

ELECTRONIC COMMERCE  
COMPREHENSIVE MARKET ASSESSMENT

INPUT

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# ELECTRONIC COMMERCE: COMPREHENSIVE MARKET ASSESSMENT

INPUT CORPORATION

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**EDI and Electronic Commerce Program**  
(EDEDI)

***Electronic Commerce: Comprehensive Market  
Assessment***

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## Abstract

This report assesses the transition of commerce from paper to electronic institutions. Electronic commerce is the use of electronic information/network systems for the transmission and recording of the many kinds of communications in a commercial transaction.

This report outlines specific information system (IS) applications, the leading vendors, and the competitive environment. It estimates total expenditures on electronic commerce services in the U.S. and forecasts what they will be in 1997. It offers recommendations to users and vendors of IS systems on how to take advantage of the electronic commerce wave of opportunity.

Issues addressed are deciding what the electronic commerce toolkit is (EDI, E-mail, payments, etc.) and what ties multiple technologies together to make an EC solution; how users and vendors should move from traditional to electronic commerce; how electronic commerce differs from traditional information services (such as commercial data base services); and the impact of electronic commerce on organizational and industrial structures.

The report is 68 pages long and contains 52 exhibits.

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COMPREHENSIVE 1992  
MARKET ASSESSMENT C.I

AUTHOR

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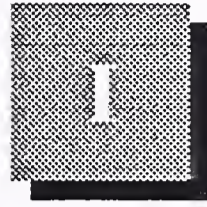
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# Introduction

## A

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### Scope of Report

As business moves from being conducted in a paper-based to an electronic environment, profit opportunities change. Electronic and networked business processes bring about new distributions of costs, revenues, and competition within an organization, within an industry, and within the large economic system.

This report describes the transition from paper to electronic institutions. It outlines the specific information system (IS) applications, the leading vendors, and the competitive environment. It estimates total expenditures on electronic commerce services in the U.S. and forecasts what they will be in 1997. It offers recommendations to users and vendors of IS systems on how to take advantage of the electronic commerce wave of opportunity.

Issues addressed are:

- What is the electronic commerce toolkit (EDI, E-mail, payments, etc.)?
- What ties multiple technologies together to make an EC solution?
- How should users and vendors move from traditional to electronic commerce?
- How is electronic commerce different from traditional information services (such as commercial data base services)?
- What is the impact of electronic commerce on organizational and industrial structures?

Companies using electronic systems to enhance reaching their customers and/or suppliers will find this report useful because it contains an outline of the issues of electronic commerce, a list of the specific technologies and how they are being used today, and profiles of the principal IS vendors who provide electronic commerce technologies and solutions.

Software, service, and IT equipment vendors can use the report to develop a general strategic definition of electronic commerce and its implications for them. These companies include EDI providers, professional service firms, banks, telephone companies, processing service vendors, applications software vendors, PC software vendors, data base vendors, UNIX vendors, and cellular, wireless, facsimile, and handheld equipment vendors.

The report focuses principally on the North American adoption of electronic commerce.

## B

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### Research Methodology

This report concludes an eight-report series on electronic commerce. It summarizes the results of INPUT's research into electronic commerce activity in eight vertical markets; INPUT's ongoing case study analysis of EDI and electronic commerce systems; INPUT's EDI program research, including its annual EDI market forecast and competitive environment assessments; and INPUT's research into specific delivery modes such as processing services and electronic information services.

## C

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### Related INPUT Reports

This report is part of a series of reports on specific communities that use network-based systems. The series was established because INPUT recognized an important trend taking place in the economy: the integration of trading communities through electronic networks.

Titles of related research reports are:

*Electronic Commerce: The New Foundation for Trade*

*Electronic Commerce in Travel and Tourism*

*Electronic Commerce in the Media Industry*

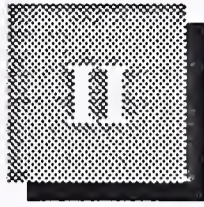
*Electronic Commerce in Health Care*

*Electronic Commerce in Trade and Transportation*

*Electronic Commerce in Grocery Production and Distribution*

*Electronic Commerce in Apparel and Retail*  
*Electronic Commerce in the U.S. Federal Government*  
*Opportunities in Electronic Payments (due 4th quarter 1992)*  
*The U.S. Electronic Data Interchange Market, 1992-1997*  
*International EDI Markets (due 4th quarter 1992)*  
*The Electronic Data Interchange Market, Europe*  
*The Electronic Data Interchange Market, Japan*  
*Trends in Electronic Corporate Trade Payments*

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## Executive Overview

### A

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#### Background and Definition: What is “Electronic Commerce”?

“Electronic commerce” means conducting business using electronic processes instead of paper documents.

Paper is currently used for purchase orders, invoices, checks, and so forth. Now, with electronic mechanisms for these business tasks becoming available, the paper-based systems can begin to be eliminated entirely. For example, we use automatic deposit of payroll to deposit our paychecks and Social Security payments. We use debit cards to make payments at the grocery store and gasoline station. In both cases, no physical money ever has to be exchanged. One’s income and expenditures can be recorded (credited and debited) electronically in a computer data base in accordance with periodic messages to the data base.

Electronic commerce is the messaging over networks among data bases in order to record commercial actions. Exhibit II-1 gives the definition of electronic commerce.

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#### EXHIBIT II-1

#### Electronic Commerce Definition

Electronic commerce is the use of electronic information and network systems for the transmission and recording of the many kinds of communications in a commercial transaction.

Replacing paper-based procedures for business with electronic ones represents a great historical shift in the practices and actions of people. The shift brings greater efficiency, lower costs, and more possibilities for action for people. In effect, electronics liberates us to do even more things in our lives.

Our economic system has been profoundly shaped by the institution of paper: we have business forms, we have file cabinets, we have a postal service, we have currency mints; the legal system requires paper documents for authentication of actions and contracts and transfers of rights and properties; magazines are routed in an office. Whole industries and whole work routines are based around paper and its handling.

When people introduce electronic systems into business practices, the paper-based organization of our economy changes. Many companies lose out. The most apparent examples are companies that make business forms, the postal service (moving letters and documents), the companies that sell postal equipment (such as mail meters), and the printers of paper money.

While there are losers, there are also winners. New services and products are required for building the electronic infrastructure, such as software products; systems integration, operation and maintenance services; and electronic information services. New practices are required, such as using credit or debit cards and operating terminals that are connected on a network.

This report summarizes INPUT's research to date on this transformation from paper to electronics. We examine how companies are increasingly doing business in an electronic mode over this electronic infrastructure. We look at the opportunities available for making new products and services. We look at the possibilities and efficiencies when paper is eliminated.

## B

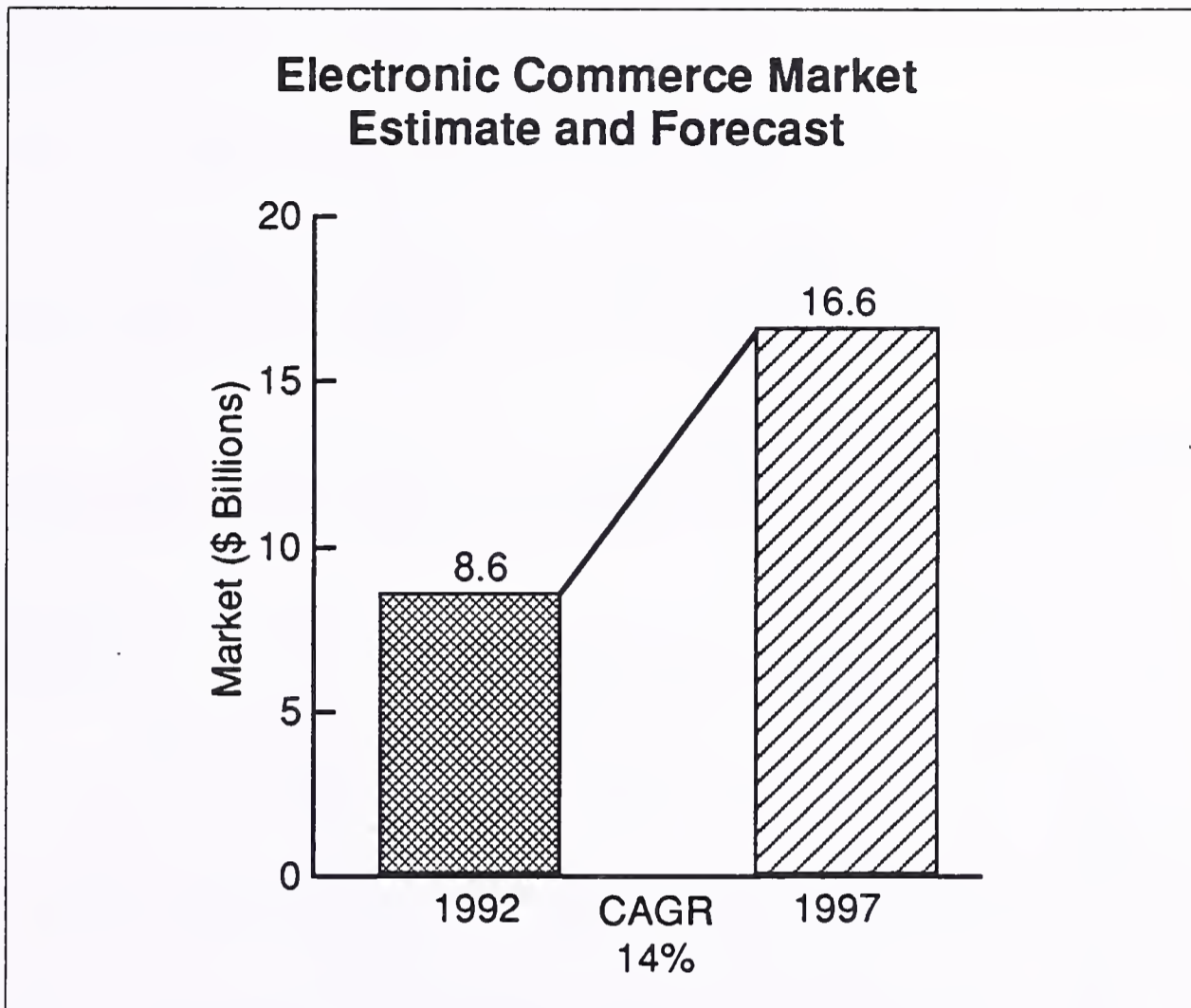
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### Electronic Commerce Software and Services Market

Exhibit II-2 shows INPUT's estimate and forecast of the revenues to information service and software vendors in electronic commerce applications. These amounts represent revenues from the sale of software, network services, processing services, and professional services that are required to build an electronic infrastructure used for commercial exchanges.



## EXHIBIT II-2



More than \$8 billion dollars will be spent in 1992, rising to \$16 billion in 1997. Although this represents a market opportunity for information service companies that provide electronic commerce systems, the more significant amount is the savings in dollars of overhead expenses that these EC systems allow.

The amount of savings is harder to estimate, but INPUT believes it to be one or two orders of magnitude larger than the amount invested in systems. This is because whole industries can be streamlined and intermediaries eliminated, therefore reducing the price of final consumer products.

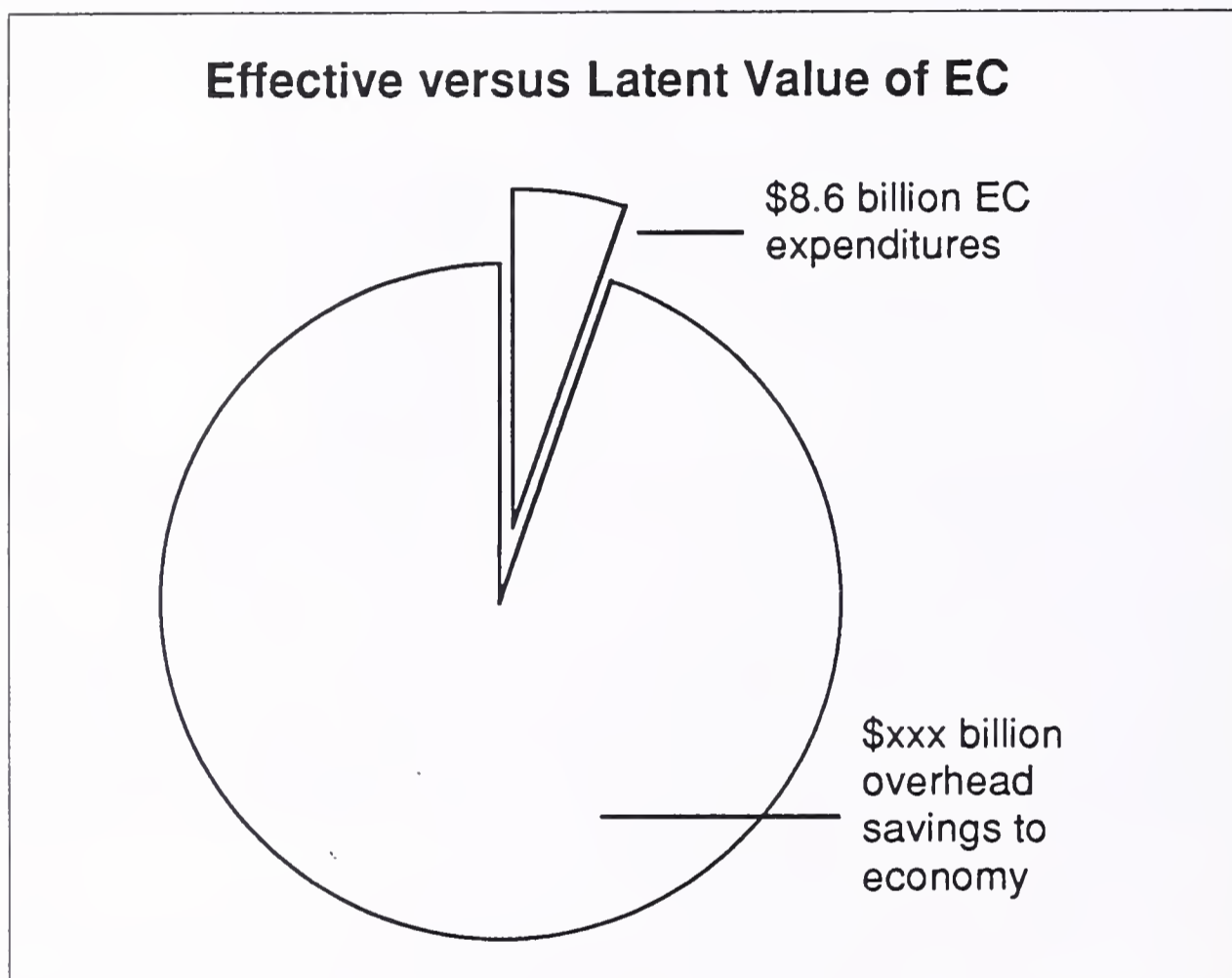
For example, in the advertising industry, an entire industry has grown up to process and pay the invoices that television stations and networks send to advertising agencies. Each invoice may have hundreds or thousands of line items indicating which commercials ran in which television time slots. The agencies pay these bills on behalf of their clients. Much reconciling has to take place among the agency, the television station, and the corporate client.

A number of companies have grown up performing this critical, but entirely automatable, billing function. Today, roughly \$300 million to \$400 million dollars are spent per year for this bill processing service. INPUT estimates that with an investment (by advertising agencies—possibly through a consortium—and by media companies) of \$50 million,

this \$300 million to \$400 million “overhead to the industry” can be eliminated. The fees for advertising would not include this overhead, and ultimately consumers could pay less for products as advertising costs become a smaller component of the total price of the product.

Exhibit II-3 shows the relationship between the investment and the cost savings of electronic commerce systems. Another way of saying this is that effective value (the investment) is a small fraction of the value, in terms of cost savings, attained from the investment (the latent value).

EXHIBIT II-3



## C

### Recommendations

Building an electronic infrastructure over which to conduct commercial exchanges is like building the telephone system: a single company cannot build it alone. By nature, electronic commerce systems are built through the efforts of many companies. The more companies that are connected to the infrastructure, the greater the value of the infrastructure. There is an increasing return to scale as the electronic commerce infrastructure expands.

But the increasing return doesn't mean that there are unlimited opportunities or that there are no competitive threats.

Within the general expanding pie of electronic commerce, there are zero-sum games with every new opportunity for adding capacity to the general electronic commerce network. The games occur among users of the systems, such as Wal-Mart, K mart, and Sears. They also occur among the suppliers of electronic commerce systems and services, such as EDS, GE Information Services, and AT&T.

Thus, whatever the company, IS user or vendor, strategies must be determined. Exhibit II-4 lists the key objectives that users should aim for in going electronic.

EXHIBIT II-4

### Key Objectives for Users

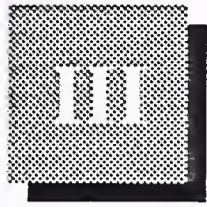
- Use standardized components as much as possible
- Use micro and midrange computers as much as possible
- Be open ended in IS architecture to allow for unforeseen business needs
- Lock in customers
- Make alliances with key suppliers and customers
- Develop technology architectures with trading partners
- Rely on IS suppliers for community facilitation services
- Adopt workflow framework internally as well as externally

Exhibit II-5 lists key vendor strategic objectives.

## EXHIBIT II-5

**Key Objectives for Vendors**

- Make alliances with other vendors
- Target industry niches and be the dominant provider
- Concentrate on core competences but be alert to new opportunities that incidentally emerge
- Have some stake in systems integration, industry expertise, and maintenance



## Impacts of and Opportunities for Electronic Commerce

The impacts and opportunities of electronic commerce are measured relative to “trading communities.” A trading community is a group of companies that work to deliver a single product. The companies include manufacturers, transportation intermediaries, financial intermediaries, distributors, and various kinds of service providers.

Exhibit III-1 gives the definition of a trading community.

### EXHIBIT III-1

#### Trading Community Definition

A company, its trading partners, and the trading partners of its trading partners.

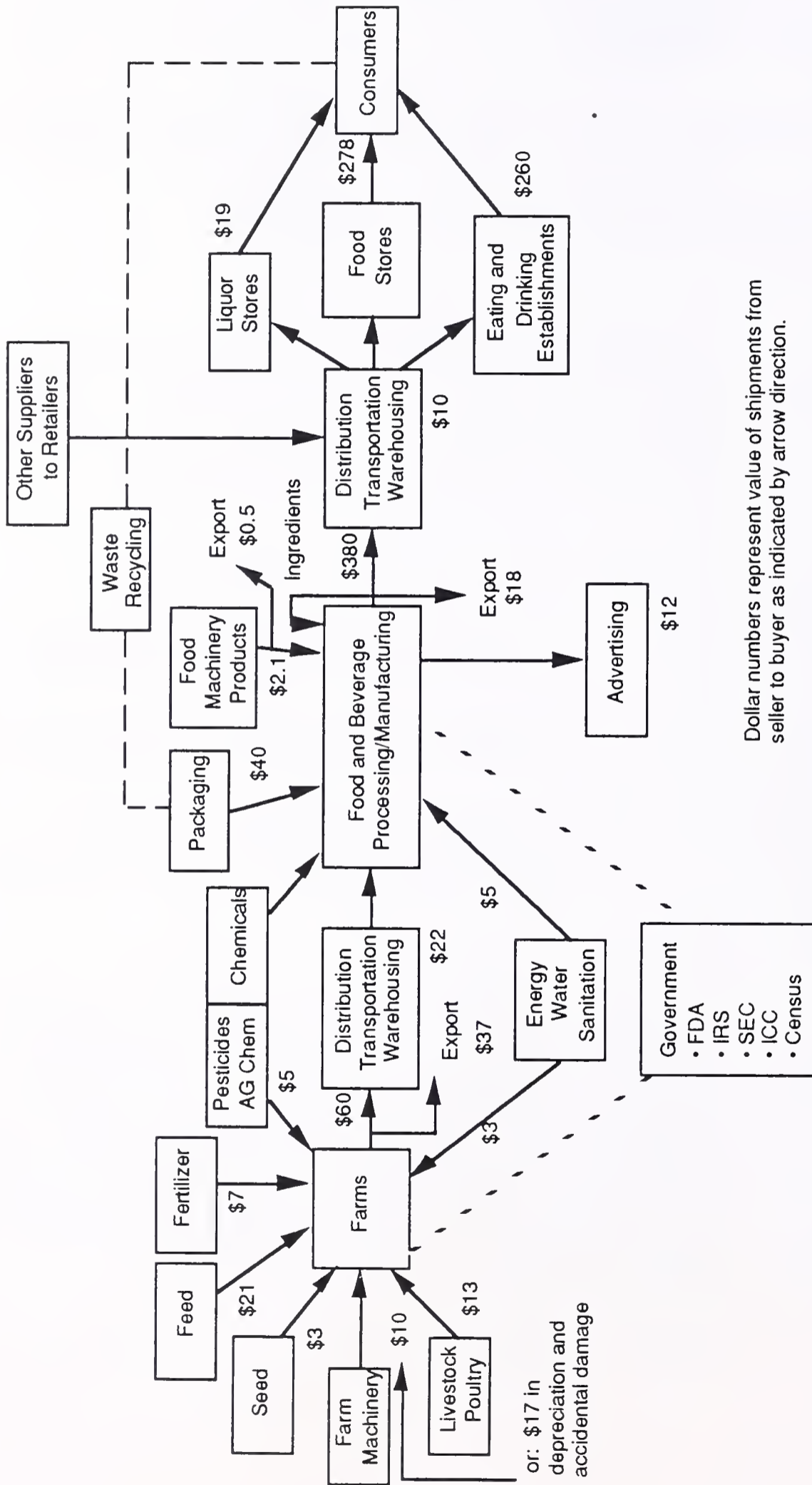
A group of organizations involved in producing a good or service.

Trading communities are different from industries classified as “manufacturing,” “transportation,” or “finance.” In this latter classification, shoe manufacturers and auto manufacturers are lumped into the same category, despite the fact that there is little commerce between them. Classifying companies into these general categories doesn’t help observers see the opportunity for “electronifying” the value chain. What is needed is a comprehensive, integrated picture of how, for a given consumer product, raw materials are attained, moved to production facilities, transformed by combining them with other materials, transported, distributed, warehoused, and financed along the way.

Exhibit III-2 shows the trading community for the grocery industry.

EXHIBIT III-2

# The Grocery Industry Trading Community (\$ Billions)



Dollar numbers represent value of shipments from seller to buyer as indicated by arrow direction.

The grocery industry trading community is a good example of how many kinds of companies work together to deliver a consumer product.

## A

### Impacts of Electronic Commerce

#### 1. Advantages and Disadvantages

##### a. Advantages

The benefits to the individual persons and organizations that use electronic commerce systems and practices are many. Exhibit III-3 lists the principal benefits.

EXHIBIT III-3

#### Advantages of Electronic Commerce

- Faster response to requested service, product, or receipt of funds
- Less cost, due to reduced overhead of paper handling
- Less cost due to elimination of intermediary paper-processing services
- Less cost due to elimination of errors introduced during paper handling
- Reduced risk in exchanges due to better information
- Flattened business cycles resulting from better synchronized inventories (inventory-based business cycles)
- Flattened business cycles resulting from better investment in capital plant (capital plant-based business cycles)

The benefits of electronic commerce revolve around improved synchronization and speed of satisfying customer requests. Incidental to this general benefit, however, is a better use of capital resources as reflected in the elimination of business cycles.

There is evidence that, during the 1980s, investments in inventory management systems, EDI, and just-in-time/quick response strategies by some of the largest manufacturing and distribution companies reduced inventories in the economy by about 12%. The national average of inventory keeping (raw material, work in process, and finished goods) was about 1.6 months' worth of stock on hand in 1980. By 1990, it had steadily fallen to 1.4 months' worth.

Leaner inventories have helped iron out the five- to ten-year business cycles, some experts believe. The stop and start of ramping up and selling off of inventories has led to periodic recessionary dislocations. It is conceivable that the improved electronic commerce systems, however, have eliminated these.

Five- to ten-year business cycles based on inventory fluctuations are not the only business cycles. Sixty-year business cycles (Kondratieff cycles) are another kind of empirical phenomenon that some experts believe is the result of an overbuilding of capital plant (factories, office buildings, ships, airplanes, etc.).

The climax of the cycle is characterized by an excess of capital plant, which must be followed by a slowdown/cessation of construction. The last such capital-plant cycle bust was the depression of the 1930s. Some economists believe that today's global downturn is the same kind of downturn (coming sixty years after the previous one).

Electronic commerce systems hold the promise of alleviating this kind of cycle as well as the inventory-based cycle. As explained in the next section (under "virtual organizations"), a network-based economy, populated by many small specialized manufacturers, is much more responsive and flexible to changes in consumer demand than an economy that consists of huge, vertically integrated companies.

The use of electronic commerce is not prevalent enough at this time to ease the larger Kondratieff downturn, but in the future it may be.

#### **b. Disadvantages**

Although there are benefits, there is also a downside in eliminating paper. These disadvantages are listed in Exhibit III-4.



## EXHIBIT III-4

**Disadvantages of Electronic Commerce**

- Invasion of privacy; inadequate security and protection of secrecy
- Difficulty in correcting "system" errors
- Lack of authentication, evidentiary, and audit material
- Dislocation of people and industries as paper systems are replaced
- Initial investment in network systems may be high
- Not all transactions will be electronic so two systems (paper and electronic) always needed

**2. The Remaking of Industries**

As network systems proliferate to support commercial exchanges, the composition of trading communities is altered. Electronic commerce systems, in general, allow for a company to support a greater volume of commerce than it could without electronic commerce. In industries where product or service demand is stagnant or declining, the only possible result of electronic commerce will be a consolidation of players in the industry.

In this section, INPUT examines the general impacts of electronic commerce as listed in Exhibit III-5.

## EXHIBIT III-5

**Impacts of Electronic Commerce**

- Elimination of intermediaries
- Consolidation of industries
- Outsourcer/contractor economy

### a. Elimination of Intermediaries

Electronic commerce has the effect of bringing producer and consumer closer together. The intermediaries in between go away. Consequently, the mark up (margin, value add, etc.) of those intermediaries can be taken out of the price of the product or service to the final purchaser.

While the market size of \$8.6 billion represents expenditures on EC software and services, the potential cost savings as a result of these expenditures are far greater than these expenditures. The cost savings are measured in terms of businesses and industries that have been eliminated due to the streamlining effects of electronics.

For example, a niche industry within the advertising industry is that of bill processing and payment. The television station or network sends a bill to the advertising agency, which in turn bills its customer, the advertiser. A processing service industry has grown up around this workflow. It is approximately a \$300 - \$400 million-per-year industry. With electronics connecting all the parties, this industry—and the \$300 to \$400 in “value added” cost—can be eliminated.

The same is true for many other service industries listed in Exhibit III-6.

EXHIBIT III-6

#### Industries that Electronic Commerce Will Potentially Eliminate or Reduce Substantially

- Food brokering
- Customs brokering
- Many banking functions
- Subscription agencies
- Securities
- Many distribution industries (books, semiconductors, videos, pharmaceuticals, etc.)

### b. Consolidation

Electronic systems help to consolidate industries. Because electronic commerce synchronizes buyers and sellers better than the former, paper-based sales channels did, electronic commerce helps to mature an industry and thus consolidate it.

Exhibit III-7 shows consolidation trends for several industries.

EXHIBIT III-7

<b>Consolidation Trends</b>		
Industry	1985 Market Share of Top 5 (Percent)	1990 Market Share of Top 5 (Percent)
Appliances	79	97
Airlines	61	75
Tires	57	66
Software	55	61
Banking (top 100)	44*	46
Meat Packers	N/A	85-90

\*Of assets

Electronic commerce is not a causal agent, it allows consolidation to happen at a faster rate than normal.

### c. Virtual Organizations/Networked Economy

Virtual means an artifact that comes into existence at the time that it is needed. Virtual circuits and virtual memory are examples of this. Virtual organizations are those productive capacities that can be put together to create a certain product at a given time, but hold together only as long as there is a market need for the product.

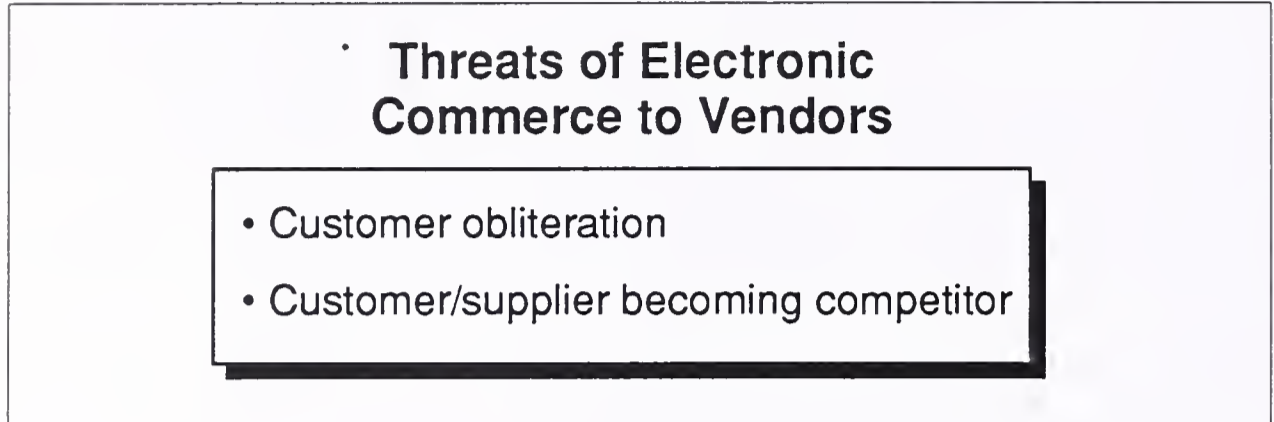
In more conventional terms, this can be described as using contractors rather than in-house resources. This is a trend in every major manufacturing industry today. Electronic commerce is not necessarily causing it, but is enabling it to happen.

In a certain sense, this phenomenon is the opposite of consolidation, but with a difference. The survivor of an industry consolidation, the large manufacturer (Nike, for example), is more of a "value-adding" distributor with tight margins than a large manufacturer in the traditional sense. While more product may pass through or be labelled by a specific large manufacturer (giving it, on the surface, a great market share), the actual production of the product is executed by several smaller contractor firms. The large manufacturer depends on information technology to coordinate its far-flung confederation of contractors and resources.

### 3. Threats to IT/IS Vendors

The principal threats of providing electronic commerce solutions are twofold and are listed in Exhibit III-8.

EXHIBIT III-8



#### a. Customer Obliteration

In the first case, the vendor loses sales because the industries that it serves consolidate. The efficiency and streamlining effect of electronic commerce, and its elimination of intermediaries, allows fewer and fewer large firms to handle the majority of the market volume for a given product or service. The vendor of EC services, consequently, is left with a smaller customer base to serve.

Evidence of this circumstance can be found in those industries that have consolidated (see Exhibit III-7, above). Also, for example, consolidation in the pharmaceutical distribution industry has made EC vendor Sterling Software Ordernet concerned about losing customers.

#### b. Customer/Supplier Becoming Competitor

The other threat electronic commerce poses is that a company that uses electronic commerce systems to conduct business may develop a new system tool that it can then commercialize, competing with vendors already in the market. Examples of this are listed in Exhibit III-9.

## EXHIBIT III-9

**Users of EC Who Became Vendors**

- Texas Instruments
- Maersk
- Dun & Bradstreet
- GE
- Kodak
- McGraw-Hill
- McKesson
- RR Donnelley and Sons
- Mrs. Fields Cookies
- Sears Roebuck & Co. (at one time)

**B****Opportunities for Electronic Commerce**

A number of industries are “ripe,” or are indeed already undergoing the effects of electronic commerce described in the preceding section.

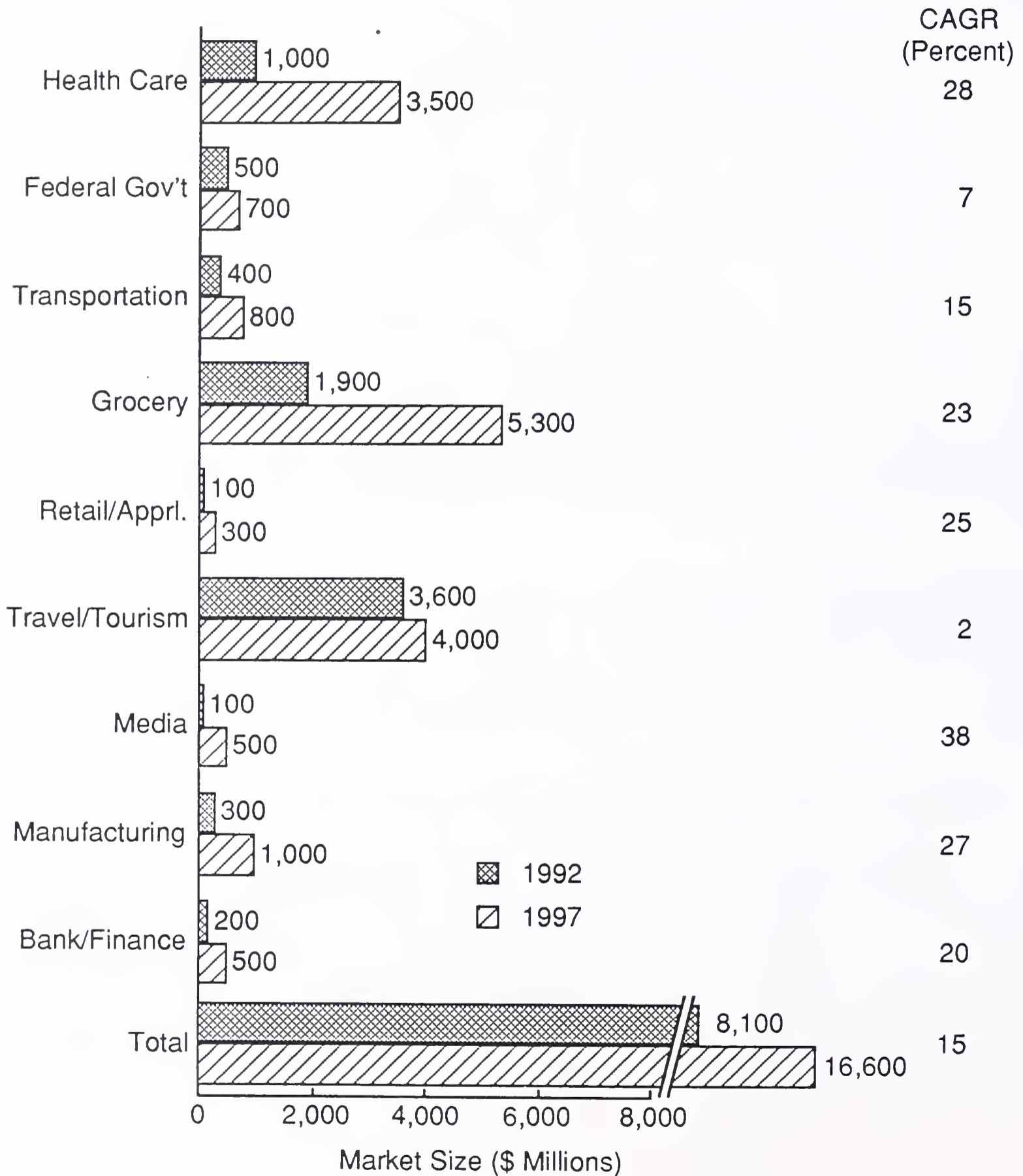
Exhibit III-10 lists industries, their current expenditures on EC services and their forecasted expenditures on EC in 1997.

Electronic commerce takes place *between* organizations and industries. Unlike other software and services that are purchased, implemented, and operated solely by a single organization, electronic commerce systems are used by multiple organizations of many different kinds of industries (banking, transportation, manufacturing, etc.)

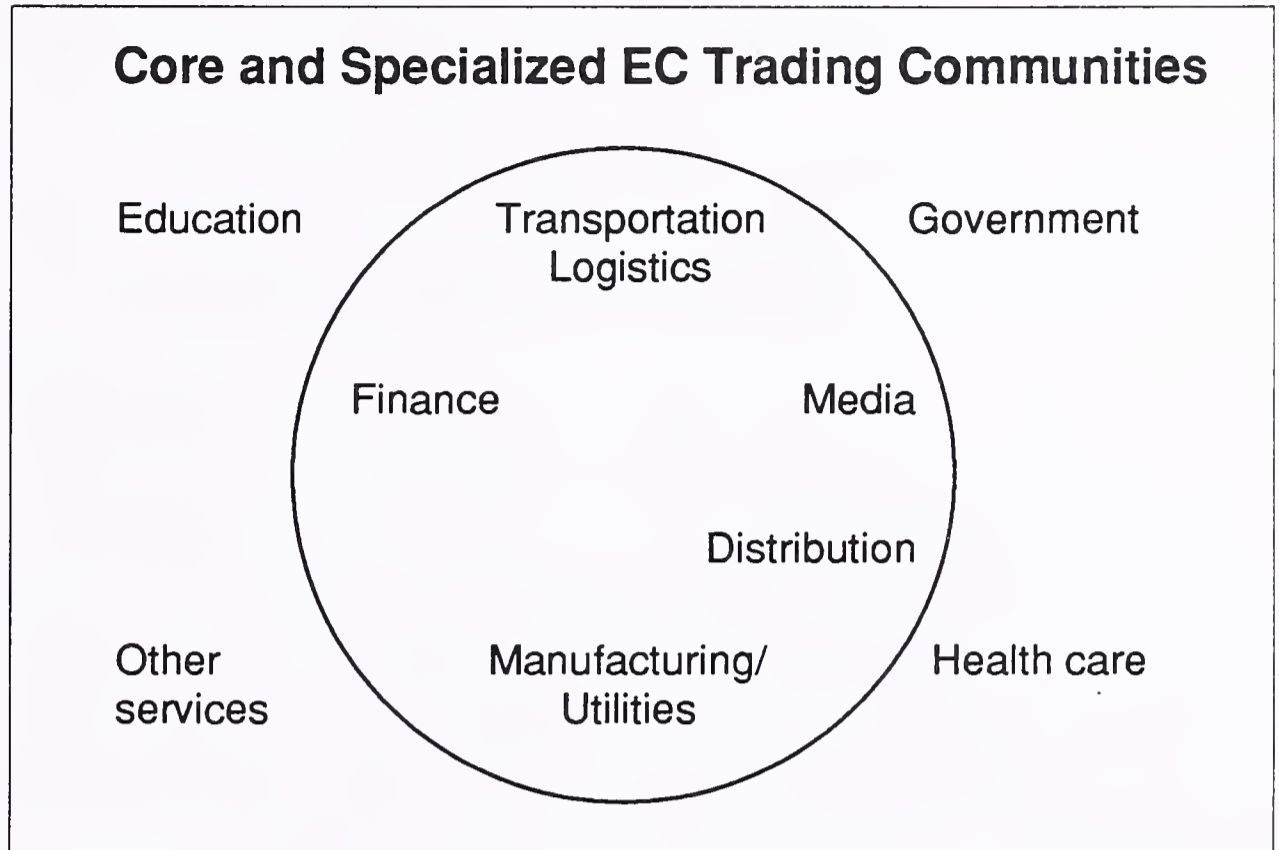
A general map of electronic commerce areas of opportunity is shown in Exhibit III-11.

EXHIBIT III-10

### Vertical Markets for Electronic Commerce



## EXHIBIT III-11



Every trading community requires the general services and industries listed inside the circle. These are core industries that will be impacted by electronic commerce.

The trading communities shown outside the circle are more specialized and have their own electronic commerce requirements.

Note that eight out of the nine general communities listed in the exhibit are service industries. This underscores the fact that electronic commerce systems essentially augment service businesses. Electronic commerce is essentially a service tool.

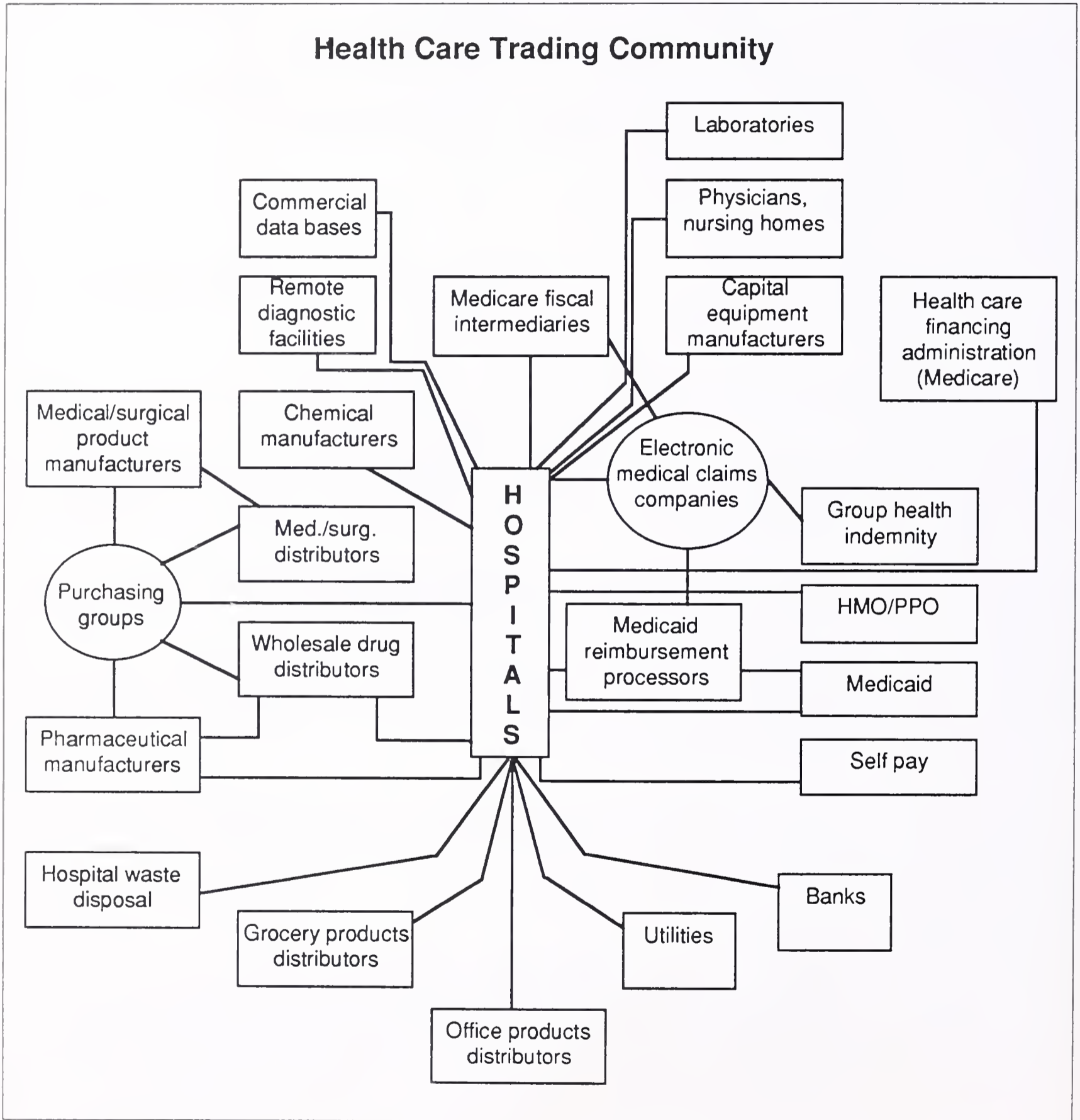
The following sections profile key trading communities and the expenditures on electronic commerce software and services in these trading communities.

### 1. Health Care

Health care is one of the most promising areas for development of electronic commerce systems. EC promises to greatly reduce the burgeoning health costs in the U.S. To attain the efficiencies of EC, however, extensive re-engineering of the health care trading community is required. Such re-engineering, because it spells the end of many intermediaries (in particular, regional claims processing companies), is dislocative and may take some time to accomplish. Many of the redundant businesses may disappear over a lengthy period of attrition.

Exhibit III-12 shows the basic players of the health care trading community.

EXHIBIT III-12





Electronification of these exchange flows will cause a re-engineering of the community and make it more efficient.

The hospital is at the center of the community. Hospitals account for 38 percent of total health care costs in the U.S. Medical and dental offices, pharmacies, and managed care facilities are other health care providers with EC application opportunities, but to a much smaller degree than hospitals.

Exhibit III-13 shows electronic commerce expenditures by major application category.

## EXHIBIT III-13

### Key Electronic Commerce Applications in Health Care

	1991 (\$M)
Medical claims	300
Network applications	180
Electronic info. services	200
Hospital EDI procurement	20
Total	700

- Consumer services revenues are the largest opportunity

Claims processing includes the complete cycle of insurance claims: electronic enrollment, eligibility checking, claims submission, and claims payment.

Procurement systems are those for hospitals and are aimed primarily at electronifying the purchasing of pharmaceuticals, medical/surgical supplies, and other supplies.

Electronic information services include utilization review, patient records, and pharmaceutical data bases, among others.

Network applications include E-mail, sending digitized CAT scans and X-rays, inter-clinic bulletin boards, and other similar applications.

## 2. Federal Government

Federal government demand for electronic commerce products and services will increase from \$411 million in government fiscal year 1991 to \$649 million in 1996.

In the federal government, electronic commerce is used to transfer engineering drawings, tax information, procurement documents, and corporate financial reports. Plans are under way for EC use in transferring electronic purchase orders, invoices, bills of lading, and other documents. EC is also used with funds transfers, health care insurance claims, electronic flight plans, benefits transfers, electronic publishing, regulatory filings, and other applications. A limited number of mission-oriented applications is also used at such agencies as the Securities and Exchange Commission and Customs.

It is interesting to note that administrative messages are included among future applications. Administrative messages differ from other applications in that they involve intra-agency or agency-to-agency communications, as opposed to communication between agencies and contractors. INPUT expects these applications to become important and widespread as agencies begin to appreciate the value of EC in handling administrative traffic.

## 3. Transportation

In the transportation industry, passenger transportation (including airlines, hotels, car rental agencies, and travel agencies) made the lion's share (90%) of investments in electronic commerce software and services, compared with the freight transportation sector (which includes air, rail, truck, deep-sea modes, warehousing, freight forwarding, and customs brokering).

Exhibit III-14 shows earned revenues for electronic commerce software and services to support freight and passenger transportation.

EXHIBIT III-14

Sector	1992 EC Revenues (\$M)
Freight (including warehousing)	400
Passenger (incl. air, hotel, car rental)	3,600
Total	4,000

The predominant EC systems in transportation are credit card processing services and airline reservation systems, which constitute the bulk of revenues in the passenger EC services. EDI, bill processing, electronic information services (such as tariff data bases or the Spec 2000 parts data base for airplane repair) represent small, limited niche markets.

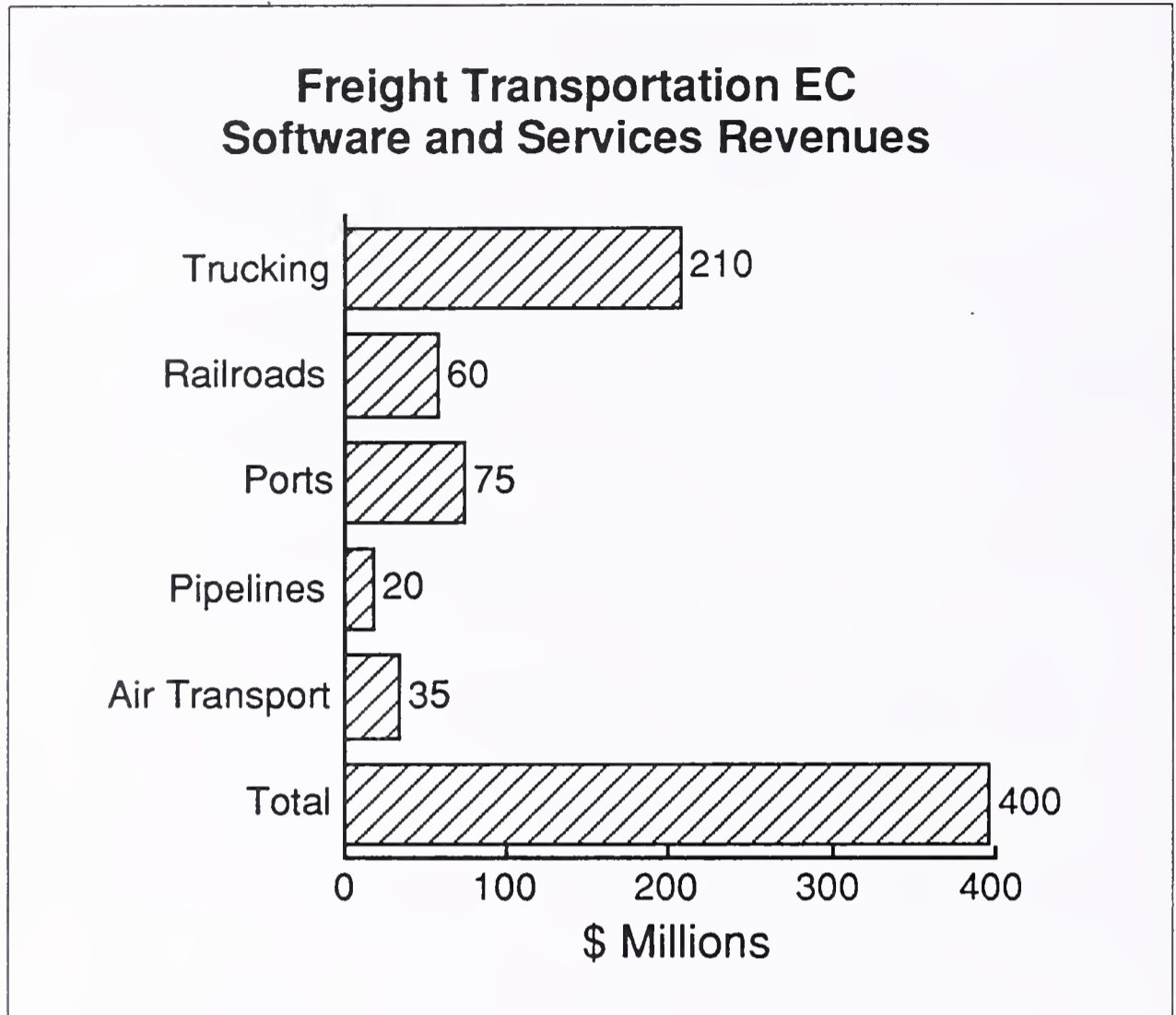
Exhibit III-15 lists the key EC applications for passenger transportation.

EXHIBIT III-15

<b>Passenger Transportation EC Applications</b>	
Software/Service	1992 Expenditures (\$ Millions)
Computer reservation systems	1,500
Non-air network applications	6
EC-related systems development	250
EDI software	3
Shared airline systems	16
Credit card processing services (travel-related only)	1,835
<b>Total</b>	<b>3,610</b>

Exhibit III-16 lists key sections of the freight transportation industry that use electronic commerce systems. These systems include EDI, freight bill processing, and electronic information services.

EXHIBIT III-16



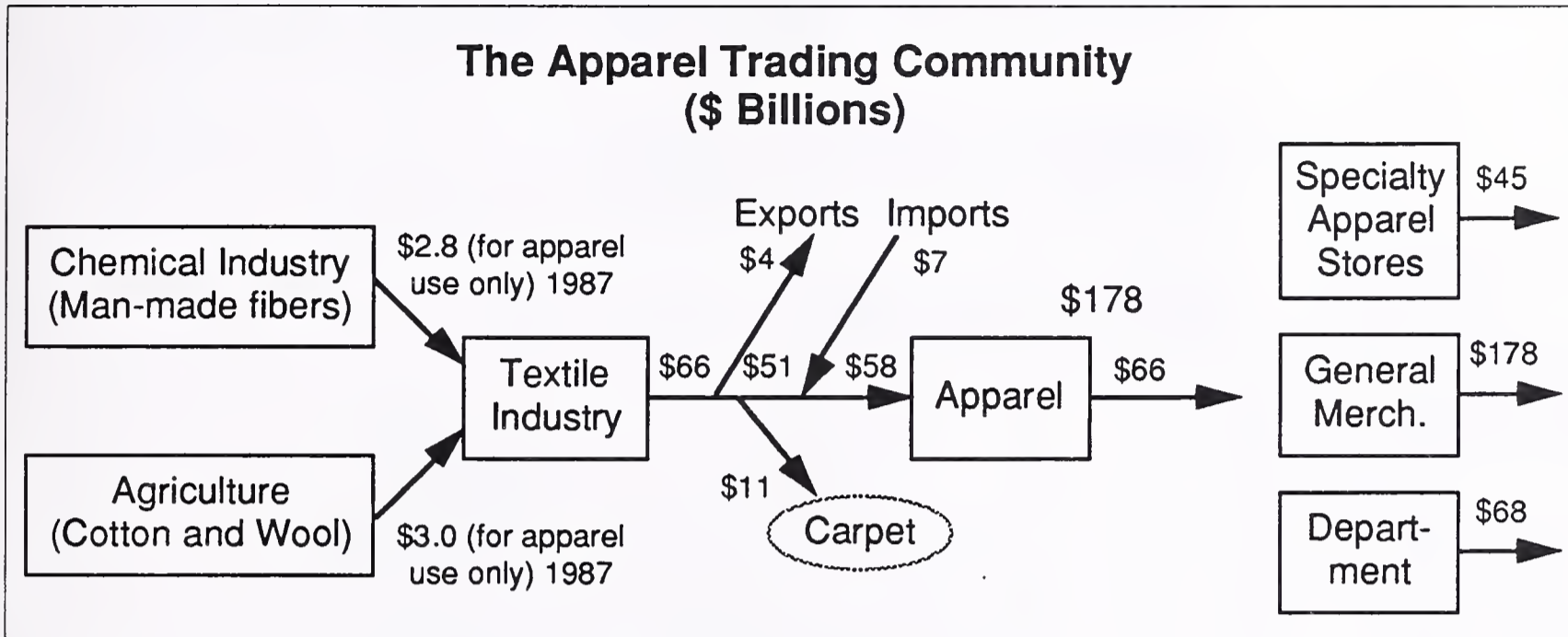
#### 4. Manufacturing and Distribution

Electronic commerce ties the consumer more closely with the producer. Point-of-sale purchasing data is now being directly and electronically relayed back to the primary producers of the products being purchased (for example, Wal-Mart, K mart, Toys R Us, Safeway).

Because of the tightening linkages between the retailer and the manufacturer, INPUT believes that the appropriate range of activities to which electronic commerce systems can be applied combine manufacturing with distribution.

INPUT examined two key value chains: those that deliver food and those that deliver clothing to consumers. Near the beginning of this chapter, Exhibit III-2 showed the grocery industry value chain. Exhibit III-17 depicts the apparel value chain.

EXHIBIT III-17



The key electronic commerce applications in the grocery trading community are listed in Exhibit III-18.

EXHIBIT III-18

### Electronic Commerce Software and Service Expenditures in the Grocery Trading Community

Software/ Service	1990 Expenditure (\$ Millions)
EDI	20
Card Processing	510
Check Authorization	200
Electronic Marketing	100
Product Movement	450
Commodity Markets	300
Other	200
<b>Total</b>	<b>1,780</b>

As the expenditures indicate, point-of-sale software and services are the largest component of the grocery industry's use of electronic commerce. This includes the use of credit card processing at restaurants, debit card processing at grocery stores, gasoline stations, and convenience stores,

electronic marketing and couponing software and services, and product movement data services (such as Nielsen, Information Resources Inc., and Citicorp POS Services). Product movement data is the reselling of transaction data gathered from scanned point-of-sale transactions.

Likewise, in the apparel value chain, the point of sale is the largest single area that uses electronic commerce software and services.

Exhibit III-19 lists the expenditures for key electronic commerce applications in the apparel industry.

EXHIBIT III-19

<b>Key Electronic Commerce Applications in Apparel Manufacturing and Distribution</b>	
EC Service Market	\$ Millions
EDI	30
Credit Card Processing	1,600
Total	1,630

## 5. Media

Examples of electronic commerce services in the media include:

- Pubnet, the EDI ordering service that allows college bookstores to order textbooks electronically from publishers
- Ad Value Network, the advertising industry network that allows television stations, ad agencies, and corporate advertisers to reconcile their billings
- The use of EDI by newspaper companies to purchase newsprint supplies
- The UPC catalog, Triad's auto parts CD ROM product catalog, and other electronic information services that allow companies to identify the objects of exchange and the parties that are conducting the exchanges
- EDI between movie studios, video cassette mastering contractors, video distributors, and video store outlets
- The EDI transmission of theatre ticket sales data to film studios

Exhibit III-20 lists the expenditures on electronic commerce software and services by media segment.

## EXHIBIT III-20

<b>Expenditures on Electronic Commerce Software and Services in the Media</b>			
<b>Media Segment</b>	<b>Software (\$ Millions)</b>	<b>Net Serv. (\$ Millions)</b>	<b>EIS/Processing (\$ Millions)</b>
TV, Radio, CATV	9.0	10	1,300
Film	4.0	4	60
Misc. Ad.	1.0	4	60
Book Publishing	6.5	10	82
Mag. Publishing	6.5	7	85
News. Publishing	11.0	13	502
Electronic Information Services	NA	NA	537
Telephone Co.	6.0	3	5
<b>Total</b>	<b>44.0</b>	<b>51</b>	<b>2,631</b>

The largest component of electronic commerce service revenues is in the processing services and information services segment, including such things as processing services.

Exhibits III-21 and III-22 depict two key trading communities within the media industry and the electronic commerce linkages.

EXHIBIT III-21

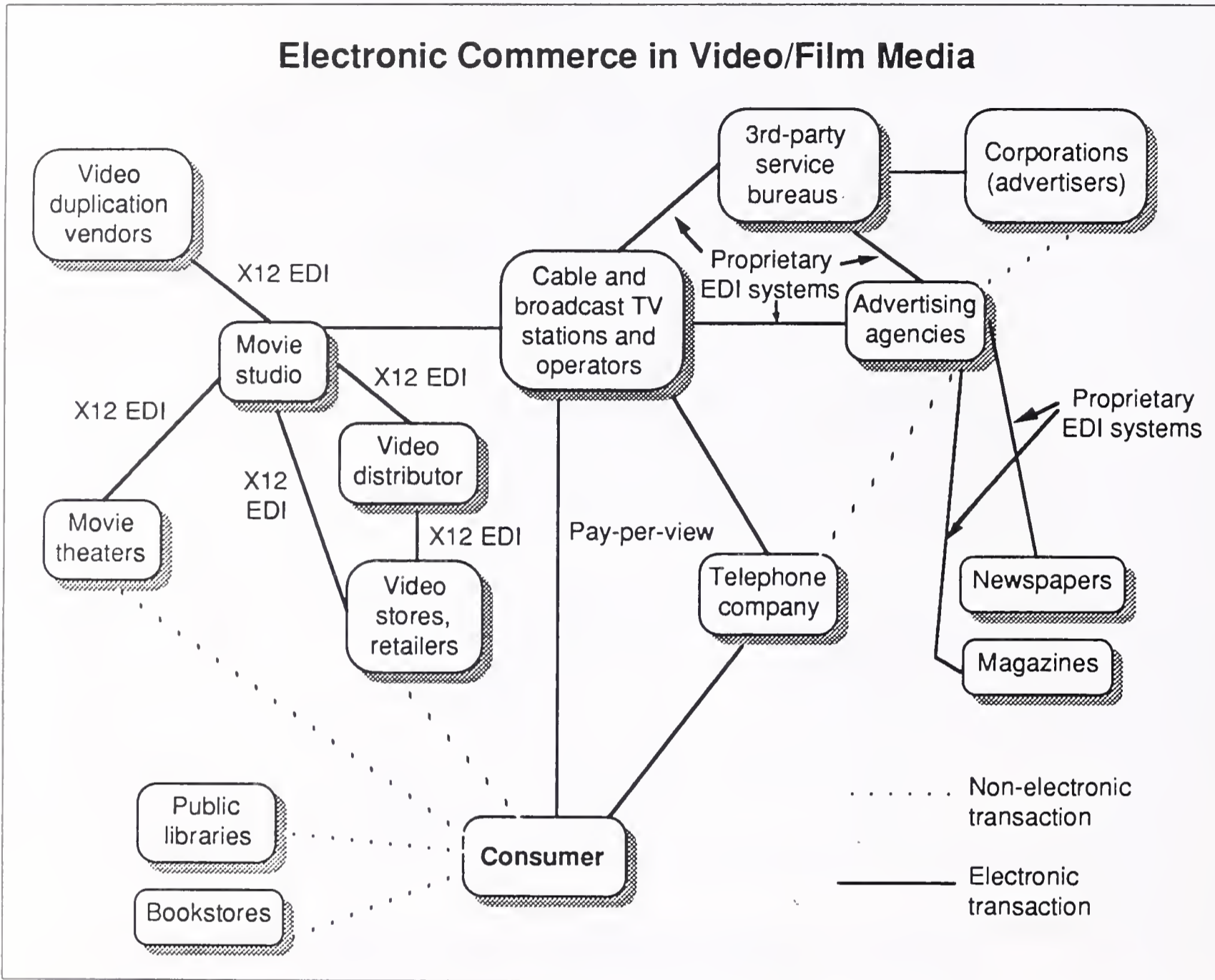
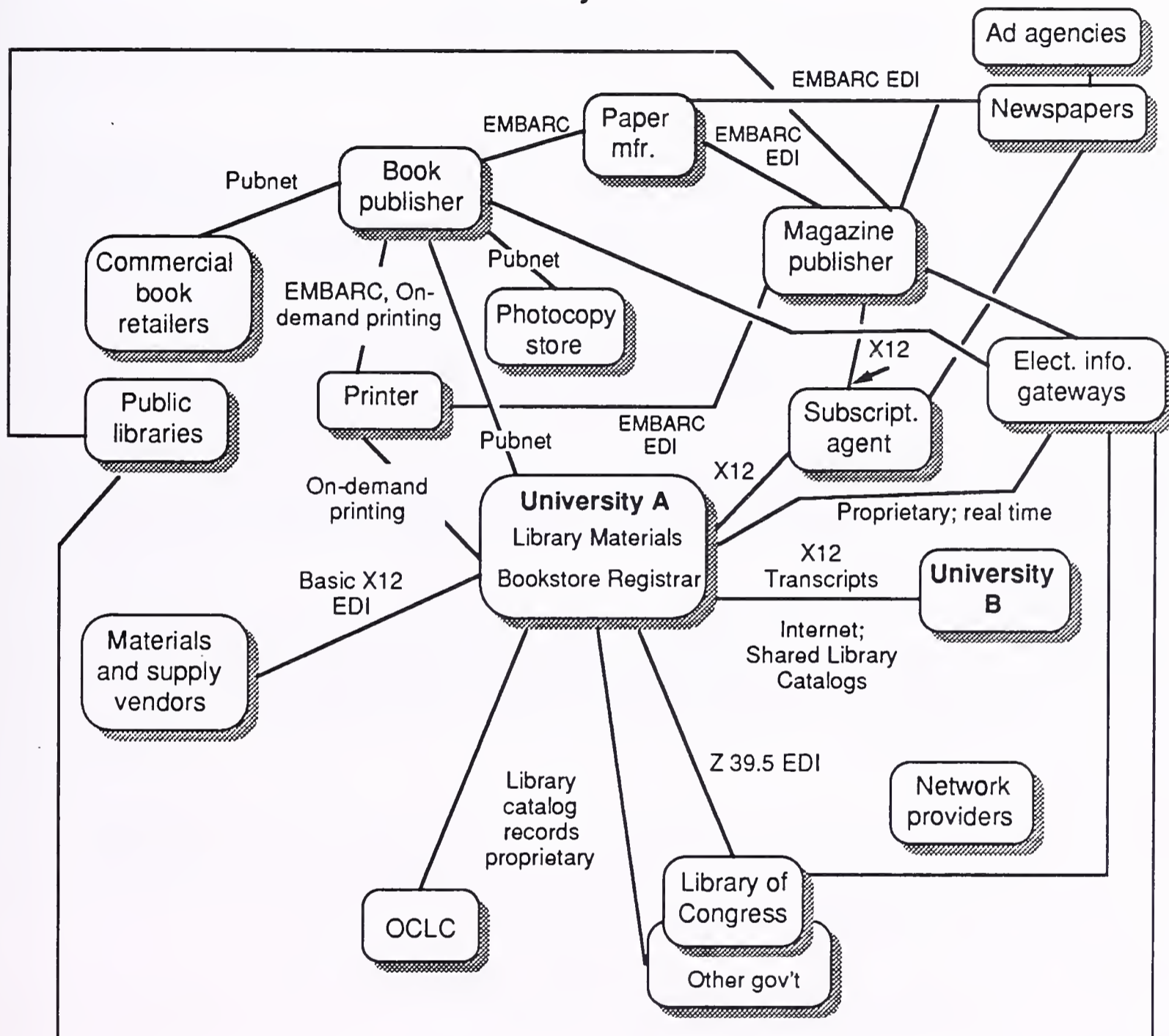




EXHIBIT III-22

## Current Electronic Commerce in the Print/Text Media Trading Community

### The University is the Core



## 6. Banking and Finance

The banking industry may be the most impacted by the widespread adoption of electronic commerce technologies. Essentially, all EC technologies are concerned with initiating, monitoring, recording, and completing commercial transactions. These are functions that banks, by and large, provide. Electronic commerce, in a way, automates the banking function of the economy.

Moves into banking and consumer credit services by non-bank corporations (such as GM, GE, and AT&T) are evidence that there are opportunities in the banking industry. Unfortunately, except for perhaps the top 100 banks in the U.S., most U.S. banks are too locally focused and mired in financial difficulties to move aggressively into the new frontiers of electronic commerce.

Financial systems (1) provide payment services, (2) mobilize savings and allocate credit, and (3) limit, price, pool, and trade the risks resulting from these activities.

These diverse services are used in varying combinations by households, businesses and governments, and are rendered through an array of instruments (currency, checks, credit cards, mortgages, bonds, and stocks) and institutions (banks, credit unions, insurance companies, pawnbrokers, and stockbrokers).

Furthermore, specialization has taken place in providing these services according to industry (such as health care versus property and casualty insurance), type of customer (such as credit card services for consumers versus corporate credit lines, investment banking, or venture capital for corporations) and/or type of functional process for a given financial service (such as credit card processing versus credit and financial information services).

Because it is the link between buyers and sellers, savers/investors and borrowers, the financial system is a system for communicating information, requests, promises, and other messages among several parties. Finance is an industry that performs an "information clearinghouse" function.

Because finance is inherently communication, the tremendous advancements in communication and information technologies over the past few decades are making a tremendous impact on the delivery, form, nature, and possibilities of financial services.

Areas in banking and finance where electronic commerce is being applied are listed in Exhibit III-23.

## EXHIBIT III-23

**Electronic Commerce in Banking and Finance**

- Corporate electronic trade payments (EDI/EFT)
- Consumer electronic payments (PPDs)
- Clearinghouse activities among financial institutions (SWIFT, CHIPS, ACH, Fedwire, American Express)
- Electronic securities markets and clearinghouses
- Insurance automation (enrollment, eligibility, claims submission, claims payment)

Over and above the strictly payment-and-financing electronic commerce applications, the electronically networked economy requires pricing and accounting mechanisms built into it that perform bank-like monitoring services.

When economic activity is done over a network and when network services include the buying and selling of information (perhaps information that was automatically collected by the network as a by-product of network use), mechanisms are needed to manage network capacity and resources. Methods are needed to monitor and distribute costs and revenues (or royalties) of data use among suppliers and users of the data. EDI, EDI/EFT and EDI-like systems may potentially play a central role in multi-organizational cost accounting and royalty allocation.

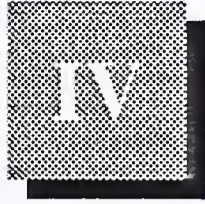
Here are some examples:

**EDI Royalty Payment Applications:** Petrodex is an information network that links oil companies. Oil companies use EDI to distribute royalty reports to holders of properties that produce oil revenues. Pubnet, a network of book publishers and bookstores, allows copy service centers (such as Kinko's) to report back to the publishers if they have copied portions of copyrighted materials and therefore owe royalties.

**EDI and Phone Call Accounting Software:** Phone companies are sending their phone bills electronically to their largest customers. The customers, in turn, apply this detailed bill information to a software application that monitors the calls of each telephone in an office or company. Thus, the phone expenses of each employee or telephone inside the company can be monitored.

Product Movement Data Services: EDI and point-of-sale applications are populating data bases that allow manufacturers and retailers to monitor the sales and movement of individual product brands. This is especially prevalent in the grocery and television/advertising industries. Product movement statistics determine the effectiveness of promotions and consumer preferences.

The systems described above have in common the allocation of costs and/or revenues generated from a source of value obtainable via an electronic network. The source of value is, sometimes, information itself; other times the information application allows the value of the resource to be determined. All the systems involve the automatic generating of management-report information from user activity. All are examples of payment and pricing mechanisms that will be increasingly important when organizational electronic information systems are widely interconnected and intellectual and physical properties are traded via electronic networks.



# The Electronic Commerce Toolkit

The infrastructure through which commerce can be conducted electronically requires many components, both tangible and intangible. This chapter surveys the basic components, tools, and services involved in building networked, digital systems that support trade.

## A

### Electronic Commerce Technologies and Applications

Exhibit IV-1 lists the key delivery vehicles for electronifying commerce.

#### EXHIBIT IV-1

#### Key Delivery Vehicles for Electronifying Commerce

- EDI
- E-Mail
- Electronic payments
  - Corporate: EDI/EFT
  - Consumer: Point-of-sale
- Facsimile
- Electronic information services
- Automatic identification
- Image technology
- Video
- Computer-telephone integration
- Workflow

## 1. EDI

Electronic data interchange (EDI) is the computer-to-computer exchange of business documents (such as purchase orders, invoices, shipping notices, etc.) in standardized, structured data formats.

EDI has proliferated throughout all industries including government, education, and health care—in addition to the mainstream industries of manufacturing, distribution and transportation.

Except for perhaps 100 to 200 large corporations, EDI is still used marginally. Approximately 30,000 to 40,000 companies in the world today use EDI. Expenditures on EDI software, network services, and professional (systems integration) services came to approximately \$320 million in the U.S. in 1992. EDI is growing at 25% annually and INPUT expects it will become a billion-dollar industry by 1997.

The EDI user community has been vexed by a single problem: it is unable to easily integrate the EDI translation software with applications software. Seamless transmission of data from one company to another is not happening. Approximately 80% to 90% of EDI users today simply receive EDI messages, print them out on paper, then re-key the data into their applications.

In addition, most EDI users conduct EDI with less than 50 companies. The rest of their communications continue in the paper-based mode. So, not only has the current EDI architecture made it difficult for users to integrate with internal applications, it has made it difficult for them to integrate electronically with their trading partners.

In the past few years, users and vendors alike have wondered if EDI is failing in its promise. To users, it is a technology that isn't giving the value it promised. To vendors, it is a market that hasn't materialized. Rosy forecasts in the mid-1980s predicted that EDI would be almost a two-billion-dollar market by now. EDI isn't even close to a billion dollars now.

## 2. E-Mail

E-mail is an important communication tool that enables electronic commerce in two ways: internally within an organization, and externally among organizations.

While there are examples of external uses of E-mail being used specifically for trading purposes (e.g., Nordstrom, Tektronix, various bulletin board services), INPUT believes the more important role E-mail plays in an electronic commerce infrastructure is within an individual organization.

INPUT believes that using E-mail internally and connecting the internal E-mail system to applications and EDI translation software will prove to have greater strategic merit in the next couple of years than having the two messaging modes used "side by side" to connect trading partners. Intra-organizational E-mail/EDI integration is critical because it is the way internal departments can integrate applications and develop a fully integrated, "EDI-enabled" organization.

- Inter-organizational E-mail-to-EDI integration. E-mail can act as the initial phase of an EDI project, whereby a company first makes linkages with key trading partners via E-mail, then later converts them to EDI linkages.
- Intra-organizational E-mail-to-EDI integration. E-mail, in this more important case, connects people, departments, and applications inside the organization. When these connections are already made, EDI can be integrated better. Requisitions for supplies, checking a customer credit rating, and other internal workflows that require interpersonal messaging *and* are related to EDI transactions can be tied together in one seamless information system. Here workflow redesign plays a key role (see below).

INPUT recently completed a study that shows that among EDI users, internal E-mail and local-area networks are common to the general corporate IS environment. Approximately one-third of the companies surveyed (45 out of 135) had their EDI translation software connected to a local-area network.

Exhibit IV-2 shows the results of INPUT's study.

EXHIBIT IV-2

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

E-mail and EDI are important, complementary messaging technologies. They promise integration of EDI systems with internal workflows and applications.

E-mail and EDI combinations are making more sense for user organizations. In response, IS vendors are coming out with offerings that combine EDI and E-mail.

- GEIS offers its general Business\*Talk E-mail service to specific vertical markets such as retail (Retail\*Talk).
- AT&T and Microsoft have formed an alliance so that Microsoft's LAN E-mail products connect to the AT&T EasyLink network.
- In December, IBM Information Network/Advantis will release "IBM Mail LAN Gateway/2," which allows for the connection of the IBM Information Network and E-mail systems running internally in companies. People on company E-mail networks can use Gateway/2 and the IBM IN to communicate with people on other internal E-mail systems. cc:Mail, IBM Mail Exchange, OfficeVision, and DISOSS are E-mail systems to be supported in the December release; Lotus Notes, Novell Netware and other LAN E-mail and operating systems will be supported in the first quarter of 1993.
- CompuServe has an MHS gateway so that any MHS-based LAN network (Novell, DaVinci, etc.) can connect to CompuServe and beyond to other LANs that are connected to CompuServe.
- EDI software vendors, such as Premenos, Blue Rainbow, American Business Computer, Tandem/Mpact, Digital, and Sterling Software have E-mail features and/or modules that work with translation software.
- Some E-mail software vendors, most notably Verimation (the commercial IS subsidiary of Volvo) has introduced EDI software that works with its internal office automation/E-mail software.

### 3. Electronic Payments

As mentioned in Chapter III (in the banking section), electronic payments are an essential form of electronic commerce.

There are two kinds of electronic payments:

- Corporate initiated payments, where one corporation electronically pays another for goods and services or pays the government or its employees electronically. This is often called EDI/EFT or financial EDI.
- Consumer electronic payments, where a consumer uses a credit or debit card or pre-authorized payment mechanism to pay for a product or service. The greatest consumer electronic payment mechanisms are at the retail point-of-sale and with pre-authorized payments for recurring monthly bills (such as insurance premiums, utility bills, car payments, etc.).



#### **4. Facsimile**

Facsimile is an important delivery mechanism for electronic commerce because facsimile technology is evolving rapidly.

Although a few years ago facsimile was simply a standalone image transfer device, now facsimile is being integrated in networks and business applications. Also, the ability to send ASCII files between fax machines and upload the files into applications changes the facsimile machine into a de facto E-mail/file transfer gateway and expands its usability beyond simple image transfer.

Facsimile is being integrated with voice response systems so that customers, for example, can inquire about company products over the phone and request information to be faxed to them.

INPUT believes that facsimile machines will play an important role as inexpensive, easy-to-use communications gateways between organizations. The installed base of facsimile machines—15 million worldwide—and their rapid growth rate—between 70% and 100% per year—make the facsimile machine a here-to-stay delivery vehicle that has to be taken seriously.

More about facsimile is contained in the section below on imaging.

#### **5. Electronic Information Services**

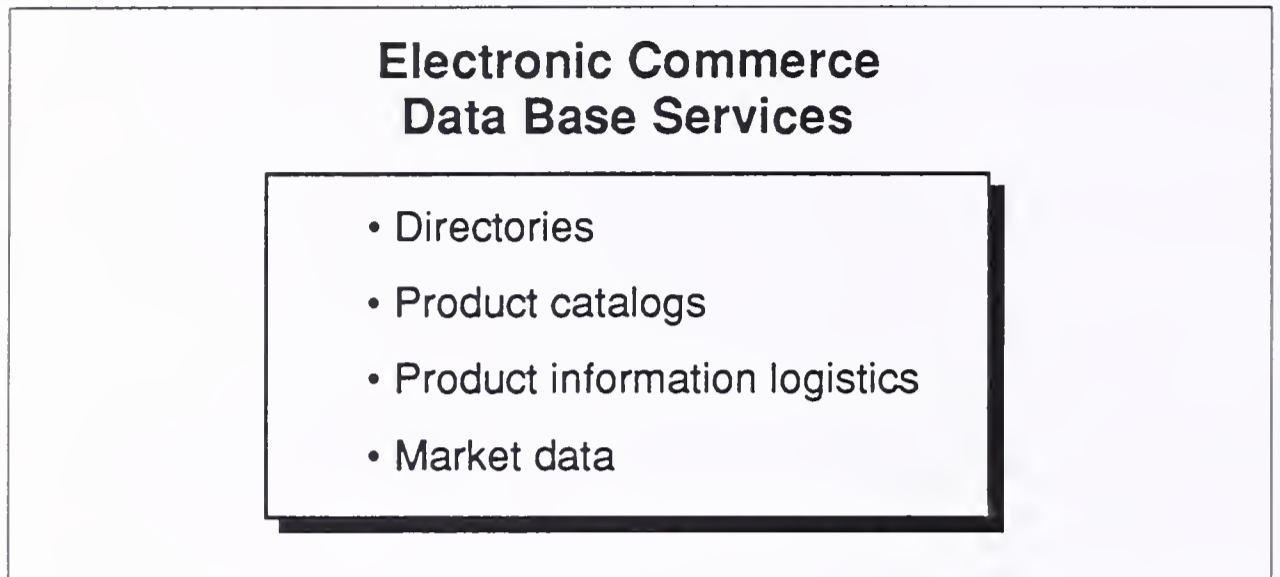
Electronic information services are commonly referred to as “commercial data bases.” These services are proliferating. There are many kinds, including news services and bibliographic data base services. Companies such as Dialog, Mead Data Central, and Dow-Jones are some of the largest electronic information service providers today.

Electronic commerce information services are a sub-set of the electronic information services industry.

Those electronic information services that are relevant to electronic commerce consist of data bases that provide lists of things that can be traded and the parties who can trade them. Also, electronic commerce information services include data bases that record the maintenance, technical documentation and other pragmatic information (information regarding use) on the product. And finally, electronic commerce data bases are those that consist of the record of sales of given products. More frequently this latter type of data base is being generated automatically from the network itself. For example, as grocery market checkout clerks scan merchandise, a data base is created which will help food manufacturers to understand what is happening in their marketplaces.

Exhibit IV-3 lists the principal types of electronic commerce information services.

EXHIBIT IV-3



Directories for electronic commerce generated \$36 million in vendor revenues in 1992 and INPUT forecasts this to rise to \$100 million in 1997. These include EDI trading partner profile data bases, NACHA's data base of the ACH capabilities of banks, and X.500 directories (Performance Systems International's directory for the INTERNET), among others.

Product catalogs include the UPC catalogs of GEIS and QRS, Triad's auto parts catalogs (on CD ROM), Pubnet's data base of books, INGAA's data base of natural gas pipeline transit points, tariff data bases (Maritime Administration, Transax, and smaller carrier systems), and Spec 2000 (for airplane parts), among others. This is a \$30 million industry expected to rise to \$72 million.

Market data services are those such as Nielsen's, Information Resources', and Citicorp POS Information's gathering and selling of supermarket scanned data. Sterling Software's MarketQuest product also monitors transaction traffic on the network and develops market reports.

Product information logistics (sometimes called technical documentation interchange) are data bases that contain technical documentation as well as record the history of maintenance performed on a given product. The most vivid example of this kind of data base is the CALS (Computer-Aided Logistics and Support) initiative proposed by the Department of Defense. All large systems purchased by the DoD are required to have their documentation delivered electronically and have their maintenance procedures electronically logged. Other industries, for example the construction, semiconductor and heavy transport equipment industries, are developing similar data delivery services.

## 6. Automatic Identification

Automatic identification is an umbrella term that includes the technologies of bar coding, optical character recognition, radio frequency technologies, vision systems, voice recognition systems, magnetic strip technology, smart cards, and even (according to some) EDI. Bar coding is the most prevalent use of automatic identification.

Automatic identification is critical in an electronic commerce environment because it allows for machine recognition of the things that are bought and sold and the buyers and sellers of things involved in a commercial transaction. Automatic identification of these components streamlines the communications involved in a commercial transaction.

The Federation of Automated Coding Technologies (FACT) has proposed "Initiative 2000." The initiative wants to formalize coding symbologies for use in the automatic identification of companies and company site locations worldwide. The symbology provides a standard and machine-readable vocabulary that unambiguously identifies objects—in this case, geographic locations—in the trading community. The codes, many already in use, can concisely identify (in 13 characters or less) ship-to, bill-to, origination, and other addresses of companies.

The initiative endorses the Dun's number, the International Article Number (developed by the European Article Number Association), and a new identification standard put forth by the International Standards Organization under the auspices of the Open Systems Interconnect (OSI) model.

## 7. Image Technology

Not all paper-based communications of a commercial transaction will be captured electronically. Image technology will be required to "capture" that remainder and place it in the electronic network. For example:

- Pizza Hut receives invoices from its suppliers by both EDI and facsimile. The facsimile invoices are immediately routed into an image data base (paper printout does not occur). The telephone number of the sending device of the faxed invoice is encoded in ASCII. Pizza Hut's receiving fax server recognizes the number and searches against a master data base of Pizza Hut suppliers. When a match is found, additional information can be coded and associated with the image of the invoice. The invoice is then automatically filed.
- A number of trucking and air courier companies use an imaging system to convert paper bills of lading into electronic files.

Image systems are a critical component of the infrastructure that allows businesses to trade. Imaging will provide the bridge between the paper and the electronic environments.

## 8. Video

Video transmissions are used for video conferencing and education. Later in the 1990s, some products will be transported directly over telecommunications networks. In the advertising and media industries, the product often is a video (for example, a television commercial). Sending this product to the appropriate television channel is quite costly when, as is currently done, couriers are used. Video transmission will be important here.

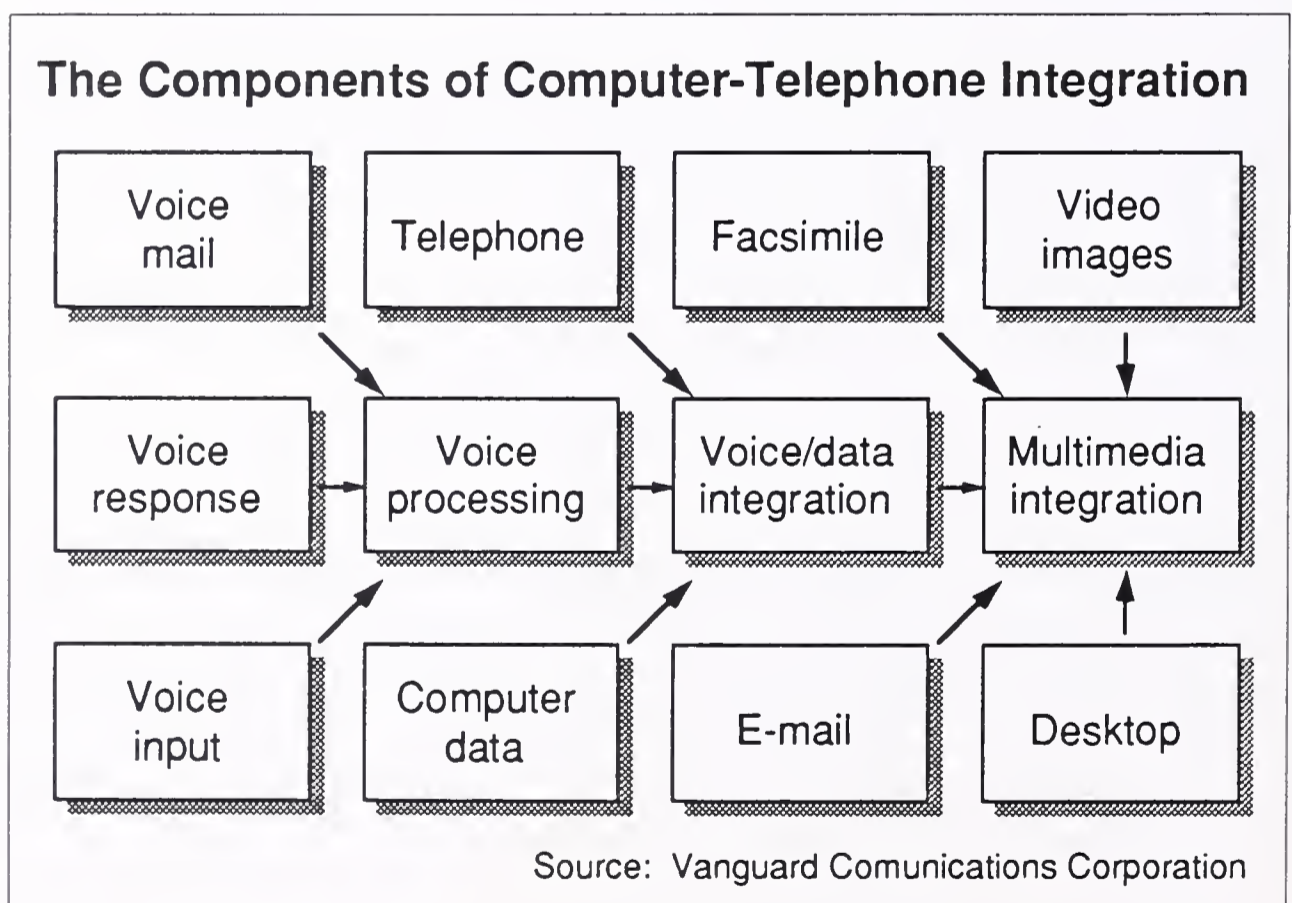
Some of the areas where video transmission will be important are: advertising, real estate, training and education, and health care.

## 9. Computer-Telephone Integration (CTI)

Computer-telephone integration (CTI) is the functional integration of human agents and: telephone network capabilities; voice and data switching; computers, their applications and data bases; voice processing; and other information media.

Exhibit IV-4 shows the various information technologies that are integrated through CTI.

EXHIBIT IV-4



Computer-telephone integration allows for (1) easily switching calls and corresponding computer screens within an organization (for example, a customer support department), (2) integrating voice, data and human interaction in a single call, and (3) delivery of information or access to information, with the information able to be delivered by voice or hard copy.

Some of the applications of computer-telephone integration are listed in Exhibit IV-5.

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**EXHIBIT IV-5**

### **Applications of Computer-Telephone Integration**

- Advertising/promotion
  - Product information/catalogs
- Financial services
  - Credit authorization
  - Credit collection
- Customer Service
  - Help Desks
  - Order/shipment updates
  - Maintenance services
- Marketing/Sales
  - Order entry
  - Data base marketing

Industries that are adopting computer-telephone integration technologies at this time to support commercial activities are insurance, distribution, banks, and transportation companies.

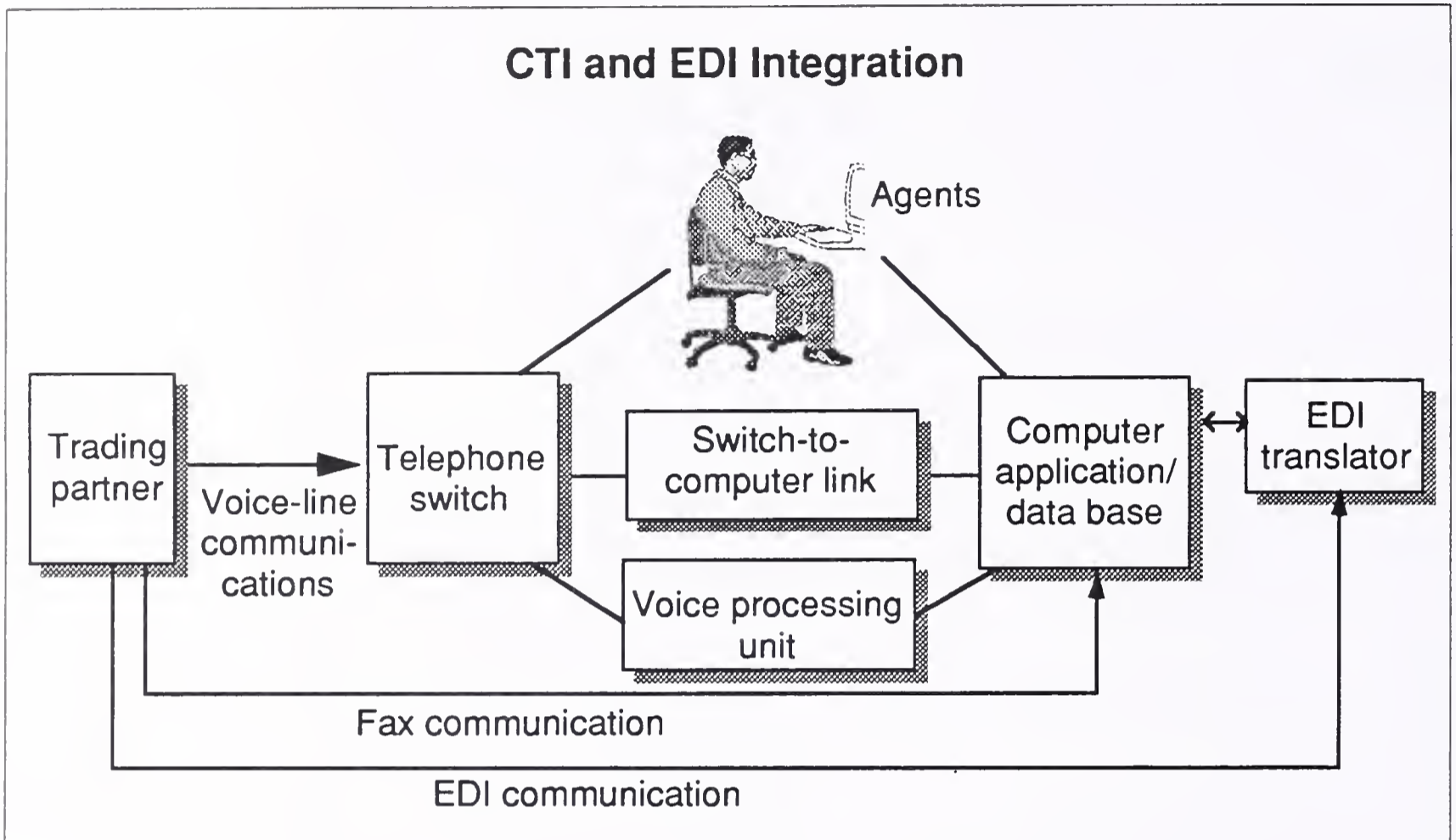
CTI, by definition, links voice communications into a company's computer applications, such as order entry, inventory, or accounting. EDI integration of these kinds of applications has already taken place. CTI, therefore, integrates the same applications that EDI has been integrating.

A basic configuration of CTI and EDI components in a company is shown in Exhibit IV-6.

Integration of voice and data through CTI, EDI and other integrated systems will allow more productive sales efforts and a linking of sales directly into the delivery of the company's products.

Companies that are integrating EDI and CTI include Ingram Micro (Santa Ana, CA), Aetna (Hartford, CT), The Prudential (Roseland, NJ), Quantum Health (Orange, CA), and Maxtor Corporation (San Jose, CA).

EXHIBIT IV-6



### 10. Workflow

Although workflow could be considered a technology (and there are a number of workflow products on the market today), INPUT believes that workflow is more than “just another” electronic commerce technology. It is a critical framework—an approach to systemizing work and integrating information systems with human work practices.

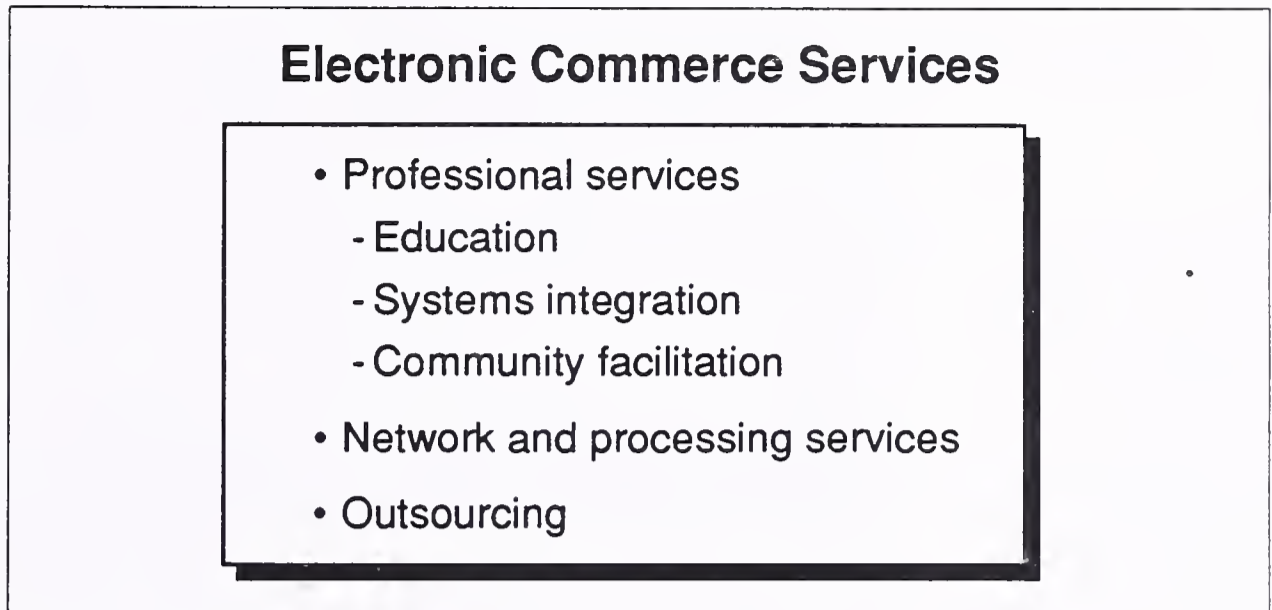
Thus, INPUT examines workflow in a separate section below to emphasize the unifying power of workflow.

## B

### Services

Exhibit IV-7 lists the main categories of services for building electronic commerce systems.

## EXHIBIT IV-7



### 1. Professional Services

Services will play a critical role in building electronic, commercial networks. Vendors of IS systems will need to educate corporate prospects on the value of electronic commerce and how to effectively implement systems. Furthermore, because these systems interconnect multiple organizations (and are not implemented and operated within the boundaries of a single organization) and frequently bring value only when operated by a plurality of organizations, there is a great need for coordinating the many parties involved.

“Community facilitation” falls into this latter category. Already in the EDI world a vendor, typically a value-added network, will facilitate the adoption of EDI by a whole trading community of organizations. For example, all of Wal-Mart’s suppliers are helped by TSI International; the Ports of New York, New Jersey, Seattle and Tacoma are aided in adopting EDI by GEIS and Sterling Software Ordernet. The vendor acts as a project manager over a period of several months to a few years to bring up all relevant trading entities.

Facilitation may even evolve further into an outsourcing arrangement where a vendor manages the data processing facilities of a large hub company (for example, Advantis, formerly IBM Information Network, manages Sears’ operations). Part of the outsourcing arrangement requires coordinating the electronic commerce systems with the clients’ trading partners.

Outsourcing may even go a step further when the vendor manages the hub company and some/many of the spoke companies’ systems. The vendor coordinates some or all of the commercial activity—as captured in the electronic trading infrastructure—of a trading community.

## 2. Network and Processing Services

These are some of the basic information service delivery modes involved in building the electronic commerce infrastructure.

The next chapter will list the top vendors in these delivery mode markets.

## 3. Outsourcing

Outsourcing is the turning over of the entire functional operation of an organization (typically, the data processing and management information systems function) to an external vendor. Outsourcing has been around for years, but recently it has grown dramatically as a business market.

Outsourcing can be a component of the electronic commerce offering. A large information services company (such as an EDS, ISSC, or Sterling Software) can take over the DP operations of a large company (say, J.C. Penney). Along with the internal operations, the services company also takes over the operations of those electronic linkages the large company has with its trading partners. Examples of this are EDS with General Motors and IBM/ISSC with Sears.

By servicing the external electronic links with trading partners, the services company in effect takes over a portion of the DP operations of the trading partners. IBM/ISSC, for example, can alter the EDI software of Sears' trading partners via the network.

# C

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## Integrating the EC Offering through "Workflow"

Workflow is a model that allows people to characterize work. It is also a technology (a collection of software modules) that allows people and automated information processing systems to interact in ways that best leverage the capacities of each. Thinking in terms of "workflows" solves most of today's problems with EDI. Workflow thinking allows people to design and implement effective EDI systems. In other words, workflow thinking allows people to integrate EDI with applications and with other communication technologies (including facsimile, E-mail, voice, "real time" processes, etc.—even computer/communication technologies that have yet to be invented).

### 1. Workflow: The Concept

Several kinds of workflow products are on the market today, including those of AT&T/NCR, Digital Equipment Corporation, Lotus Development Corporation, Corporate Memories Inc., and others. While these help to substantiate a "market," INPUT believes the workflow concept of Action

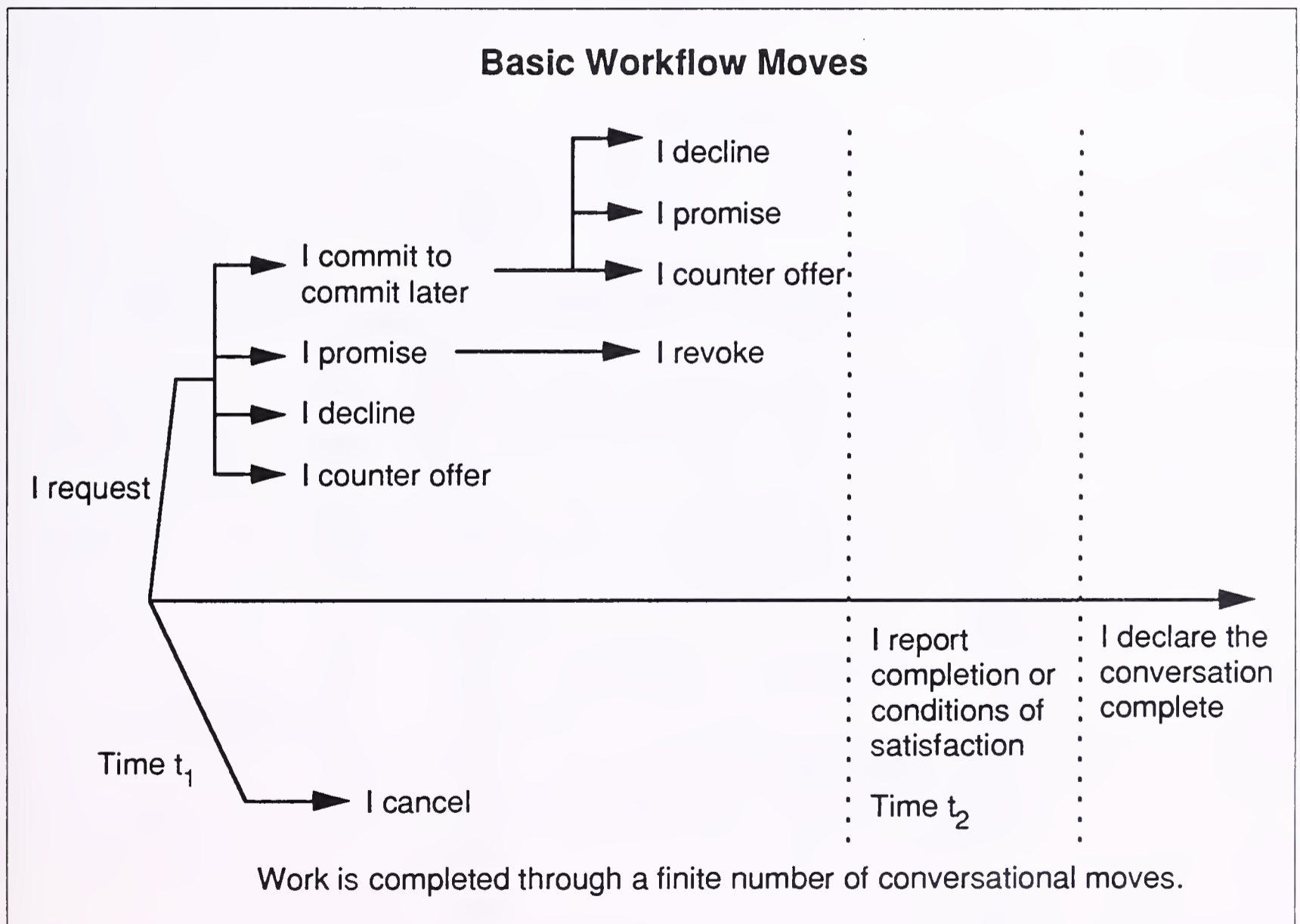


Technologies, Inc. is the definitive product. ATI's workflow is different—and more powerful—than the others because it takes as its primary and overriding purpose customer satisfaction.

In all work situations, there are two fundamental players: a customer, who has asked for something, and a supplier or performer, who fulfills the customer's request. There may be many intermediary steps and delegations of work involved along the way in satisfying the original customer's request. These intermediary, delegated steps, however, can themselves be characterized as more workflows, each with its own customer and performer. Work and information systems can be designed using this concept.

Exhibit IV-8 shows the basic "moves" involved in a workflow.

EXHIBIT IV-8

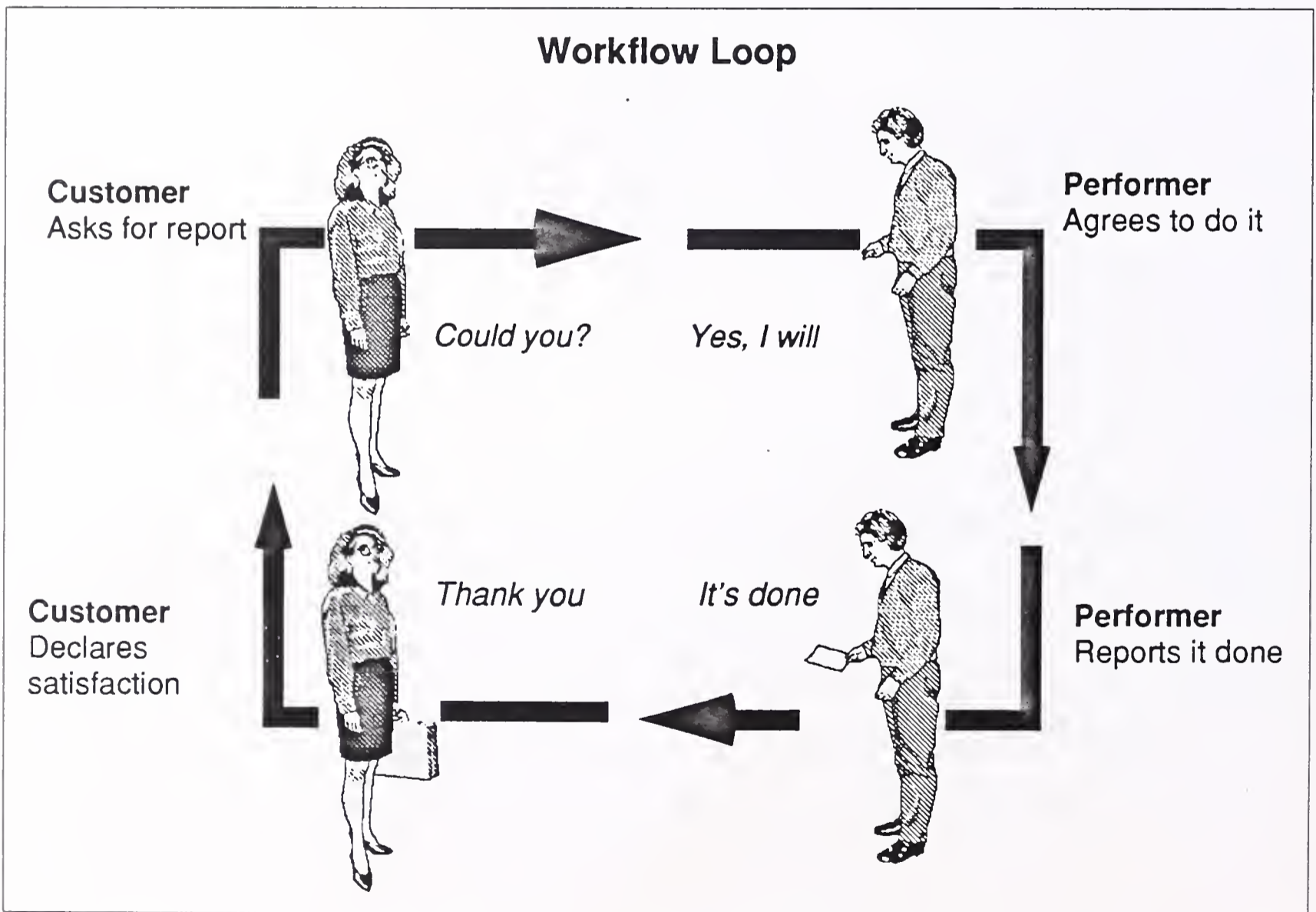


Actions that accomplish work are “set in motion” through a finite set of conversational moves that are listed in Exhibit IV-8. Work begins with a person making a request. The performer has a variety of options in responding to the request: to promise to do it, to decline to do it, to make a counter offer and so on, as shown. If the performer promises to do what is requested, he or she may, in turn, make a request of another person (an employee in the same organization) to do some related task. This sets up another workflow with a customer and a performer.

Completion of the work is accomplished when the performer informs the customer that the work is done and the customer, after examining the work, declares that it is satisfactory.

The whole work cycle can be depicted as a loop that begins with a customer request and ends when the customer announces satisfaction. The basic workflow loop is shown in Exhibit IV-9.

EXHIBIT IV-9



## 2. The Relationship Between EDI and Workflow

Most workflow tools today are implemented within a single organization. Nevertheless—and perhaps more significantly—workflow occurs among organizations. This is, of course, the domain of EDI.

EDI data formats allow companies to streamline the flow of data between mutually corresponding business functions across organizational boundaries. For example, the EDI invoice data format allows the accounts receivable function of one company to “speak” to the accounts payable function of the company’s customer. A standardized, electronic invoice is created by the accounting department of the supplier company and sent to the accounting department of the buying company.

Yet EDI standard data formats, as currently conceived, lack the integrated vision of conversational moves which achieve customer satisfaction. As such, the purpose of any given EDI message is not connected to the larger work context. How the message is to be integrated with the general functioning of the organization is not clearly discernible. This is at the root of why company integration through EDI has not been attained.

A commercial trade is the exchange of two promises. A buyer and a seller make promises to each other. Usually, one party promises a product or service, and the other party promises cash. Each party is the customer for the promise of the other. Given this understanding, a purchase order can be considered a request and an implicit promise to pay. Its acknowledgment is a promise to provide the requested product or service.

Today’s EDI message formats can be classified according to workflow moves. Exhibit IV-10 shows this classification.

Since EDI messages weren’t designed according to the conversation-for-customer-satisfaction in mind, they don’t perfectly fit the model. In many cases, EDI messages are lacking equivalent workflow messages, such as declining a purchase order.

## EXHIBIT IV-10

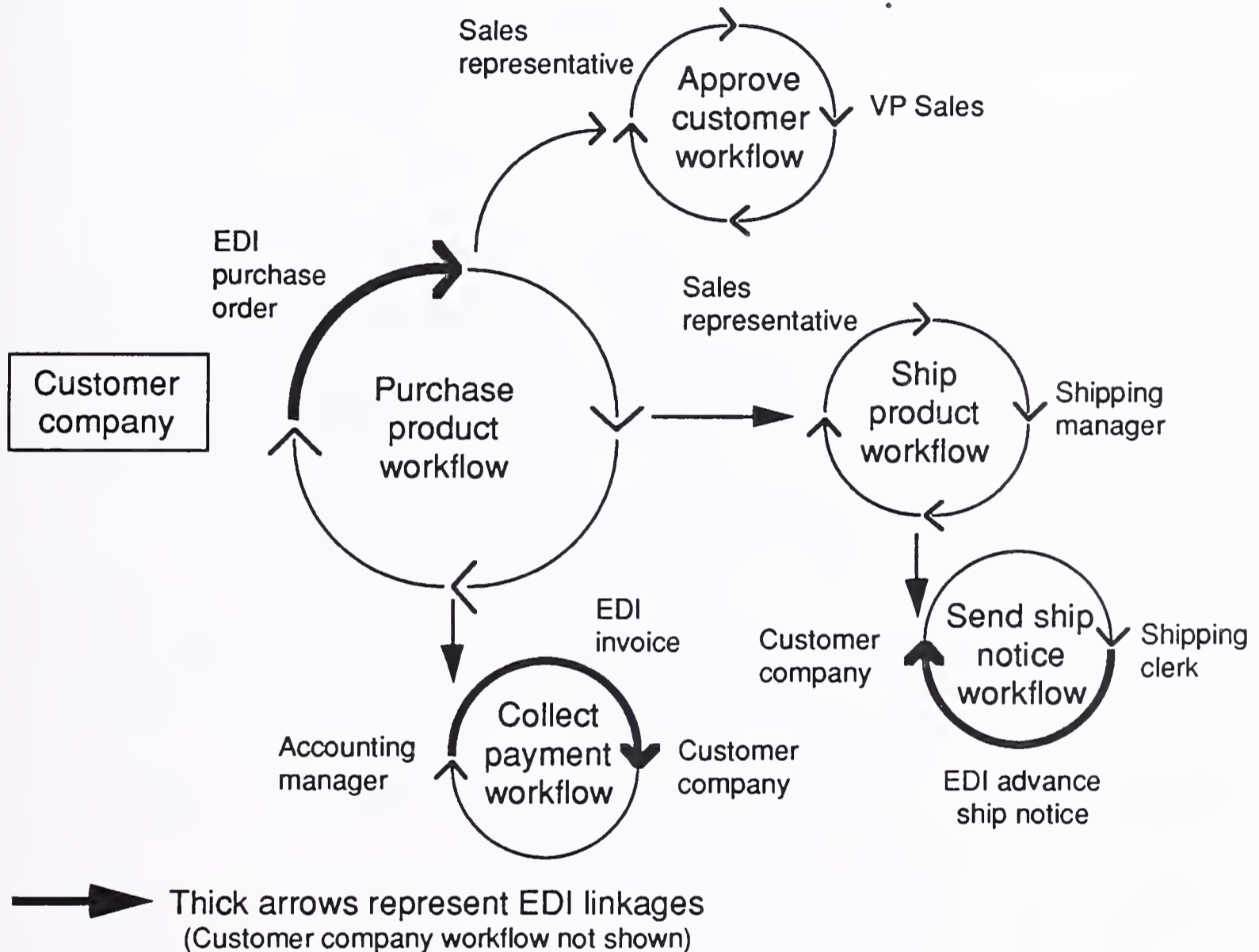
**EDI Messages as Workflow Moves**

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

It is possible to superimpose the workflow model on two companies that are trading. Exhibit IV-11 shows how the workflow design methodology gives a context for EDI messages. It gives "meaning" to the messages. A workflow management software module can look at the messages and determine what work steps need to be done next, what person or application to route messages to, and who or which software process to involve in the next work step.

## EXHIBIT IV-11

### The Inter-Organizational Workflow Model Showing EDI Linkages

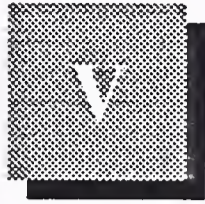


With the workflow concept, EDI messages become just tokens in a larger workflow. They are not ends in themselves. Today's EDI integration attempts place EDI messages as ends in themselves. This is wrong.

Users implement EDI to be more effective competitors, to have better relationships with customers, and to be more efficient with suppliers—not to transfer files, per se. Effective file transfer among organizations and among different computer environments is important, but it is only a component of a larger objective: to be more competitive.

EDI is a technology that fits into a larger solution. The solution is competitiveness and customer satisfaction. Workflow is a method and technology that allows the organization to design and implement customer satisfaction.

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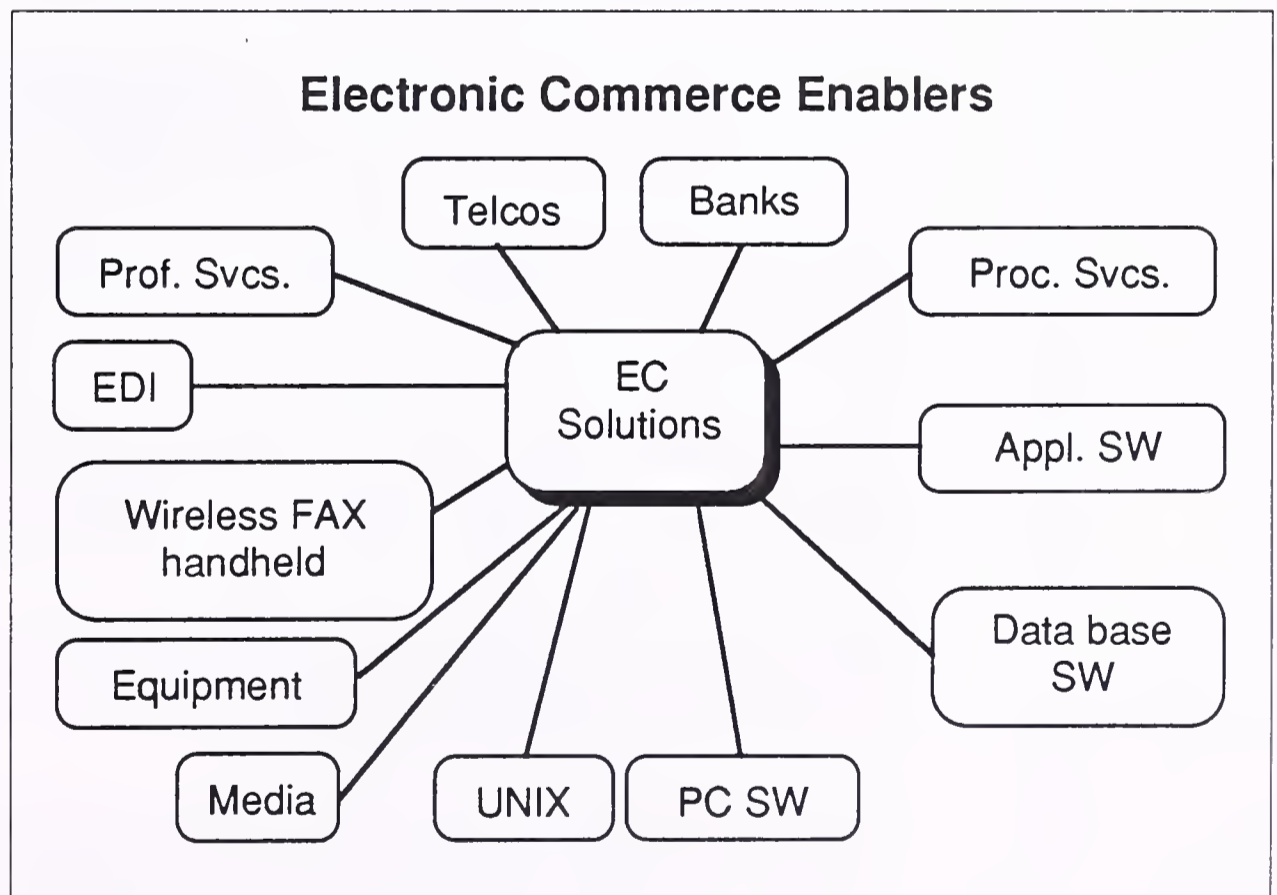


## Providers of Electronic Commerce Tools and Solutions

The wide range of different technologies and services required for electronic commerce (as reviewed in the previous chapter) underscore the fact that no single vendor will be able to provide a complete solution for every user. Alliances, reseller agreements, and strategic supplier arrangements (including outsourcing) are absolutely key in providing comprehensive electronic commerce solutions.

Exhibit V-1 shows some of the types of businesses getting involved in providing electronic commerce technologies.

EXHIBIT V-1



In the remainder of this chapter, INPUT summarizes the companies that are beginning to offer electronic commerce tools and solutions. Companies are listed according to the category of product or service as listed in Exhibit V-1. These listings are intended to enable the reader to identify the players and potential players in delivering electronic commerce-

enabling technologies and services. For more details on any given company, please refer to INPUT's vendor analysis library of profiles available through INPUT's EDI/Electronic Commerce Program and Vendor Analysis Program.

## A

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### Telephone Companies

Telephone companies are important enablers because they provide at least the base transport method for data transmissions, if not higher level value added services. Leading telephone companies offering electronic commerce solutions are:

- AT&T—Electronic commerce offerings are the EasyLink E-mail, EDI, and enhanced facsimile services. Also, AT&T credit card operation gives it an entry into point-of-sale opportunities. NCR, the computer maker that AT&T acquired in 1990/1991, gives it a strong equipment base in the point-of-sale and banking (automatic teller machine) markets. AT&T's acquisition of McCaw Cellular (pending at the time of publication) will position AT&T to provide wireless communication services (needed in such areas as transportation and distribution).
- British Telecom—BT maintains and is expanding a global data and voice transport network. Through its BT North America (formerly Tymnet and Dialcom) division, it is offering EDI, E-mail and value-added network services as well as credit card processing services.
- GTE has a toe into health care claims processing as well as credit card processing.
- Sprint and MCI both offer data network services, including EDI and E-mail, but concentrate more on voice and telecommunications outsourcing for large corporations rather than value-added network and electronic commerce services.
- Ameritech and BellAtlantic offer EDI and data network services. They are the two regional Bell operating companies that are farthest ahead in providing electronic commerce services.
- NTT (Nippon Telegraph and Telephone) has the capacity, but is not prepared to venture out of its administrative domain (Japan and international ties to Japanese businesses) until the late 1990s if at all.
- Cable and Wireless—This U.K. company has been developing EDI and electronic commerce offerings in Europe, Asia and the U.S. It is small, but may have some winning offerings.



**B****Banks**

Many of the largest U.S. banks offer electronic commerce-type services (mostly in payment and treasury management areas). However, they have been slow to capitalize on the marketplace.

Some of the leading banks that offer electronic commerce services are listed in Exhibit V-2.

## EXHIBIT V-2

**Banks That Offer Electronic Commerce Services****U.S. Banks**

- First National Bank of Chicago
- C&S/Sovran
- NaBanco
- Mellon Bank
- CitiCorp
- Chase Manhattan Bank
- First Interstate Bank
- Manufacturers National Bank of Detroit
- National Bank of Detroit
- Pittsburgh National Bank
- Wells Fargo
- Bank of America

**Canadian Banks**

- Bank of Montreal
- Bank of Nova Scotia
- Banque Nationale
- Canadian Imperial Bank of Commerce
- Royal Bank of Canada
- Toronto Dominion Bank

**C****Processing Service Vendors**

Processing service companies, including those that offer facilities management—"outsourcing"—services, are ready candidates to provide electronic commerce services. These companies already provide systems and services that support transactions among companies.

Leading processing service vendors include the top airline computer reservation vendors and the credit card processing companies. Both types of companies are considering widening their current processing service offerings to offer EDI services and other services. Leaders are listed in Exhibit V-3.

## EXHIBIT V-3

**Processing Service Vendors that Provide or Could Provide Electronic Commerce Services**

- First Data Corporation
- First Financial Management Corporation
- American Airlines Information Services, Inc. (Amris)
- American Express Information Services Company
- EDS
- National Data Corporation
- ADP
- Covia Partners
- Systematics

**D****Enterprise Application Software Vendors**

These companies provide mission-critical computer applications that form the core and/or essential components of a company's management information system(s). The applications that these companies supply are and will be affected when user organizations interconnect electronically with their trading partners. The largest application software providers are

either building EDI and other electronic commerce features into their software or else they are making alliances with EDI software companies, value-added resellers, systems integrators, and the like to insure that their products operate within an electronic commerce environment.

Exhibit V-4 lists some of the enterprise software vendors who are adapting their products to electronic commerce specifications.

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**EXHIBIT V-4****Enterprise Application Software Vendors  
with Electronic Commerce Features**

- Dun & Bradstreet
- Computer Associates International, Inc.
- American Computer
- Integral Systems
- Sterling Software
- ASK Computer Systems
- Software AG
- Pansophic Systems Inc.
- SoftSwitch

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**E****Data Base Software Vendors**

Data base software vendors may have a greater ability to provide users with electronic commerce solutions than enterprise software vendors because data base software is more flexible, modifiable and can serve more purposes than specific application software products. Flexibility allows for easier integration with other systems, including the systems of trading partners. Data base software can act as the core engine from which workflow and other applications run.

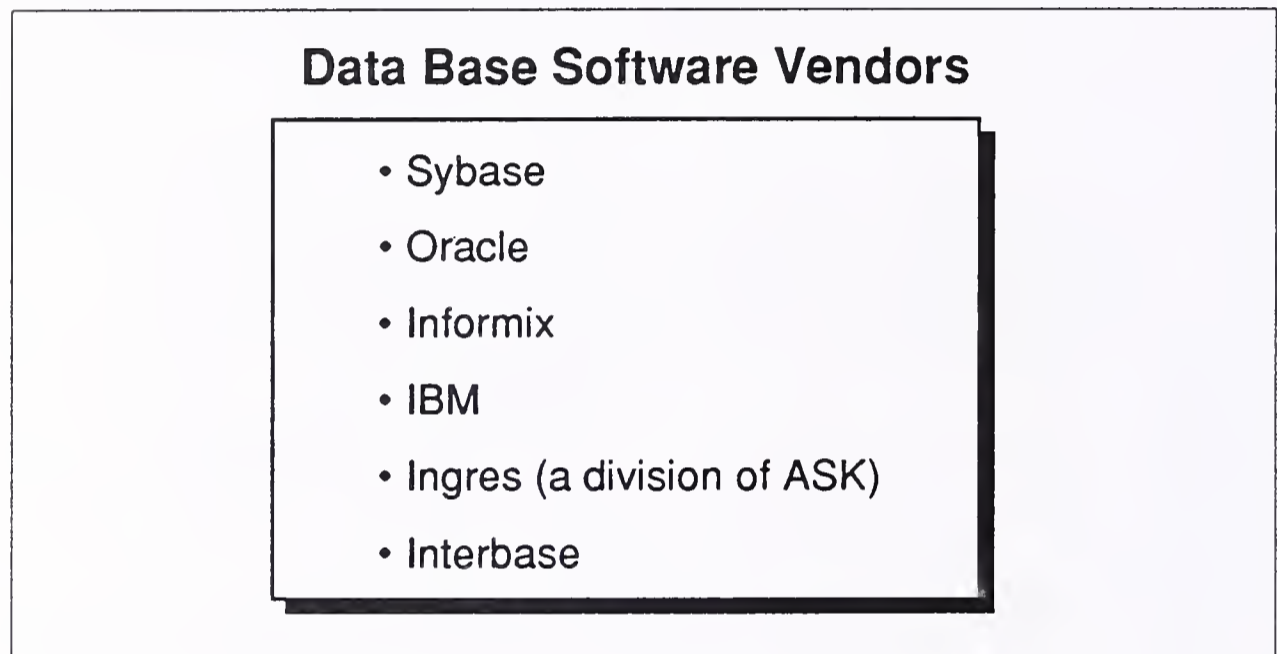
Data base vendors may be key electronic commerce vendors in that their data base installations will become the file servers that are interconnected in inter-organizational network systems.

The leading data base vendors use value-added resellers, systems integrators, and independent software vendors to develop applications based on their products. These distribution channels are important to the development of an electronic commerce infrastructure because third parties have the specialized expertise to build systems that are specific to the business function needs of different sectors of the business community. Their presence brings a greater diversity of applications that the data base vendors would be unable to provide on their own.

The top data base software companies are listed in Exhibit V-5.

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EXHIBIT V-5



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## F

### PC Software Vendors

PC software vendors, by the latter 1990s, may be the most active and competitive IS vendors in the electronic commerce marketplace. Because of the widespread use of microcomputers as the de facto CPU platform in the world today (which continues to expand as companies downsize their DP operations), it is with those software applications running on PCs that electronic commerce will ultimately be implemented.

Already, in the EDI world, spreadsheets and PC data bases are some of the easiest and most successful “integrations” of EDI translation software with application software.

The players in the PC arena are listed in Exhibit V-6.

## EXHIBIT V-6

**PC Software Companies with  
Electronic Commerce Potential**

- Lotus
- Microsoft
- Borland
- Novell

**G****UNIX Software Vendors**

UNIX operating system software is technically ideal for the emerging electronic commerce network environment. Hardware independence, inexpensive and fast development/implementation cycles, savings in daily operating expenses, and the breadth of choice offered by UNIX software and service vendors make UNIX an appealing operating system foundation on which to build systems that support electronic trading.

Flexibility in developing systems is mandatory because the competitive environment of users is changing rapidly. The ability to put up production applications and have them interconnect with other applications inside and outside the company, and be able to do so as new business opportunities arise, is the name of the game in the 1990s.

Already, in the EDI market, translation software for UNIX environments is showing a rapid, eager acceptance in the marketplace (see INPUT's report, *The U.S. EDI Market, 1992-1997*).

Exhibit V-7 lists the principal vendors of UNIX operating systems.

## EXHIBIT V-7

**Principal Vendors of UNIX  
Operating Systems**

- The Santa Cruz Operation
- Sun Microsystems
- Hewlett-Packard
- Unix Software Laboratories
- Digital Equipment Corporation
- IBM

## H

### Professional Services Firms

Professional service firms that offer education, consulting, and systems integration are key players in building the electronic commerce infrastructure. These companies provide the vertical market/value chain expertise, the expertise in business function (accounting, marketing, etc.), and are able to develop custom electronic commerce solutions that meet specific organizational demands.

The leaders in professional services are listed in Exhibit V-8.

#### EXHIBIT V-8

#### Professional Services Firms Critical in Electronic Commerce

- Andersen Consulting
- Price Waterhouse
- Computer Sciences Corp.
- EDS
- McKinsey

## I

### Traditional EDI Software and Service Providers

EDI is the closest single technology to electronic commerce, even though technically it is only a single kind of electronic commerce technology (see Chapter IV). Nevertheless, today's vendors of EDI software and services are well positioned to be full electronic commerce service providers due to their familiarity with the unique features of the electronic commerce market (for example, the hub-and-spoke phenomenon, which is very important from a marketing/sales standpoint and applies to EC markets as well as EDI markets).

For more details on EDI vendors, please refer to INPUT's report, *EDI Vendor Profiles and Competitive Assessment*. A brief listing of key EDI vendors is shown in Exhibit V-9.

## EXHIBIT V-9

**EDI Vendors to Become EC Vendors**

- GE Information Services
- Sterling Software
- Advantis
- AT&T
- BT North America
- RBOCs
- DEC

**J****Platform Equipment Vendors**

The main computer manufacturers want to have their equipment serve as the platform on which electronic commerce networks and services are built. As profit margins in hardware alone are dropping, the trend among these manufacturers is to provide more added value to their hardware products by bundling them with software and services. Manufacturers are pursuing various strategies to achieve this bundling, from creating software/system subsidiaries to making alliances and/or selling through value-added resellers, independent software vendors, and systems integrators.

Leading platform makers are listed in Exhibit V-10.

## EXHIBIT V-10

**Sources of Electronic Commerce  
Equipment Platforms**

- Hewlett-Packard
- IBM
- Tandem
- Sun Microsystems
- Digital Equipment Corporation
- Stratus
- Unisys
- AT&T/NCR
- Xerox

**K****Communication, Identification, and Other Equipment Manufacturers**

A large, hodge-podge group of companies manufactures the equipment components that are required of an electronic commerce infrastructure. This equipment ranges from handheld computer devices to bar code scanners and printers, cellular phones, satellites, facsimile devices (including cards for computers), smart cards, and image equipment.

The breadth of this category is inversely proportional to the influence these varied manufacturers exert in defining the practices of electronically conducted business. While their equipment is necessary and represents a significant portion of the total investment in the EC landscape, the software and service providers will offer the integrated solution to user companies—that is, if the user company doesn't develop the solution on its own.

Equipment vendors are increasingly making alliances with and selling their products through resellers, systems integrators, turnkey vendors, and sometimes wholly owned subsidiaries. Electronic commerce solutions buyers and sellers should be alert to the fact that their solutions come to them through these new distribution channels.



Some equipment vendors in this category are listed in Exhibit V-11.

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**EXHIBIT V-11****Equipment Vendors**

- Motorola (Schaumburg, IL)
- TRW Financial Systems Inc. (Berkeley, CA)
- Litton Integrated Automation (Alameda, CA)
- FileNet Corp. (Costa Mesa, CA)
- Eastman Kodak, (Rochester, NY)
- Image Business Systems (New York, NY)
- Sigma Imaging Systems (Anaheim, CA)
- Calera Recognition Systems (Santa Clara, CA)
- Recognition Equipment Inc. (Irving, TX)

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**L****Publishers, Media, and Information Industry Providers**

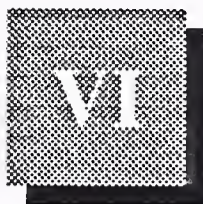
Other companies are providing services that facilitate commercial transactions over electronic networks. These companies, because they provide some kind of information critical to a transaction (e.g., credit histories, standard medical prescription practices, insurance adjuster records), are players in the electronic commerce marketplace of services. Some of these media/information industry vendors (such as Bloomberg, Ziff, Reuters) maintain sizable networks and/or processing service facilities that are or could be commercialized.

Exhibit V-12 lists information industry companies that have a stake in providing electronic commerce services.

## EXHIBIT V-12

**Information Industry Companies that Offer Electronic Commerce Services**

- Barclays
- Bloomberg
- Information America
- Information Resources
- McGraw-Hill
- MEDSTAT Systems
- PR Newswire
- Reuters
- TRW
- Videotron
- Ziff
- RBOCs



## Conclusions and Recommendations

Building an electronic infrastructure over which to conduct commercial exchanges is like building the telephone system: a single company cannot do it alone. By nature, electronic commerce systems are built through the efforts of many companies. The more companies that are connected to the infrastructure, the greater the value of the infrastructure. There is an increasing return to scale as the electronic commerce infrastructure expands.

But the increasing returns don't mean that there are unlimited opportunities or that there are no competitive threats.

Within the general expanding pie of electronic commerce, there are zero-sum games with every new opportunity for adding capacity to the general electronic commerce network. The games occur among users of the systems, such as those among Wal-Mart, K mart, and Sears. They also occur among the suppliers of electronic commerce systems and services, such as those among EDS, GE Information Services, and AT&T.

Thus, whatever the company, IS user or vendor, strategies must be determined.

### A

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## User Strategies

Exhibit VI-1 lists the key objectives that users should aim for in going electronic.

## EXHIBIT VI-1

**Key Objectives for Users**

- Use standardized components as much as possible
- Use micro and midrange computers as much as possible
- Be open ended in IS architecture to allow for unforeseen business needs
- Lock in customers through superior service, not proprietary technology
- Make alliances with key suppliers and customers
- Develop technology architectures and platforms with trading partners
- Rely on IS suppliers for community facilitation services
- Adopt workflow framework internally as well as externally

Small, modular, standardized components (including EDI, workflow, UNIX, and microcomputers) are better suited today for building electronic trading systems than are large, mainframe-based, proprietary systems. These latter systems at one time provided the user with a competitive advantage. Today, the proprietary approach places all the development and maintenance costs on the provider and they are no longer recouped in strategic advantage.

Alliances, such as Proctor & Gamble with Wal-Mart, are key to competitiveness as well as developing streamlined communication linkages among trading companies. The business relationship must be in place before the details of the communication platform are worked out.

The community of software, network, and other information service vendors is a rich source of (often free) education about electronic commerce possibilities. Also, the IS vendor community can be instrumental in organizing a whole community of trading companies to coordinate its activities through standardized communication practices.

The workflow framework can be applied not only to internal workflows of the company but also to the workflows between the company and its trading partners. This approach helps in identifying where communication needs exist and how to re-engineer the linkages with trading partners.

## B

### Vendor Strategies

Exhibit VI-2 lists key vendor strategic objectives.

#### EXHIBIT VI-2

#### Key Objectives for Vendors

- Make alliances with other vendors
- Target industry niches and be dominant provider
- Concentrate on core competences but be alert to new opportunities that incidentally emerge
- Have some stake in systems integration, industry expertise, and maintenance

Perhaps the most important objective is making alliances with other vendors, whether those vendors are software developers, systems integrators, value-added resellers, or equipment makers. No single company can offer a full suite of electronic commerce services.

Some of the most important skills to offer customers will be industry and application expertise. Companies in the food distribution value chain, for example, need assistance in building EC systems from people who understand food distribution. Electronic commerce is where technology solves business problems. Knowing how to solve a business problem requires industry expertise.

New opportunities for making profit might emerge in the process of providing electronic commerce solutions to customers. For example, the selling of scanned supermarket data is an incidental business opportunity that arose when scanning became widespread. Vendors should concentrate on what they do best but keep an eye out for new possibilities in serving market needs.

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