recommendations, and Conclusions

This chapter is based upon the preceding examination of EDI activities in various industries. While industries and individual companies now using EDI are certainly not saturated, opportunities for EDI service and product vendors emerge as conspicuous in their absence, while other opportunities are suggested because they appear underdeveloped.

A company investigating any of these areas would, of course, need to evaluate their business potential and other factors that are not described in these brief paragraphs.

The chapter also includes recommendations to market participants and summarizes the study.

A

EDI Opportunity Evaluation

Although competing EDI service providers are addressing many segments of the market, INPUT is aware of several areas worth further examination, suggested here.

1. Reinsurance

Reinsurance companies provide insurance for insurance companies, spreading risks among several firms. The industry's paperwork requirements are weighty, with labor intensive analysis required to determine individual company exposure in the event of a claim. This environment of shared information is similar to that described in the oil industry's joint interest billing requirement.

EDI services adapted to the reinsurance industry are being examined, principally in Europe with the RINET project which was awarded to IBM. EDI professional services and software supporting this variety of EDI will be needed, although it is likely participants will select IBM for its industry expertise.

2. Insurance and X12 Links

INPUT has identified two areas where links between the insurance interface variety and the X12 variety of EDI can be applied to basic business problems:

- While most shippers and their carriers hold blanket insurance policies, there may be occasions when the materials being transported require special handling and accordingly, insurance coverage riders. These situations include high-value products or hazardous materials.
- Mortgage bankers are beginning to develop X12-based transaction sets covering Computerized Loan Origination (CLO). Among transactions needed are those for title and other types of real estate insurance.

The Insurance Value Added Network (IVANS) has identified purchasing-oriented EDI as a way of extending its value to its insurance company and agent users.

- The company has already negotiated a group buy for long distance services from MCI.
- IVANS is evaluating a similar arrangement regarding electronic mail and EDI.

However, due to its alliance with the IBM Information Network (and newly, with Sears Communications Network), opportunities for other network vendors may be limited, although software and professional service firms may find a niche opportunity here.

Only a few software packages fully supporting EDI Insurance Interface are available. No one in services or software has addressed the X12 to insurance opportunity.

3. Financial Services

Banks are beginning to offer EDI services through Electronic Funds Transfers carrying information describing the transaction. There are other variants of financial EDI services to be examined:

- Receivables covered by EDI transactions could form the basis of a company's credit rating, making available short-term funds for immediate needs.
- A value-added enhancement to EDI transactions may also be developed by applying a payment guarantee to EDI-based selling. Under this scenario a supplier would be insured, by an EDI service provider's partner, that payment would be received within a predetermined period.

4. Legal Services

As a subset of EDI in the office products and paper segments, EDI can be targeted to large law offices for routine supplies and a range of other consumables, durables, and research and other services.

Specific needs in the legal profession would be ways of ordering legal forms, many of which must be filed as originals, i.e. they cannot be photocopied. This is because legal forms and filings contain specific language which must be included to conform to industry practices.

Assuming these customs can be addressed, it may be possible to implement EDI systems for electronically filing routine legal transactions with the court system. INPUT has not evaluated traditional or legal barriers to such a scenario, however.

Indications are that the legal profession would not immediately welcome the efficiencies EDI can provide.

Anecdotically, consultants have heard of a New York law firm that decided not to purchase a computer system because it would reduce, by 75%, the time required to prepare paperwork on trusts and estates filings. Since law firms bill by time, there was no incentive to cut billable hours.

5. Small Business Services

Just as small businesses have available storefront service bureaus supplying telex, facsimile, and parcel services, EDI could be made available through these agents.

One configuration could be a telemarketing operation that receives paper or verbal transactions on behalf of smaller companies being required to adopt EDI.

Firms providing shared tenant services may also be candidates for providing group EDI service, as well as Bell Operating Companies and independent franchised business centers such as Mailboxes, USA. These entities could resell EDI services and products to smaller businesses.

6. Localized EDI Services

As most trading between small companies generally occurs in a localized area, EDI services might be formed within these areas. This too suggests a role for BOCs, either acting through unregulated subsidiaries or, as regulations now permit, through their regulated businesses. They could also act in conjunction with independent service providers, similar to the agent scenario described above.

7. Marketing Services

Shop-at-home, catalog sales, and other varieties of telemarketing service operations may be suitable for an EDI approach. In these companies, incoming orders are manually prepared, or, in more sophisticated operations, keyed into an order entry system. Credit card information is increasingly collected with the order, although mail order operations may receive checks which are forwarded to a bank's lockbox operation.

In a service center environment, the orders are forwarded, in paper or proprietary data formats, to the supplier.

By adopting EDI standards and network services, several benefits can be realized. Principally, a service center representing several clients can speed orders to its customers, resulting in quicker turnaround and increased consumer satisfaction. This can be accomplished through a single system for multiple accounts if an EDI technique is adopted.

8. Hotel Supply

Hotels require a continuous stream of consumables as well as services. The supply chain in some ways resembles hospital supply. Purchasing in this segment is characterized by centralized buying, locally contracted cleaning, and other services.

9. Fresh Fish, Meats, and Produce

Although IBM, through its investment position in a company called Agridata, is promoting EDI within the agribusiness segment, it does not appear that EDI is being applied to the purchase and distribution of fresh products in the grocery segment.

INPUT is aware of two electronic bulletin board services being applied to fresh fish, as reported in this volume. As an ancillary service to grocery industry EDI services, these areas may be worth further examination.

10. Specialty Retail Distribution

There are a range of specialty retail chains and single store outlets, each with their own distribution structure, that may be examined for their EDI potential. These include art galleries, shoe and leather goods stores, jewelry and other gift stores, and pet stores.

Although proprietary or EDI-like order entry capabilities may be introduced into a distribution channel, professional service and software opportunities may be present.

Industry associations may be a proper vehicle for sizing the opportunities that may exist here.

11. Veterinary Clinics

Industry sources report that approximately one-third of all veterinary clinics are computerized, with these systems largely used for marketing purposes such as tracking patient appointments and issuing checkup reminders. Vendor-specific purchasing systems are just now being developed to address this marketplace, where profit margins are high.

Also, veterinary insurance coverage is available, meaning the potential exists for an Electronic Medical Claims and/or Insurance Interface variety.

12. Advertising

As in many industries, there are unique measurements and business conditions that are applied in this segment. EDI could be applied to advertising agency time-buying applications, adapted for print, radio, television (both broadcast and cable), and outdoor advertising.

Due to technological advances, it may be possible to associate the actual advertisement with an EDI advertising purchase. High-quality color facsimile capabilities for print advertising, digitized audio and video for broadcast/cable use, and perhaps drivers for creating outdoor advertising displays may follow today's experimentation with EDI and CAD/CAM graphics integration.

Exhibit XII-1 lists these potential EDI market opportunities.

EXHIBIT XII-1

EDI OPPORTUNITIES

<ul style="list-style-type: none"> • Reinsurance • Insurance/X12 Links • Financial Services • Legal Markets • Small Business • Localized/Franchised Services 	<ul style="list-style-type: none"> • Marketing/Telemarketing Services • Hotel Supply • Fresh Food Products • Specialty Retail • Veterinary Clinics • Advertising
--	--

B**Recommendations to
Industry Participants****1. Target New Markets**

Investigate and promote industry association activities, particularly in segments with little or no current EDI activity, and solicit requests for proposals from such associations. If new segments are adjacent to currently served markets, economies and synergisms can result.

There are several successful examples of EDI networks established by associations or by third-party suppliers endorsed by associations. There are also several examples when this approach was not successful.

New systems should be designed with gateways supporting more than industry-specific activities, since trading often crosses industry lines and since purchasing activities are similar in many functional areas, regardless of industry.

Hire and train marketing and sales personnel from industries being targeted for EDI services and products, but exercise caution if the EDI market is a new area for your firm. It is difficult enough to develop new offerings without adding the burden of learning a new market.

The agent and Marketing Assistant Partner approaches used by some EDI service vendors are worth emulating. Resale agreements with existing EDI services can reduce development risks while allowing participation in the market.

- By linking its communications services to the expertise of other qualified processing, messaging, turnkey, or software vendors, an EDI network service can efficiently expand its market presence.
- Of course, it is important to verify that agent relationships are within the corporate mission and will help meet stated goals.
- Also, such relationships need to be examined to determine their impact on profit margins.

Target marketing efforts to corporate managers responsible for purchasing, manufacturing, and logistics, as well as to end user department managers, IS managers, financial officers, and corporate presidents. This usually means consultative selling to a corporate EDI task force.

2. Migrate Industry-Specific Closed-User-Group E-Mail Users to EDI

Several companies support closed user group E-mail services for specific industries. Telenet's support of the American Bar Association with ABANet and of the mortgage banking industry through Mornet are examples.

Such affinity groups can be excellent starting points for introducing EDI into a new industry. In the ABA case, EDI for standard legal forms, office supplies, and research services may be appropriate, as discussed above, especially if group buying power can be concentrated for discounts.

3. Offer Industry-Specific Enhanced Services

Provide gateways to industry-specific data bases as a value-added service. Examples include market information and tariff/shipping services.

Use EDI network traffic to create commercial or restricted-access data bases, as described earlier in the section of the pharmaceutical industry.

Evaluate user's needs for graphics/EDI services in various manufacturing industries and in graphically oriented industries such as advertising and construction (blueprints).

Provide detailed EDI billing, and make available management report summaries and reports by trading partner to enable users to determine their EDI savings and to track trading partner activity levels. Think about demonstrating the savings EDI is providing a specific industry by publishing comparative data: expenses for EDI versus expenses that would have been incurred by using paper documents.

4. Fine Tune Your Marketing

Evaluate the need for, and interest in, EDI by the industries now using your services. A strong customer knowledge base can be invaluable and is best acquired by focusing resources on a small number of market segments.

Establish or strengthen local or industry-focused sales and support offices to improve customer response time.

Investigate the feasibility of selling micro-based turnkey systems to support smaller, uncomputerized trading partners in specific industries with needed applications, including EDI.

Work to identify industry-specific requirements and work with large users to address these opportunities. For example, an industry may have unique inventory handling routines or unusual transactions that are not adequately addressed by the standards.

5. Look to Partnering Opportunities

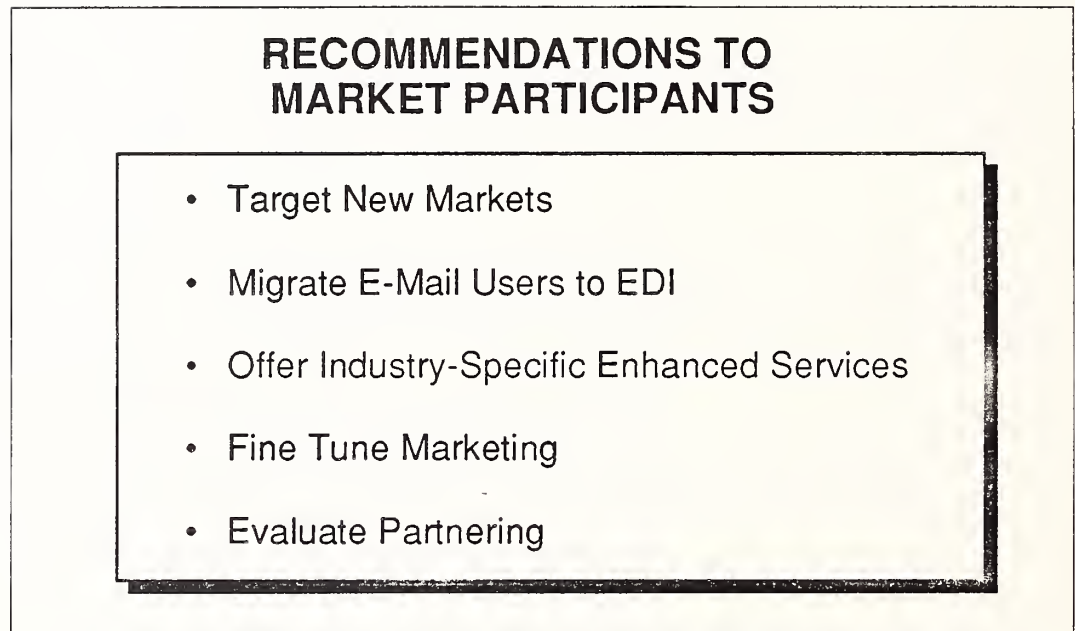
Investigate expansion of marketing and distribution channels through joint ventures with turnkey systems and software companies. Partnering will enable quick and economical market development.

Seek partnering with network service vendors, including but not limited to BOCs, to improve your marketing profile and networking capabilities. The BOCs are very interested in transaction and other information services opportunities as regulations are removed.

Cultivate consultants who are becoming more important as IS markets and technologies grow in complexity.

INPUT's recommendations to RCS vendors are shown in Exhibit XII-2.

EXHIBIT XII-2



C

Recommendations to Users

1. Sell EDI Internally

Form an EDI task force with broad company representation to work across departmental lines and to avoid internal jurisdictional problems.

Educate corporate management on the benefits of EDI to encourage resource allocation for its development. Use every appropriate means: distribute articles about competitors and EDI in general, enter multiple gift subscriptions to INPUT's *EDI Reporter* newsletter, send E-mail messages, and conduct informational presentations.

2. Get Help If Needed

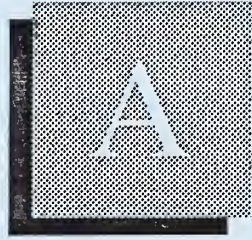
Guidance in EDI implementation, programming, standards, and communications is available from many industry associations and from the vendor community, including professional services firms. The implementation of EDI can be eased by drawing on those with previous experience.

D**Concluding Remarks**

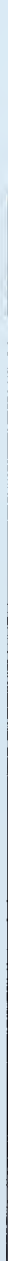
Participants in EDI standards-making bodies, representing many different industries, are exhibiting something unique in Information Services: competitors are setting aside their differences to work side-by-side, across industry boundaries, to come to a consensus approach on EDI standards for the greater good.

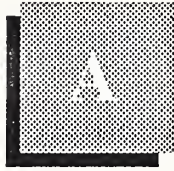
As this study has demonstrated, EDI shows every indication of being poised for explosive growth through wide scale adoption in many (if not most) industry segments. It represents a revolution from millennium-old paper-based operations, towards an application of technology to address fundamental business needs.

In and of itself, EDI does little but replace paperwork. However, through integration of EDI with other applications and other data services, the benefits, and opportunity, for users in virtually every industry segment can be substantial.



Appendix: Glossary of EDI Terms





Appendix: Glossary of EDI Terms

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

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

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

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

ANSI—American National Standards Institute.

ASC—Accredited Standards Committee.

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

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

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

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

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

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

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

CLM—Car Location Messages, applied to railcar logistics.

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

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

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

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

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

CTP—Corporate Trade Payments, an Electronic Funds Transfer application.

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

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

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

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

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

EDICT—Istel's U.K. EDI service.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TAMCS—Textile/Apparel Manufacturer's Communications Standards.

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

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

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

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

Tradanet—An ICL (U.K.) EDI service.

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

UB82—A format for health claims insurance submissions.

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

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

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

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

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

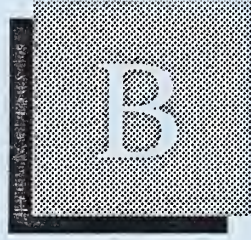
VICS—Voluntary Interindustry Communications Standards, a committee developing EDI standards between retailers and manufacturers.

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

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

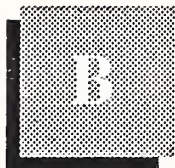
X.400—An international electronic messaging standard.

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



Appendix: EDI User Questionnaire





Appendix: EDI User Questionnaire

My name is _____ and I'm calling from INPUT, a Market Research Firm in California. We have a special research program in Electronic Data Interchange, and I understand you are using EDI. Is that correct?

If you have a few minutes, I'd like to ask you some questions which are designed to help improve EDI services and software. The results of our survey will be read by the companies offering EDI products. By the way, we won't be identifying you or your company in this survey, only the aggregate results. In exchange for your help, I'll send you a summary of our survey. Fair enough?

1. Can you tell me when you started using EDI?

- a. _____ this year (1988)
- b. _____ LAST year (1987)
- c. _____ 1986
- d. _____ 1985 or earlier

2. About how long did it take to you implement your EDI, once you got started?

_____ 3 months _____ 6 months
 _____ longer—how long?: _____

3. Where there any particular problems that stick out in your mind regarding getting your EDI system up and running?

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

- a. Contract with a THIRD PARTY to help implement your EDI system?

yes no

(IF YES ASK:) Why did you take this approach?

[IF YES] 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? [IF YES:]
WHO? _____
- (iv) _____ A communications company, such as a value-added network?
- (v) _____ A Remote Computing Service?
- (vi) _____ A financial services organization?

[IF NO] Based on your answer, I assume your staff implemented the system TOTALLY YOUR-SELF? Is that correct?

yes no

5. Was your EDI IMPLEMENTATION MANAGED BY THE FUNCTIONAL DEPARTMENT (such as marketing or order entry), or did INFORMATION SERVICES (IS) MANAGE its implementation?
- a. _____ IS
 - b. _____ functional dept.
 - c. _____ committee
 - d. _____ d/k
 - e. _____ other answer: _____

6. Did you start using EDI in response to a major customer or customers, or did you did it for your own reasons?

_____ customers _____ own reasons:

What were those reasons? _____

Communications & Hardware Environment

7. What TYPE OF COMPUTER are you using for EDI? Is it a
- a. _____ micro
 - b. _____ a mini or
 - c. _____ a mainframe?
 - d. _____ other
- specify: _____

- 8a. Do you think that the computer equipment you're now using for EDI might **change** in the foreseeable future, say the next two or three years?
- yes no

b. **WHY** would it change?

Comments _____

9a. Are you doing EDI _____ DIRECTLY WITH YOUR TRADING PARTNERS
or do you go through _____ A THIRD PARTY DATA NETWORK?

b. [IF THIRD PARTY NETWORK] Which network are your primarily using for EDI?

- _____ AT&T
- _____ GEISCO
- _____ McDonnell Douglas' Tymnet
- _____ Sterling Software's ORDERNET
- _____ IBM Information Network
- _____ Kleinschmidt
- _____ other: _____

10a. On a scale of 1 -5 with five being "HIGHLY LIKELY," HOW LIKELY is it that you would
CHANGE YOUR CHOICE OF NETWORKS FOR EDI?

1 2 3 4 5

b. **WHY** that rating? _____

11. On a scale of 1 -5 with five being "HIGHLY RATED," how would you rate the third party net-
work in terms of:

- a. Overall technical quality 1 2 3 4 5
- b. Customer support 1 2 3 4 5
- c. Price 1 2 3 4 5
- d. Cleanness of the bill 1 2 3 4 5

e. Do you have **any specific complaints** about the network you are now using?

12a. On our scale of 1-5, with 5 being HIGHLY IMPORTANT, how important is it for your network
vendor to connect with another network. In other words, how important is it for you to send
EDI documents to someone who subscribes to another network?

1 2 3 4 5

b. Why that rating?

13a. On a scale of 1-5, how important is it for you to be able to send a **hard-copy** of your EDI document to a trading partner, **THROUGH THE NETWORK...** in other words, have it printed and mailed to the recipient.

1 2 3 4 5

b. How about sending a document to a **FAX** machine... how important is this on the scale of 1-5.

1 2 3 4 5

c. Why did you rate these two, hardcopy and FAX, this way:

14. Could you tell me approximately how much you figure you've spent on EDI services last year? In other words, for using the network you described above? \$_____.

15. As part of your **INTERNAL EDI development** work, I presume you directed some of your people to the project, correct?

yes no

a. Could you estimate the amount of effort this **internal development** work cost, in a dollar amount? An approximation would be fine. I will be asking about development work in systems linked to EDI, but first, I'd like to get a sense of the work associated with developing **ONLY your EDI capabilities**. \$_____ [IF CAN'T ESTIMATE DOLLAR AMOUNT] How about in terms of "man-days" or months of effort? _____ (day/months/years - circle which).

b. Now, we know that EDI can **stimulate** other development work, for example, on your purchasing system, order entry or accounts receivable systems. **Has EDI "stimulated" any other internal development work?** Y/N. [IF YES] Could you tell me a little bit about these projects? What systems were involved? _____

Can you estimate the dollar or "man-day" effort associated with these EDI "Stimulated" Projects: \$_____ or _____ days/months/years.

Software

Next, I have a few questions about EDI Software.

16a. Did you WRITE THE EDI SOFTWARE yourself, 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?

d. Why did you choose this particular company?

17. 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:

a. **BE INTEGRATED** with other business applications such as accounting, inventory, etc.
 1 2 3 4 5

b. Support **GRAPHICS**
 1 2 3 4 5

c. Be **EASILY USED** by non-computer users
 1 2 3 4 5

d. Have **ENCRYPTION** capabilities
 1 2 3 4 5

e. Be **EASILY UPGRADED** to new standards
 1 2 3 4 5

f. **ACKNOWLEDGE** successful transmission
 1 2 3 4 5

g. Report **EXCEPTIONS** clearly
 1 2 3 4 5

h. Have a **MAINTENANCE AGREEMENT** for updates/fixes
 1 2 3 4 5

18. 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.

19. What do you think is needed to make EDI software work more closely with your other applications?

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

<u>Type of Document</u>	<u>Time Frame</u>			
	now	1989	3yrs	d/k
a. _____ Purchase Orders FROM customers	_____	_____	_____	_____
b. _____ Purchase Orders TO suppliers	_____	_____	_____	_____
c. _____ Invoices	_____	_____	_____	_____
d. _____ Bills of Lading	_____	_____	_____	_____
e. _____ Payments	_____	_____	_____	_____
f. Others _____	_____	_____	_____	_____
_____	_____	_____	_____	_____

21a. Do you think there are any additional transactions or information still needed from the EDI standards? Y/N

b. How about any special needs in your industry that are not being addressed?

c. Comments:

22. Could you estimate to be your GROWTH IN THE NUMBER OF EDI TRANSACTIONS, first between the end of 1986 and the end of last year (1987)? _____ %

23. And how about your **EDI EXPECTATIONS FOR THIS YEAR...**what percentage of growth in transactions would you estimate? _____%
 comments: _____

24. 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?)

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

26. With approximately how many other companies do you exchange **EDI TRANSACTIONS**:
 a. 1-5
 b. 6-10
 c. 11-20
 d. 21-30
 e. 31-40
 f. 41-50
 g. 50+ how many: _____
27. Do you have any estimate of how many additional companies you will be adding to your **EDI THIS COMING YEAR**?
 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?

28. 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. Concerns about the COST of Using EDI
1 2 3 4 5
- d. Network/Data SECURITY
1 2 3 4 5
- e. Software MAINTENANCE
1 2 3 4 5
- f. 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?
 yes no
- g. Changing BUSINESS PRACTICES, for example managing the change from paper forms to electronic forms
1 2 3 4 5
- h. RELIANCE on ONE VENDOR or Service
1 2 3 4 5
- i. VENDOR VIABILITY
1 2 3 4 5
- j. EDI STANDARDS and COMPATIBILITY
1 2 3 4 5
- k. OTHER CONCERNS? _____
1 2 3 4 5
- l. _____
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 colleagues 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

