U.S. PROCESSING / NETWORK SERVICES

1987 - 1992

INPUT

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Market Analysis and Planning Services (MAPS)

U.S. Processing/Network Services, 1987-1992

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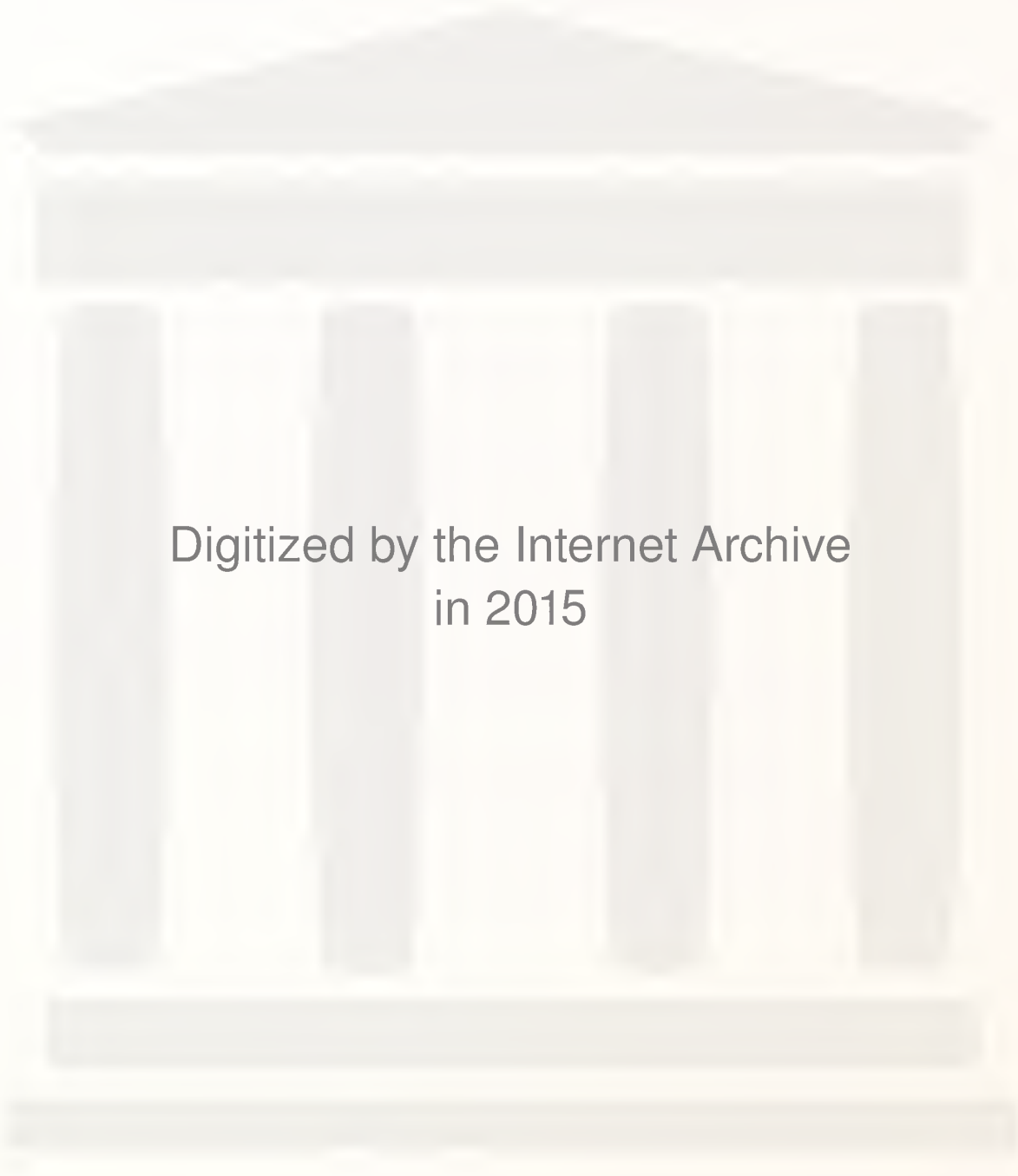
Abstract

This is the 1987 annual analysis and forecast for the Process/Network Services segment of the U.S. market for Information Services.

The period for the forecasts is 1987 through 1992. Sectors reviewed in detail are Remote Computing/Batch services, On-Line Data Bases, Value-Added Networks, Utility Processing, and Electronic Data Interchange. Included for each of these sectors is a Market Trend and Overview, a Market Forecast, and Competitive Environment Information.

The report also covers forecasts for industry-specific and cross-industry expenditures as well as describing the largest and the fastest growing vendors.

The report contains 82 pages and 28 exhibits.



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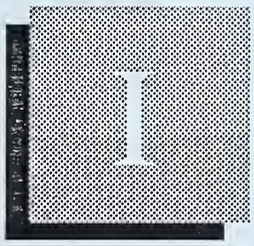


Introduction

Introduction

This report is produced as part of the INPUT Market Analysis and Planning Service (MAPS). INPUT segments the entire Information Services industry into four delivery modes:

- Processing/Network Services
- Software Products
- Professional Services
- Turnkey Systems

Each delivery mode is discussed in an annual report.

This report analyzes the Processing/Network Services in terms of trends, issues, market size, market forecast, and competitive factors. The report is to be used by executives and planning and marketing management to obtain insight and perspective.

A

Purpose of this Report

This report analyzes the following segments of the Processing/Network Services Market:

- Processing:
  - Remote Computing Services (RCS).
- Batch Processing Services:
  - Utility Processing.
  - Facilities Management.
- Network Services:
  - Value-added Network Services.
  - On-line Data Base Services.
  - Electronic Data Interchange.

The report is a useful instrument for vendors to obtain market information to assist them in:

- Identifying the growth segments of the market to allow for careful redeploying of resources to sell to those segments in an effective fashion.
- Identifying the new opportunities emerging and ways to shift focus.
- Obtaining information on new market entrants.
- Monitoring areas that could impact vendor market share, market growth, and company profitability.

B

Scope

The report, which is issued annually, assesses the issues, trends, and competitive developments within each of the market segments mentioned in section A. In addition it sizes each segment and provides a five-year forecast for user expenditures in the segment.
(Note: user expenditures are expenditures made by users and are noncaptive revenue. For example, the revenue received by EDS from General Motors is captive and is not included in INPUT's numbers. Also excluded is revenue obtained by Boeing, McDonnell Douglas, and similar companies from subsidiaries by providing preferential rates or without competition.)

- The report is organized into several sections as follows:
  - Section I is the Introduction describing the report contents, purpose, scope, and methodology.
  - Section II is the Executive Overview, which is designed to provide the interested yet hurried reader with an overall view of the report.
  - Sections III through VII examine segments of the market and provide information on issues, trends, market forecasts, and sizing.
  - Section VIII discusses opportunities, recommendations, and a summary of the Processing/Network Services markets.
  - The appendixes contain the data base forecasts for each of the markets and INPUT's defintions.

C

Methodology

INPUT is continuously developing its forecast data and improving its methodology. The overall process is described in detail in the Executive Overview for the Market Analysis and Planning Service (MAPS) binders. The MAPS binders are two three-ring binders containing the industry-specific reports and cross-industry reports that segment the Information Services market by market areas.

Using the approaches described therein, INPUT prepares its annual view of the different delivery modes and attempts to account for events, trends, and issues that could impact the success of the market segment. Consideration is made for technological changes and regulatory and legislative changes as well.

Forecast numbers presented are in current dollars (i.e., each year's expenditive forecast is in dollars of that year). INPUT is using the Department of Commerce's projection for inflation through 1992, which is shown in Exhibit I-1. If clients have a different inflation assumption, the INPUT numbers should be adjusted accordingly.

EXHIBIT I-1

INPUT INFLATION ASSUMPTIONS

YEAR	INFLATION RATE (Percent)	NOMINAL GNP GROWTH (Percent)	REAL GNP GROWTH (Percent)
1987	3.3	6.1	2.8
1988	4.1	7.5	3.4
1989	3.0	6.9	3.9
1990	3.0	6.6	3.6
1991	2.0	5.5	3.5
1992	2.0	5.4	3.4

Source: U.S. Department of Commerce

D

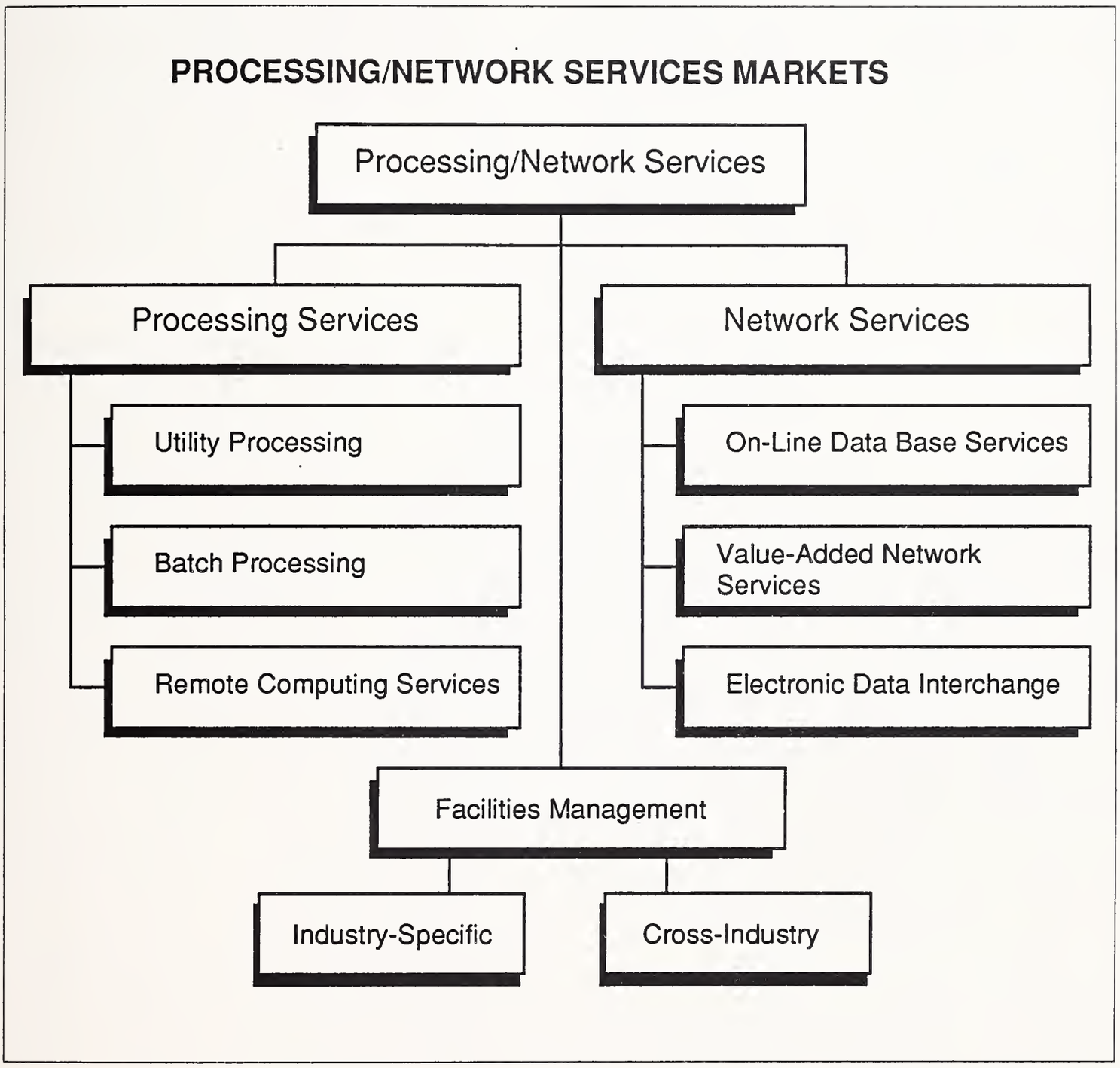
Processing/Network Services Market Structure

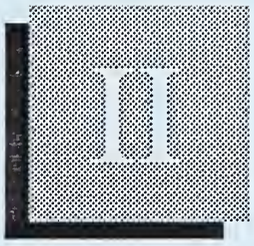
The Processing/Network Services market has been evolving for quite some time. It is the largest of the four delivery modes INPUT uses to account for user expenditures in the Information Services market.

Exhibit I-2 shows the two major segments of the Processing/Network Services Market structure as Processing Services and Network Services. Processing Services consists of several subsegments, namely: Utility Processing, Batch Processing, Remote Computing Services, and Facilities Management (Processing mode). Network Services subsegments are On-Line Data Base Services, Value-Added Network Services, and Electronic Data Interchange.

The continued growth of the Processing/Network Services delivery mode is predicated on continued use of vendors to provide communication-oriented applications capability to deliver business solutions between different locations and customers, as well as provide complementary services to augment the in-house Information Services department with either unique data (e.g., OLDB) or processing capabilities (Supercomputers, Electronic Vaulting).

EXHIBIT I-2





Executive Overview

Executive Overview

The Processing/Network Services delivery mode is a mature segment of the Information Services market. Although this entire segment is forecast to grow at a moderate 13% AAGR through the 1992 forecast period, it should be noted that some subsegments are growing at much faster rates.

The industry-specific processing services expenditures are consistently higher than the cross-industry expenditures. In fact, several cross-industry subsegments are barely growing and one is actually shrinking. However, some of the newer networking services markets are developing at fast rates, allowing the overall growth to be maintained.

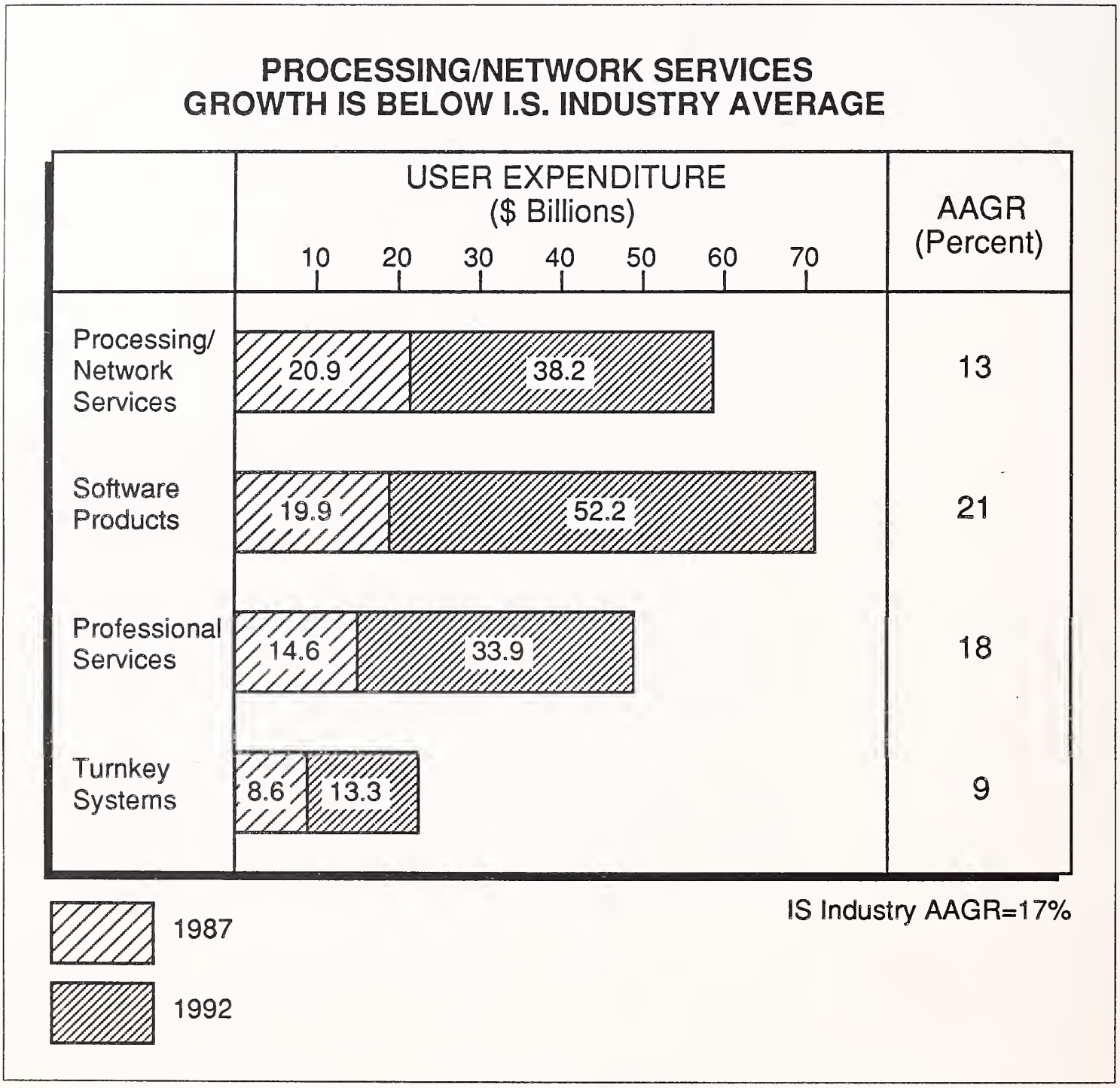
The cross-industry segments (except On-line Data Base Management) are barely growing and in some instances are growing more slowly than the Gross National Product. This slow growth is due in large measure to the continued growth and success of microcomputers in providing the functionability previously obtained through remote processing services.

A

Processing/Network Services Growth is below IS Industry Average

The Processing/Network Services market will almost double in the next five years, as shown in Exhibit II-1. This doubling is due to the continued acceptance of remote computing capablilites. Examples of some of the newer applications are the provision of ATM networking facilities that allow banks to provide important benefits to their customers, the use of on-line networks to monitor spare parts in the automotive repair industry, the access of driver's records for insurance company underwriting, the provision of blue-book values for claim adjustment, and the use of computer systems to perform shopping, travel, and credit card services at home.

EXHIBIT II-1



The Processing/Network Services market will grow by 14% from 1986 to 1987 to reach a user expenditure level of $20.9 billion. The main industry-specific sectors contributing to this growth are the four largest (listed with their growth rates and size in 1987):

- Banking and Finance, growing 16% to $4.4 billion.
- Medical, growing 17% to $1.3 billion.
- Services, growing 15% to $1.1 billion.
- Distribution, growing 16% to $1.1 billion.

These four industry segments represent 60% of the industry-specific processing/network services user expenditures in 1987.

Another major growth segment in Processing/Network Services is the continued success enjoyed by On-Line Data Bases. This segment will almost triple in the forecast period, growing at a 23% AAGR to $2.9 billion in 1992.

Utility Processing, which is growing at a low 7% AAGR during the forecast period, is still a significant portion of the market and will represent almost 10% of the network/processing services market in 1992 with a sizeable $3.7 billion.

In Exhibit II-1 the processing Network Services market is shown to be growing at 13% during the five-year forecast period. This growth is below the total Information Services industry growth rate of 17%. The Processing/Network services market nonetheless is still a significant portion of the Information Services market.

B

Remote Computing/ Batch - Major Portion with Steady Growth

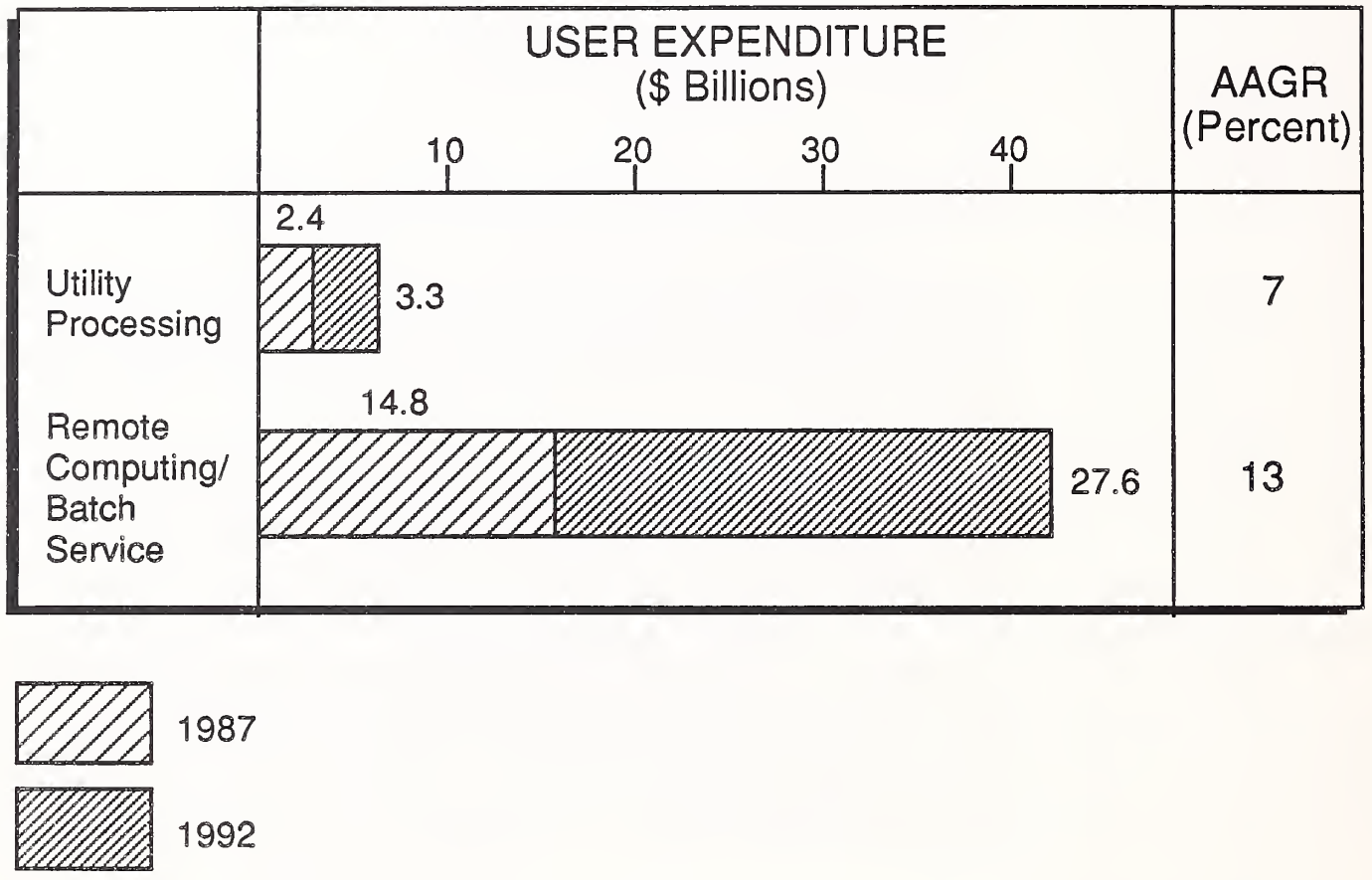
The major portion of Processing/Network Services is the remote computing/batch services segments. Exhibit II-2 shows the two segments of processing: Utility Processing and Batch/Remote Computing.

These segments represent a very mature part of the Information Services market, yet one that is growing at a relatively constant rate. This market has a few very large organizations such as McDonnell Douglas, Boeing, Computer Sciences, EDS, and ADP. In fact, aside from a computer manufacturer, Remote/Batch is the only delivery mode that has a company (ADP) with a revenue level exceeding $1 billion in 1986.

Remote Computing/Batch Processing services involve industry-specific and cross-industry applications. Examples are credit card authorization, payroll services, and demand deposit accounting. All applications have been fundamental applications of the enterprise. RCS/Batch is at a user expenditure level of $14.8 billion and is growing at 13% AAGR to attain $27.6 billion in 1992.

EXHIBIT II-2

REMOTE COMPUTING/BATCH SERVICES – MAJOR PORTION WITH STEADY GROWTH



Utility Processing utilizes generally available systems software and computer resource to allow users to generate applications pertinent to their environments. Although much of the Utility Processing performed in the past has shifted to microcomputer systems (PCs and PS/2), there still is a requirement to have large computer systems available to provide vast amounts of disk storage, a large memory, multiple locations, multiple user access, and major cpu resources. Thus Utility Processing is at the expenditure level of $2.4 billion in 1987 and will grow to $3.3 billion in 1992, representing an AAGR of 7%.

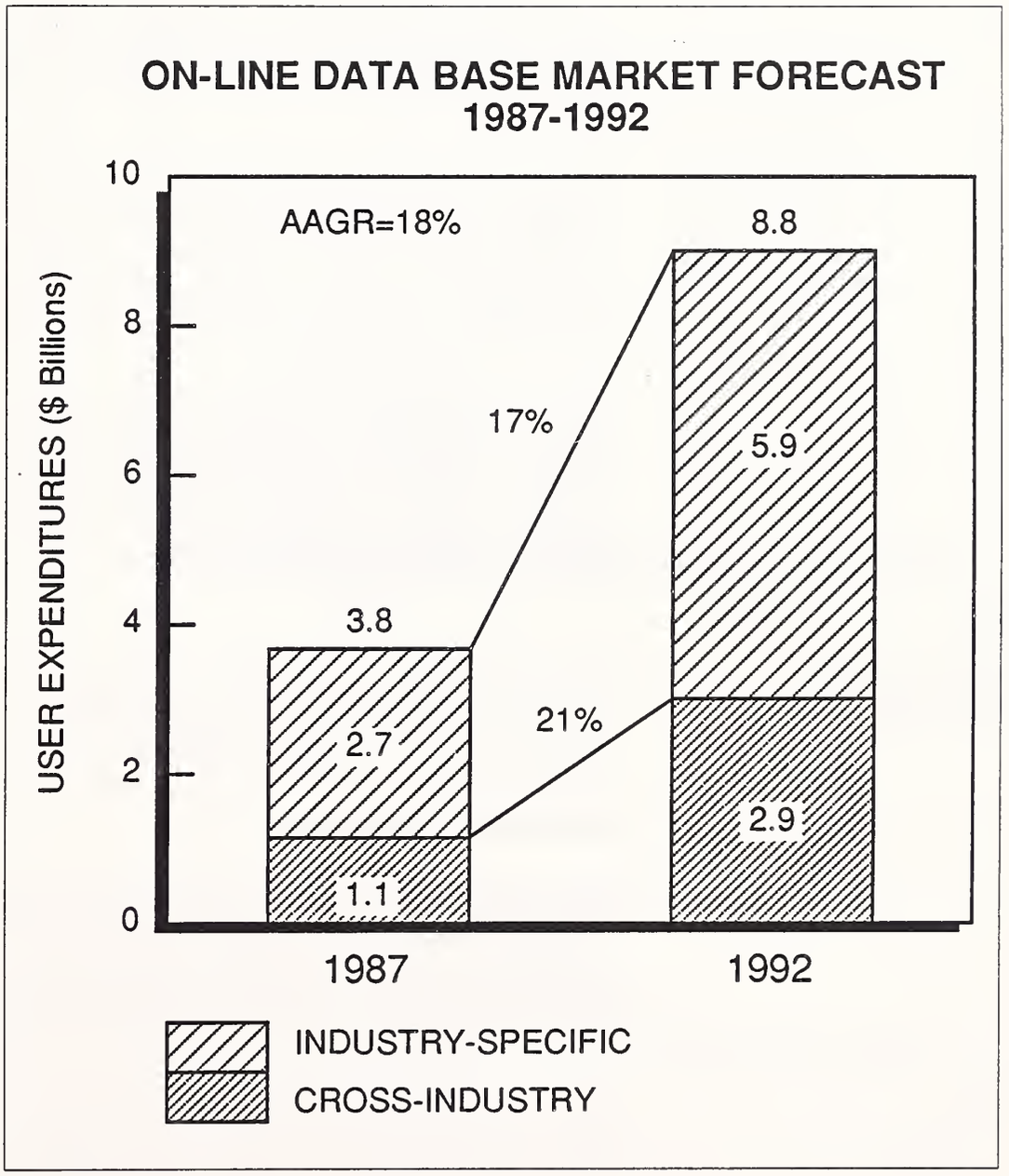
A new special niche in processing services is the new time-sharing requirement to have supercomputers available on a remote basis. The ability to use a CRAY, ETA, or large CDC mainframe on a remote access basis for limited periods of time is becoming quite popular. INPUT estimates this market to be $50-60 million in 1987, growing to approximately $220 million in 1992. The growth rate is 30%.

C

On-Line Data Base Services Market Forecast

The On-Line Data Base Services (OLDBS) Market is the second fastest growing segment of the Processing/Network Services delivery mode. Overall it is growing at an average annual rate of 18% over the five-year forecast horizon. User expenditures will be $3.8 billion in 1987 and will increase to $8.8 billion in 1992. Exhibit II-3 graphically depicts this market.

EXHIBIT II-3



Industry-specific OLDBS expenditures will grow at a 17% AAGR, as contrasted with cross-industry expenditures growing at 21% AAGR. In absolute size, however industry-specific OLDBS expenditures will be more than twice those of cross-industry in 1987.

The Banking and Finance industry sector will be 36% of the expenditures for OLDBS in 1992. The industry-specific data in the banking and financial markets is key to many multi-million dollar deals and has a high premium value associated with it.

In the cross-industry sector major newspaper chains are investigating ways to have more impact at the executive's desk by using OLDBS and videotex mechanisms. Executives require a method to stay current with news and industry developments that affect their businesses.

There are far too many OLDBS vendors offering the same services and capabilities. INPUT believes there will be a significant consolidation of vendors, with the large, established vendors starting to acquire the smaller speciality data base vendors, and/or with the smaller vendors dropping out of business because of poor profits.

The charges for OLDBS are likely to increase as the proposed FCC access charge for network-enhanced services is implemented. The FCC had postponed the access charges to provide an opportunity for the emerging OLDBS industry to flourish. Now that the industry is established, the charges will be implemented and will act as a catalyst to the expected consolidation.

D

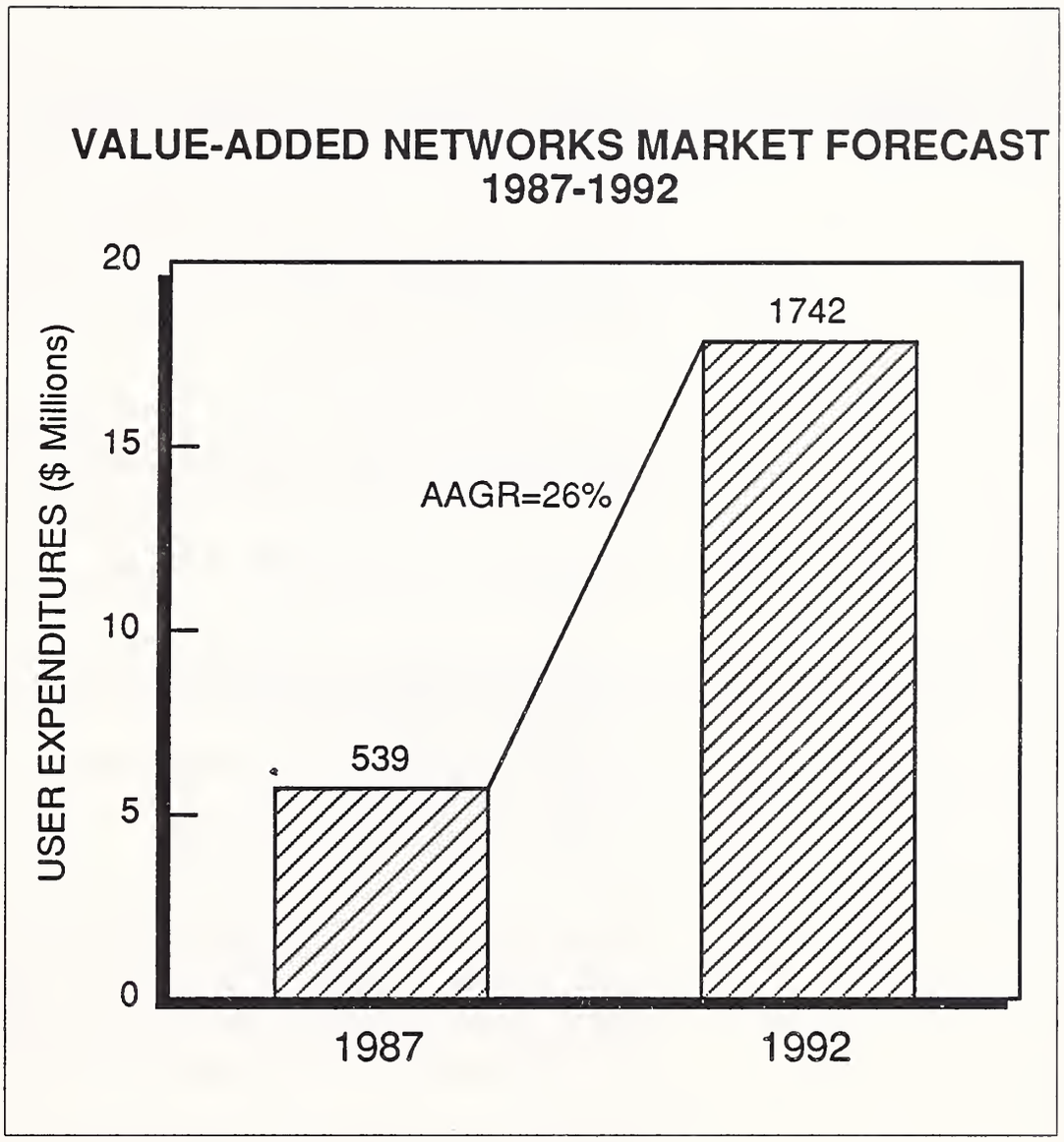
Value-Added Networks

Value-added network vendors are adjusting their marketing plans to target vertical industries as a way to maintain the high growth rates exhibited over the past few years. GE Information Services has been using a new approach of VARS to extend its penetration into key vertical/industry segments.

McDonnell Douglas (TYMNET) has been focusing on the Banking and Financial and the Manufacturing industry segments as a vehicle for continued growth. TYMNET also has been working with major credit card/check approval services to penetrate the electronic verification market, which is in its early stages of development.

The market forecast for VAN expenditures over the 1987-1992 period is shown in Exhibit II-4. VAN expenditures will grow from $539 million in 1987 to $1742 million in 1992, representing an average annual growth rate of 26%. Industry-specific applications will grow at a faster rate than cross-industry applications.

EXHIBIT II-4



Factors that are contributing to the growth of value-added networks are:

- The expected explosive growth of Electronic Data Interchange.
- The increase of On-line Data Base usage.
- The need to tie disparate locations together.
- The continued use of remote processing services.
- The emergence of videotex applications later in the forecast period.
- The use of virtual private nets to complement the true private nets being designed using T1 hardware.
- The significant improvement of VAN node hardware to provide more "local" functionality.

E

New Opportunities/ Recommendations

Processing/Network Services vendors are looking at new technologies and new applications to sustain their business growth. The Processing/ Network Services market is a mature market that requires considerable capital to enter as a prime participant at this point in time. The early vendors – such as ADP, Boeing, McDonell Douglas, Shared Medical, Equifax, and National Data – have all acquired companies or developed new application thrust to complement their original remote computing/ batch processing services.

Processing vendors are able to take useful applications and put them on a microcomputer, thereby offering a software product or turnkey system, depending upon how the application system is packaged and marketed.

Examples of new offerings that have revenue potential are:

- Electronic Credit Authorization.
- Electronic Document Interchange and Electronic Data Interchange.
- Software Product trials.
- Bulletin Board / On-Line Data Bases.
- Electronic Vaulting.
- Time-sharing to supercomputers.

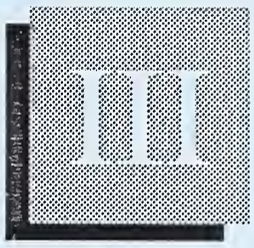
The developing of useful alliances will be a factor in continuing the growth of many Processing/Network Services vendors. Mtech and UC-CEL joining to solve banking needs is an example of the type of alliance that could be very productive. All vendors should realize that they cannot do everything and working together is acceptable.

Exhibit II-5 summarizes the action items for Processing/Network vendors to take advantage of new opportunities.

EXHIBIT II-5

NEW OPPORTUNITIES/RECOMMENDATIONS

- New Cost/Performance/Delivery
- Develop Alliances
- Look at New Technologies
- Develop Complementary Applications



Processing/Network Services Market Trends and Growth

Processing/Network Services Market Trends and Growth

A

Market Overview

1. Remote Computing Services

The Remote Computing Services (RCS) portion of Processing/Network Services is still suffering from the major "technological" change in how users work brought on by the PC revolution. INPUT does not believe the RCS business will entirely cease but rather will become a complementary tool, co-existing with PCs. The additional resources provided by remote access of additional memory, processing power, a major reservoir of storage, and communication connectivity (i.e. user interaction) will continue to provide the market with important tools.

Applications will continue to be spawned that take advantage of these resources and provide even more essential business system interaction between companies. An example of such an application is Electronic Data Interchange which has major industries in numerous discussions agreeing on procedures and standards to facilitate such interaction.

IBM has announced a very serious effort for the use of its Information Network (IN) to facilitate interaction between customers and its vendors. IBM has launched a thrust wherein its vendors will be encouraged to communicate directly through the IN facilities to replace the previous paper transactions between the two companies. In addition, IBM customers will be able to access important information that only IBM could provide through its network. Information on service criteria, PTFs, and training schedules and administration will clearly acclimate IBM users to the "communication" capabilities of the RCS facilities.

This strategy can work well for RCS vendors (e.g., McDonnell Douglas, Boeing, Computer Science) that can encourage their vendors and customers to "communicate" through networks to model the IBM strategy. The strategy (or is it a marketing thrust?) will have the effect of acclimating users to a new way of doing business that will be more timely and pro-

ductive for both parties involved. It also bootstraps companies into thinking about how they can stimulate their vendors to perform in a similar manner, thereby creating a domino effect.

Once users are on the Remote Computing Service, there is a small likelihood that "local" applications will be spawned by the familiar access; after all, the RCS vendor will generally support additional facilities to do utility processing and certainly will have mechanisms to gateway to data that it does not have immediately (and locally) available on its own system.

Digital Equipment Corporation has been letting customers interact directly through a terminal to enter orders, monitor equipment shipment status, and electronically communicate with its production process. This arrangement frees the salesperson to "sell" rather than administer the business needs of the account. This application is called Digital's Electronic Store.

2. Batch Processing

Besides the sustained growth of the core business applications of payroll, human resources, and billing applications, there has been a thrust into novel areas. The electronic vaulting of information started as a way to store key business information offsite electronically, rather than on discrete media such as tape.

Another major application area evolving is the disaster recovery capabilities that many organizations are examining. There is no doubt that most businesses are extremely dependent on an up-and-running computer system. For years this dependence has been true of the airlines industry in terms of reservations and passenger administration certainly the rise of ATM usage in the last few years has similar attributes.

In a similar vein SunGard and Comdisco have had success in contingency planning, and this is an ever-increasing need. DEC has a very "local" industry-specific effort headquartered in New York City. DEC's effort uses computer systems in Parsippany, N.J. to offer disaster recovery and special RCS/Batch Services to the Financial Industry.

DEC has also opened an Applications Center for Technology (in midtown Manhattan) and staffed it with a team of experts from commercial and retail banking, trading areas, and the general MIS area. The future use of ACTs suggests industry specialization, with centers that target industries with equipment and applications in other locations. For example, an ACT for Oil and Gas would likely be opened in Dallas or Houston, an ATC for Insurance could be set up in Hartford, etc.

A useful service being provided by RCS/Batch vendors is that of allowing users to evaluate application systems or packages prior to making a major investment that does not truly satisfy their needs. Thus hardware manufacturers are providing RCS/Batch services to allow users to try out application systems prior to making a commitment. IBM offers only its systems software and applications software in this regard, whereas DEC and NCR offer the availability of third-party software as well.

Furthermore, after a purchase commitment has been made, users are offered the ability to get a head start in implementing their applications by buying RCS/Batch time prior to delivery of their hardware systems. This arrangement provides the hardware manufacturer with an opportunity to reinforce the sale, to obtain incremental dollars prior to hardware delivery, and to start the learning curve.

Another important trend is the provision of supercomputer access (such as a CRAY, ETA, or CDC 7600) to companies in need of significant processing power on an interim basis. One small company (OPTICOM, San Jose, Ca.) acts as a broker to find excess capacity and/or specific applications software from a provider to match its customers'/prospects' needs. Most of the time the customers' needs are based on a project or task that is limited in nature or is for specific application software such as STRUDEL, NASTRAN, or SUPER SPICE. Generally the application requires unusual computational resource or has a large purchase price that precludes purchase by the customer for the limited use planned.

3. Processing Facilities Management

This segment consists of a vendor supplying processing services for its customers on equipment the vendor itself owns. This is contrasted with Professional Services Facilities Management, where the vendor supplies the personnel to run the computer systems that are owned by the customer.

The success of Facilities Management has to do with the desire of the management of the customer not to be intimately involved in the direct provision of an IS group. The Facilities Management vendor provides the expertise and resources to make the IS function a success, while providing a fixed-cost structure and comfort factor to its client's management.

Although there is some facilities management activity in all the industry market segments monitored by INPUT, it should be noted that the major facilities' success is localized in a small group of industries. Exhibit III-1 lists the five largest industry segments (the only ones over $100 million per year) that account for 90% of the Processing Facilities Management.

EXHIBIT III-1

PROCESSING FACILITIES MANAGEMENT 1987-1992

INDUSTRY SECTOR	USER EXPENDITURES ($ Millions)			AAGR 1987/1992 (Percent)
	1986	1987	1992	
Banking and Finance	990	1,131	2,151	14
Medical	383	442	811	13
Insurance	361	397	639	10
State and Local Gov't	347	406	722	12
Federal Government	213	223	337	9
Subtotal	2,294	2,599	4,660	12
Total–All Industry	2,547	2,876	5,108	12

B

Market Forecast 1987-1992

The overall prospects for the Processing/Network Services markets are good. This is the largest delivery mode and the most mature in terms of applications success and breadth. The ability of this delivery mode to show its resilience to microcomputers, workstations, private communications capabilities, and technology in general speaks of the importance and complementary nature of the services provided by this mode.

The overall Processing/Network Services market will grow from 1986 user expenditures of $18.3 billion to $20.9 billion in 1987, representing a 14% growth. INPUT is forecasting this growth rate to decline slightly over the five-year forecast view to 13%. The user expenditures in 1992 will be $38.2 billion. See Exhibit III-2

EXHIBIT III-2

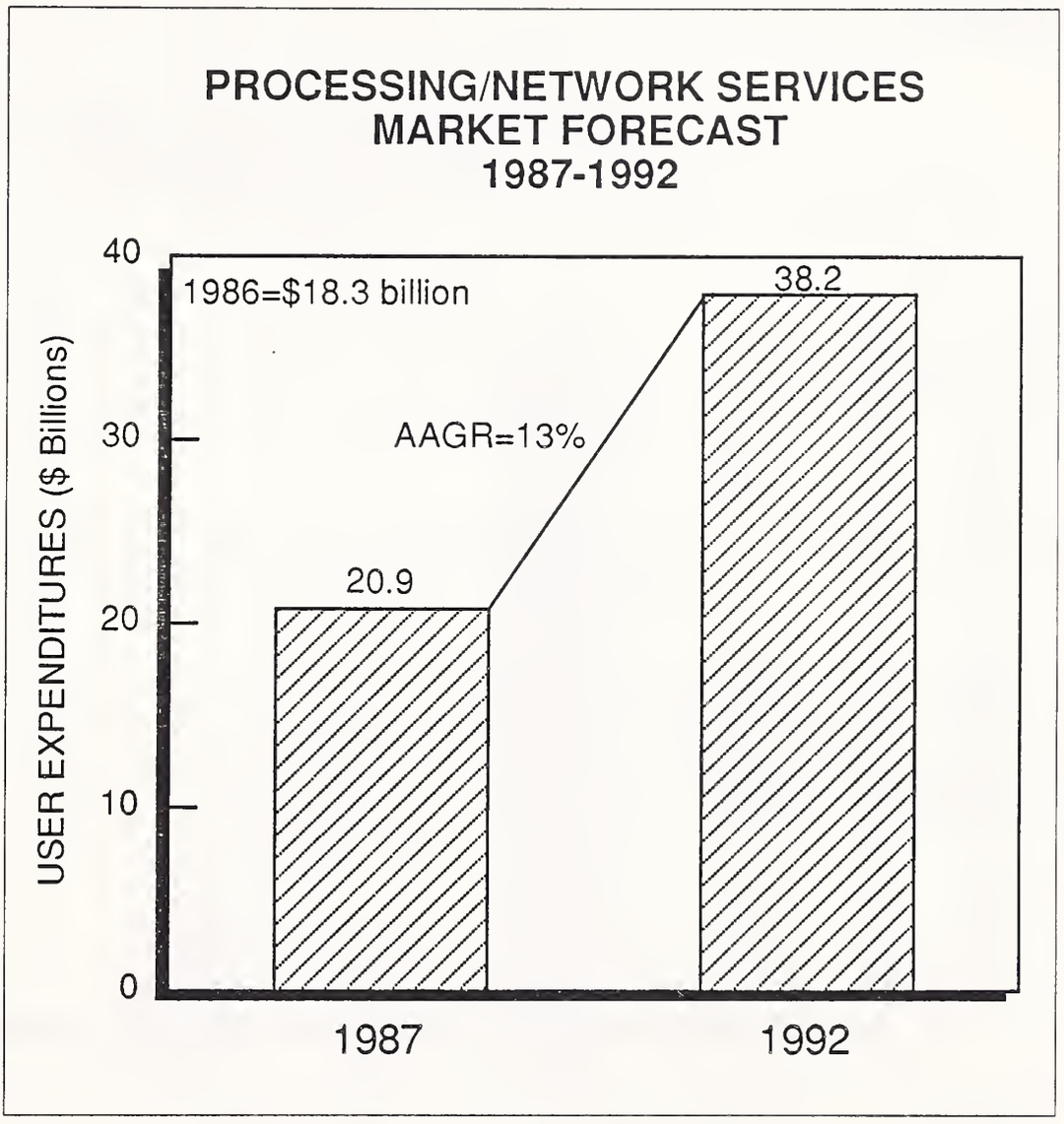
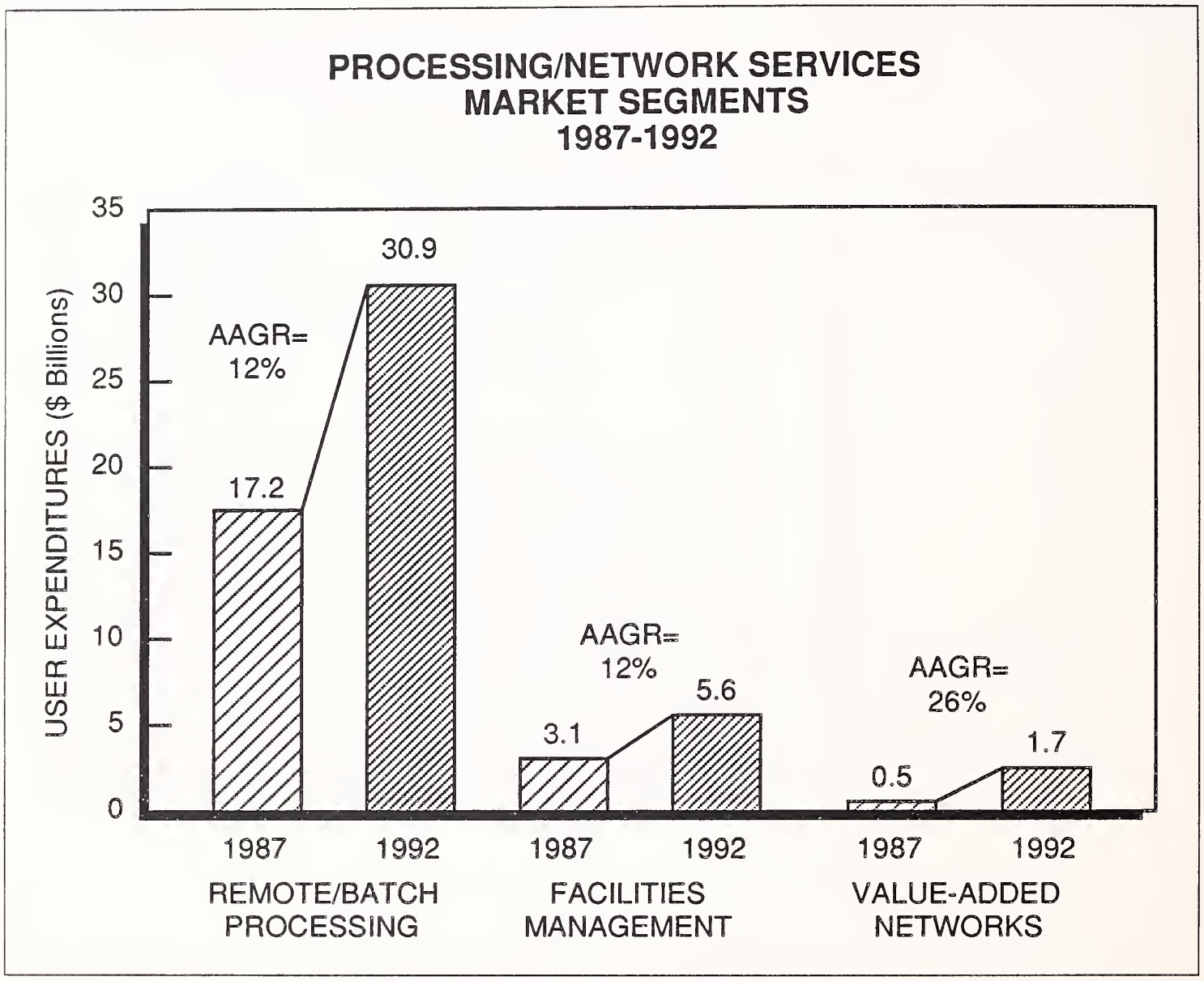


Exhibit III-3 shows the segments of the Processing/Network Services market as Remote Computing/Batch Services, Facilities Management (Processing), and Value-Added Networks. Both the Remote/Batch Processing and Facility Management segments in Exhibit III-3 include contributions from Utility Processing. The utility processing contributions are $2.4 billion for Remote/Batch and $208 million for Facilities Management in 1987, and $3.3 billion for Remote/Batch and $389 million for Facilities Management in 1992.

Remote Computing/Batch Services expenditures are continuing to grow at modest but steady rates. As the economy becomes more services-oriented, the need for timely information and responsiveness occurs. This change causes a need for Processing Services.

Remote Computing/Batch Services are becoming more desirable in several industry segments as a mechanism to improve their performance

EXHIBIT III-3



to their clients. Using outside service for the entire processing task is covered in the Facilities Management segment. However, there is a growing trend to rethink how Information Services activities are provided and how they may be obtained.

Banking is a very large user of processing services. Smaller banks (less than $300 million in assets) generally cannot afford the personnel, resources, and planning to have the comprehensive systems that are developed and supported by the large major banks. Smaller banks' choice is to obtain a turnkey system or use the processing services of vendors such as Mtech, First Financial Management Corp (FFMC), Norwest Information Service, M+I Data, or Citicorp Information Resources. Generally, small banks have opted for turnkey systems, although INPUT believes that this

situation is changing due to the applications complexity and the desire to stay contemporary with the major banks.

Midsized banks (between $300 million and $2 billion in assets) have generally been too big for the turnkey system solution, yet too small for the major commitment that the large banks have made. Midsize banks have engaged the vendors that provide processing services for banks.

Larger banks will farm out some of the specialized work and applications, such as trust processing, ATM network participation, and processing for discount brokerage transactions, as ways to complement the sophisticated systems they can justify and generate in-house.

Facilities Management is growing from $3.1 to $5.6 billion in the 1987 to 1992 period. This growth represents an average annual growth rate of 12%. The growth is predicated on two major trends.

- The continued investigation of the use of outside services to provide either the processing for an entire organization or a major application over a long-term agreement. An example of a major application is medical processing for state governments, e.g., the State of California medical processing contract, generally a five-year deal and recently won back by EDS from CSC.

- The completion of the commercial systems integration contracts that were initiated in the 1985/1986 period to provide large-scale mission-critical application systems. Now that these systems are coming on stream, INPUT has observed a growing tendency to have them reviewed for Facilities Management possibilities. The reason for reviewing is that the prime contract of that has built the system is intimately familiar with the system, clients, and mission and therefore would be well-suited to run or execute the delivered system.

C

Processing/Network Services—Industry-Specific and Cross-Industry Markets

The growth rates by industry for Processing/Network Services range from a low of 5% for the Federal Government to a high of 18% for Telecommunications. These are the growth rates over the forecast period of 1987-1992. The largest absolute growth, however, will be the Banking and Finance sector, which will more than double to $8.9 Billion — a growth of $4.5 Billion.

The low growth of Federal Expenditures is due to the serious efforts that will be made to balance the budget and the effects of the Gramm-Rudman legislation on federal procurement. The high growth of Telecommunications will be related to the requirement to have billing services, rates, regulation data, and other applications pertinent to its business activity. (Note that growth is based on a low expenditure level relative to the other

industries tracked. Telecommunications is currently 11th of the 14 industry segments INPUT monitors.)

Banking and Finance's growth is based on the assumption that an overall positive economy will continue to provide more services to the consumer and commercial sectors. In addition, the increase in stock market awareness will continue as the tax laws of 1986 practically require individuals to seek new investment strategies and instruments after all the tax shelter benefits were modified. The recent stock market plunge has also heightened the use of stock data information provided be processing vendors and on-line data base vendors.

On the average, the industry-specific group will grow at an average annual growth rate of 14%. The other major industry participants are Medical, Distribution, and Services. (See Exhibit III-4.)

The leading segment of Cross-Industry Processing/Network Services is on-line data base services, which is expected to grow at 23% during the 1987-1992 forecast period. On-line data bases have become a fundamental part of the processing/network business, underscoring the value of information in the U.S. economy.

INPUT has produced a separate report, *On-line Data Base Markets, 1987-1992,* that discusses this fast growing segment of the industry. Exhibit III-5 details the Cross-Industry segments. The entire Cross-Industry segment is growing at 11% a year which is slower or less than the Industry-Specific segment.

D

Largest Processing/ Network Services Vendors

The largest independent Information Services vendor continues to be Automatic Data Processing, which received $1135 million in revenue in 1986. ADP's track record since 1961 has been consistently positive. Exhibit III-6 shows the five largest Processing/Network Services Vendors.

In Exhibit III-7 the fastest growing Processing/Network Services vendors are listed; these vendors are companies/organizations that are in speciality markets of the Processing/Network Services market. These speciality markets are shown in Exhibit III-8. Note how they are oriented toward industry-specific applications.

EXHIBIT III-4

PROCESSING/NETWORK SERVICES INDUSTRY-SPECIFIC MARKETS 1987-1992

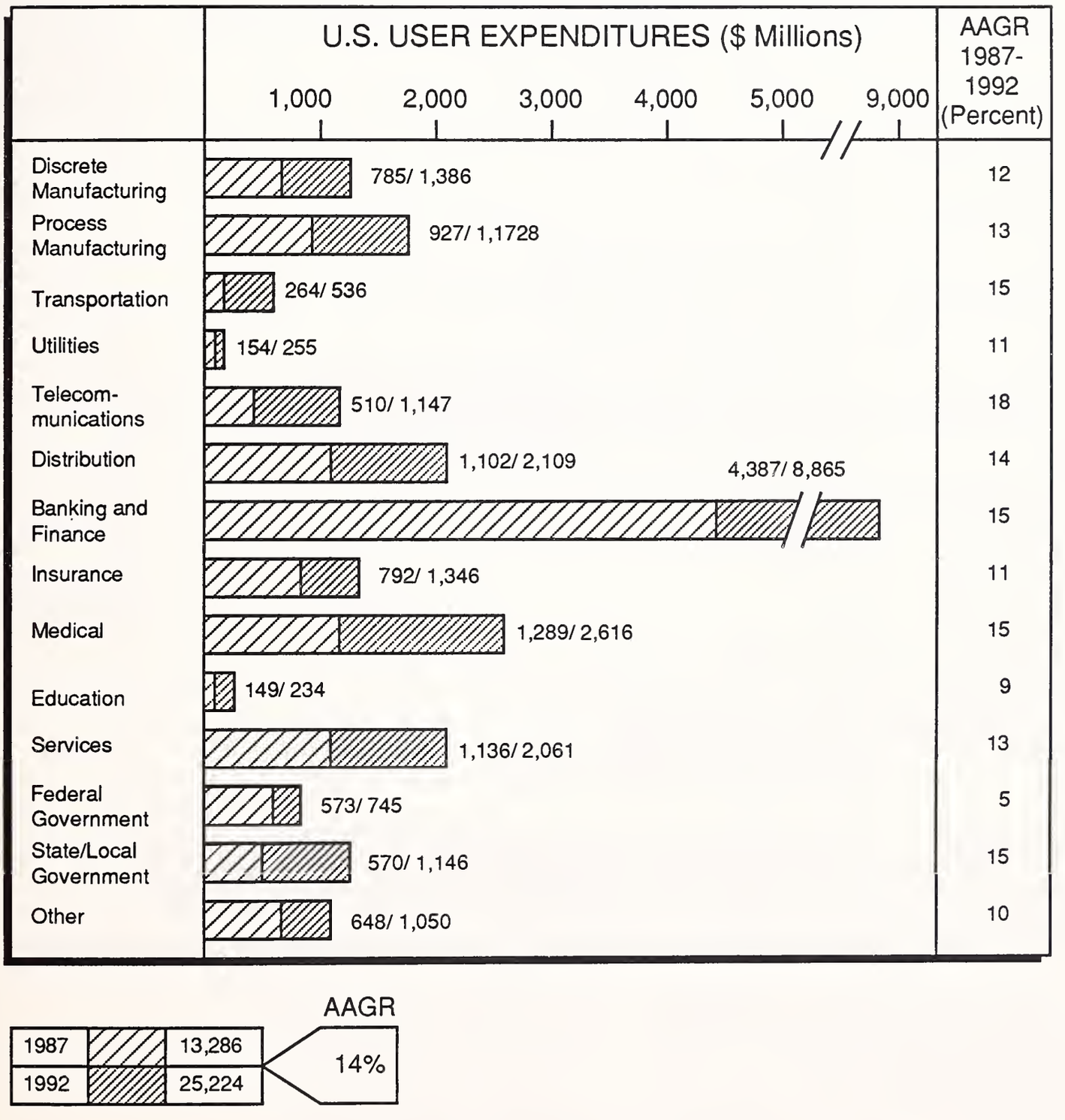


EXHIBIT III-5

PROCESSING/NETWORK SERVICES
CROSS-INDUSTRY MARKETS
1987-1992

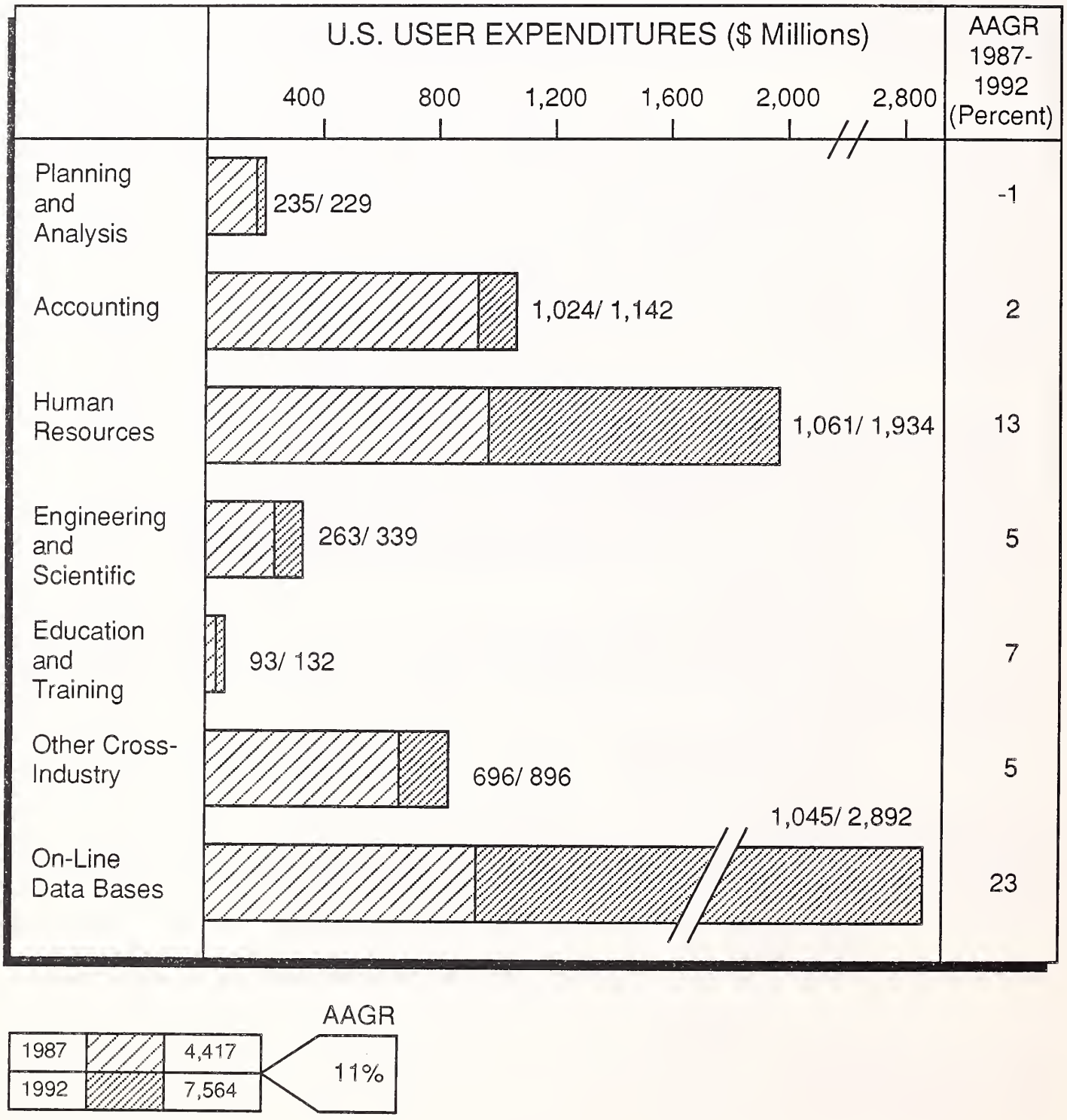


EXHIBIT III-6

PROCESSING/NETWORK SERVICES
LARGEST VENDORS
1986

VENDOR	REVENUE ($ Millions)
Automatic Data Processing	1,135
Electronic Data Systems	788
Control Data	600
McDonnell Douglas	470
Equifax	302

E
Competition

1. RBOCs

The RBOCs created three years ago are cash-rich organizations with a pent-up desire to enter the Information Services and computer hardware business. In the latest review of the Modified Final Judgement, Judge Greene continued to limit the RBOC's ability to directly enter the Information Services market with telecommunications products.

Judge Greene did allow for joint ventures with information services companies and acquisition of non-telecommunications firms. Gateways can be provided to allow transmission for videotex, electronic mail, and on-line data bases – but the direct creating and providing of such services is expressly prohibited.

An example of what is allowed is the joint venture between Ameritech (Chicago, IL) and Inet (Chantilly, VA). Similar ventures are likely by the other RBOCs.

Another example of participation in the Information Services industry by RBOCs is Ameritech's acquisition of Applied Data Research in late

EXHIBIT III-7

PROCESSING/NETWORK SERVICES
FAST GROWING VENDORS
1986

VENDOR	REVENUES ($ Millions)	1985-86 GROWTH (Percent)
GTECH	75	188
FIserv	63	114
CC Information Services (Formerly Certified Collateral)	14	89
CCX Network	22	67
CUC International (Formerly CompuCard)	128	62

1985. INPUT has observed ADR through 1986 and most of 1987, and there were no apparent new announcements or products resulting from the acquisiton.

However, in September, 1987, ADR announced several new products in software, financing credit terms for software purchases, and a voice mailbox enhancement for electronic mail. Although none of these announcements are immediately pertinent to the Processing/Network Services delivery mode, these announcements do show the deep pockets and major investment interest possible from the RBOCs and the latent power that is sitting on the sidelines anxious to participate.

INPUT believes the RBOCs will eventually be allowed to enter their more natural product domains, which do fit more closely with the Processing/Network Services delivery mode products through full vendor services for on-line data bases, voice and text electronic mail, value-added network services and processing services, such as remote computing/batch services and utility processing.

EXHIBIT III-8

PROCESSING/NETWORK SERVICES MARKET GROWTH LEADERS SPECIALTY AREAS

COMPANY	SPECIALTY MARKET
GTECH	Lottery/Gaming Processing
Fiserv	On-Line Processing for Thrifts (S&L, Savings Banks)
CC Information Services (Formerly Certified Collateral)	Vehicle Valuation for Insurance Industry
CCX Network	Direct Marketing Data Bases
CUC International (Formerly CompuCard)	Consumer Services in Travel, Legal, and Shipping

This change will happen as the comfort level of the trade associations such as the Information Industry Association and ADAPSO observe that competition will be better than anticompetitive behavior. The RBOCs have "deep pockets" and massive capital sunk in a communications backbone that could be leveraged inappropriately if not restrained by regulatory watchdogs. However, the RBOCs lack some fundamental qualities in the Processing/Network market, such as expertise, sales, marketing, service, and an installed product base. These are viewed as serious limitations to the RBOCs' desired success.

INPUT has observed the efforts of AT&T to become a major success in the computer industry as a hardware vendor and sees an analogy to how the RBOCs would fare if their business desires were yielded to at this time. It is fairly clear that the same lackings have been factors in why AT&T has yet to achieve success in the computer business.

The RBOCs will continue to buy into the Information Services industry due to the exciting rate of return on investment the industry provides. The

likelihood is that the buy-ins will be in the non-telecommunications markets. INPUT believes the RBOCs in the near term will take advantage of the joint relationships allowed in the new rulings of the MFJ review to establish "toeholds" in the more "native" business segments. Simultaneously, the RBOCs will be looking for participation in the software and professional services delivery modes to provide short-term, more-efficient investment of their resources.

Examples of some recent activities are:

- Ameritech, Telenet Communications, and Bell Canada Enterprises formed the iNET Company of America; this information services entity will offer iNET in the U.S. – a gateway service based on Bell Canada's iNET 2000. The new company will provide access to information data bases, data confrencing, electronic messaging, and EDI protocol support. Other RBOCs are believed to be interested in participating.

- NYNEX purchased an option for one-half of Tel-Optik, a company set up to provide a fiber optics transmission service across the Atlantic. The Modified Final Judgement does not allow the offering of long-distance services, but does not restrict equity participation in companies providing long-distance service.

2. Vendor Profiles

There are numerous companies that serve the needs of the user community in the Processing/Network Services delivery mode. In the next few pages several companies are profiled to give a sense of their efforts to provide more comprehensive services. These companies are not necessasarily the largest, the closest to the leading edge, etc. They were chosen mostly at the discretion of the researcher to show a cross-section of companies that have been successful and how they have been able to prosper in the Processing/Network Services delivery mode.

a. Automatic Data Processing (Roseland, NJ)

ADP was formed in 1949 to perform payroll services. It has since grown to be one of the largest information services providers in payroll and accounting services; brokerage, banking, and thrift services; automobile dealer services; and collision estimating for the insurance industry. ADP has been improving its profits and revenues by double digits for over 30 years. In the fiscal year June, 1987 revenues were $1,384 million.

ADP acquired the Bunker Ramo Information Systems in February, 1986. This stock quotation service is provided to over 25,000 users in the securities industry. Financial services account for over 25% of ADP's revenue.

Another fast growing area for ADP is Collision Estimating Services (although only 4% of ADP's business), which provides computerized services for estimating automobile repair and related claims.

ADP obtains 45% of its business from payroll services and related products. It has a joint payroll marketing relationship with over 800 commercial banks, many of which formerly did payroll processing for their customers. ADP's automated payroll tax impound and filing service processes and remits federal, state, and local withholding taxes. ADP has over 50,000 clients for this service.

ADP has acquired quite a number of companies over the years and has been very successful in integrating them into the total ADP operation. Lately the company has been growing "organically," but it is difficult to imagine sustained growth in double digits when that means growth by over $100 million each year.

INPUT believes that ADP will be trying to enter an emerging market (such as EDI) that could leverage ADP's business base and financial resources. In addition, acquisitions are not to be ruled out.

b. CompuServe (Columbus, OH)

CompuServe was founded in 1969 to provide remote processing. It currently has grown to provide electronic mail services, on-line data base access, a data base management system tool, and value-added network services. CompuServe has also distinguished itself as the largest provider of communication and information processing services to microcomputer users.

Revenues increased in the most recent fiscal year by 21% and broke $100 million for the first time. Nearly 1300 corporations rely on CompuServe's proprietary value-added networks (some 200+ nodes), business information, and on-line data bases services (data base management systems, remote computing, EDI, and home shopping). There are also over 350,000 microcomputer subscribers utilizing bulletin boards, electronic mail, and forum services.

CompuServe has been a wholly owned subsidiary of H & R Block since May, 1980. It has been very aggressive lately in forming alliances that should allow it to grow the "critical mass" of services and users. Examples are:

- It entered into an agreement with Computer Sciences to jointly market electronic communications systems and business-related services in Europe and the Far East. This agreement follows another agreement to offer on-line data bases in Japan with two Japanese companies: Fujitsu and NISSHO IWAI.

- CompuServe has a "bundle" agreement with several manufacturers of personal computers to provide CompuServe with the use of on-line data base and consumer-related products. CompuServe also is selling its subscription kits through retail outlets such as Sears Business Centers and Walden Books.

- The company acquired The Software House in December of 1986. Software House provided 1022 and 1032, a DBMS in the DEC environment. This acquisition offers an interesting possibility of selling DBMS services to on-line data base users and vice versa. There are currently 400 users of Software House products.

- CompuServe has developed an agreement with MCI to interconnect MCI's electronic mail box services, thus permitting more than 500,000 users to communicate with each other.

- CompuServe has positioned itself to take advantage of the fastest growing segments of the Processing/Network Services market, i.e. on-line data bases, value-added network services, and EDI. The company also has struck important alliances and developed new distribution channel thrusts that should allow it to maintain revenue and profit (contribution) growth.

c. Computer Language Research (Carrollton, TX)

CLR has been a major participant in the tax-processing business and used its expertise to enter additional product markets such as forms, generation hardware and software, and EDI. It has had product development expenditures in the past couple of years that have exceeded 15% of revenue.

Overall company revenues have declined as the number of microcomputer software products that perform tax processing have impacted the tax processing business. CLR itself offers standalone software. The Electronics Forms Systems software and hardware systems have increased in revenue but also had an impact on the profits of the company as it ramps up this new activity.

CLR has expanded its tax business by acquiring software packages to develop a new product, FAST-TAX Corporate Series Software, to serve large corporate tax departments. Thus CLR is broadening its core business and providing analogous services to its large prospect base.

CLR is an example of a company that has attempted to take technology developed for its original business, i.e., tax processing, and use it to enter complementary applications or new business areas. The software developed to do the tax processing drove the Xerox 9700 laser printer to create the multitude of forms that make up a tax package on a dynamic basis. This development lead to software technology to drive remote laser printers; the developing of hardware to support printing; and the development of other applications such as insurance forms, real estate forms, and the Electronic Forms company itself. Finally, to complete the development process CLR developed EDI capabilities to allow forms (i.e. tax) to be transmitted to the IRS directly and of course in the general sense to allow intercompany EDI communication.

d. DIALOG Information Services (Palo Alto, CA)

This subsidiary of Lockheed has been providing on-line data base information retrieval services since 1972. Its main competitors are Mead Data Central, and Dow Jones in the business data base area, and BRS and Pergamon Orbit in the bibliographic data base area.

DIALOG receives the majority of its $90 million revenues from on-line data base services, but also is offering DIALNET as a telecommunications network and DIALOGLINK as a microcomputer communications software package. The latter are natural and complementary services to provide more product capability for its users and prospects. DIALOG augments its own network with the other VANs as necessary.

DIALOG is currently providing access to over 300 data bases with 120 million records. There are approximately 80,000 customers in 80 countries.

DIALOG is offering a service called DIALOG ON DISC, which combines the search capabilities of the DIALOG system coupled with data on a CD-ROM. The initial data base offered was from the U.S. Department of Education. MEDLINE and NTIS data bases have been announced as additional data bases that will be availble on CD-ROM.

The Dialog Medical Connection service was introduced in 1987 to provide on-line access to comprehensive medical information for physicians, researchers, and other medical professionals.

e. ISI Systems (Braintree, MA)

ISI provides transaction processing services and application software products to the property/casualty segment of the insurance industry. Its

revenue in the last fiscal year (6/87) was $31.7 million. ISI was founded in 1969, acquired by Grumman Data Systems in 1976, and returned to a separate private company through a leveraged buyout in July, 1986. In January, 1987 it went public, raising $14 million.

ISI has developed comprehensive software to allow insurance companies in the property/casualty segment to obtain current assigned risk rates, automated underwriting, policy issuance, forms design, and regulatory compliance.

ISI provides the Massachusetts Automobile System. This system keeps track of the automobile insurance rates regulated by the state, which are subject to change. MAS keeps track of these changes for its clients and handles policy processing. It also supports direct billing to insureds and agency billing, including commission statement preparation.

Like most industry-oriented processing companies, ISI has had to put its old software and/or new software on IBM and compatible microcomputers. It also has had to continue to offer complementary products to further substantiate the business relationship.

ISI uses numerous IBM and COMPAQ microcomputers for in-house use and development. To provide transaction processing services, ISI uses an IBM mainframe that is owned and operated by CITICORP Information Resources (Greenwich, CT).

f. Mtech (Dallas, TX)

Mtech provides processing services, software products, and professional services to the banking and finance industry. It provides an automated teller machine network for banking and a point-of-sale network marketed to the retail industry. Mtech was founded in 1968 to provide processing services for commercial banks.

Mtech has aquired a number of small processing companies providing services for banks. The majority of Mtech's remote computing services were derived from interactive processing services provided to over 600 commercial banks and 150 thrifts in 11 states.

Mtech developed and operates Mpact, one of the nation's largest shared ATM networks for electronic funds transfer. Mtech has installed ATMs in Safeway supermarkets and is a member of CIRRUS, a national ATM network. Under the CIRRUS program, 42 million customers from 14 banking organizations covering 46 states have access to over 10,000 ATMs.

Mtech has also introduced the Mpact Express point-of-sale program in Texas. Over 165 retailers will install 10,000 POS terminals to accept an Mpact debit card for payment of goods and services. Some of the participants are Mobil Oil, Exxon, Pacific Stereo, Kroger, and Tom Thumb Supermarkets.

In 1987, Mtech entered into a joint effort with UCCEL to obtain state-of-the-art software, couple it with processing power and offer a solution to a major new customer in Texas. The approach of working with a large software vendor and providing processing responsibility is one that should be reviewed by other processing firms seeking to enhance their own product offerings.

g. National Data Corp (Atlanta, GA)

National Data Corp was incorporated in 1967 to provide specialized data processing and facilities management services. The company currently provides processing services; professional services; turnkey systems and facilities management, primarily in the areas of cash management, credit card authorization, and processing; health care; and telemarketing.

The company's credit card services have become a leader in the fast-growing electronic authorization market while still maintaining its voice authorization leadership position. National Data authorizes more than 200 million bank card transactions annually. Two-thirds are processed electronically. There is a growing trend toward authorization on every transaction. It is expected that 70% of all bank card transactions in the year 2000 will be electronically authorized. Currently only 20% are authorized in this manner.

The Electronic Data Capture (EDC) application uses an intelligent terminal to authorize a transaction, capture transaction data, reconcile the transaction with sales tickets, and transmit it to NDC for processing, thereby releasing funds for the merchant. There are currently 25,000 EDC terminals that NDC has placed at 700 retailers, triple the penetration of a year ago.

NDC has been providing value-added services to the health care industry through a pharmacy management application. NDC developed a microcomputer-based version similar to that of other processing companies that had successful remote computing applications. The microcomputer version was so successful that the on-line system was totally shut down.

Telemarketing Services is a relatively new area where NDC has emerged as a leading provider of operator services for long-distance telephone common carriers. This complements NDC's strength in both inbound and

outbound telemarketing, especially for cable television direct response. Direct response allows consumers to dial an 800 number to interact with a vendor to obtain services. National Data provides these services for eight of the nation's ten largest cable networks. These services can be duplicated for the emerging catalog and home-shopping television services as well.

In 1986, NDC sold the business segment that contained Rapidata (acquired in 1981) to Electronic Data Systems (Dallas, TX). The Rapidata group no longer was compatible with the other specialized services and industry-specific applications and had several years of declining revenues and profitability.

h. Shared Medical Systems Corp (Malvern, PA)

Shared Medical Systems (SMS) was formed in 1969 to provide computer services to the hospital segment of the medical industry. It went public in 1976 and is currently the largest computer services vendor in the medical industry. SMS achieved revenues of $375 million in 1986.

100% of SMS' revenue comes from providing processing, application software products, professional services, and turnkey systems to the health care industry. Thus, although 75% of SMS' revenue comes from processing, the company has grown by offering complementary services in other delivery modes, as well as by providing functional breadth in its applications suite.

SMS has tried to expand internationally but was not as successful as it had been in the U.S. An affiliate in Japan (45% owned by SMS) was shut down in 1986 and a $20 million write-down was required.

SMS has significant IBM hardware in its data center in Malvern, PA. It has branched into the DEC world through an acquisition in 1985 of Computer Synergy Inc., a supplier of turnkey systems to perform financial applications for hospitals. Although most of SMS' applications are for acute-care hospitals, it has branched out to offer services to physicians.

- Major competition for SMS is as follows:
  - Processing : McDonnell Douglas Health Information Systems; Blue Cross.
  - In-house systems : IBM; HBO; Baxter-Travenol.
  - Professional services : Cycare; Arthur Anderson.

i. Systematics Inc. (Little Rock, AR)

Systematics was founded in 1968 to provide facilities management and disaster recovery processing services, applications software, turnkey systems, and other related services to the Banking and Finance industry. In its most recent fiscal year (ending May, 1987) the company had revenues of $141.6 million, an increase of 15%.

Systematics derives all of its revenue by providing products serving the Banking and Finance industry. The company has been systematically expanding from its primary processing facilities management business into software products, professional services, and turnkey systems.

In 1986 Systematics acquired two firms to further that expansion:

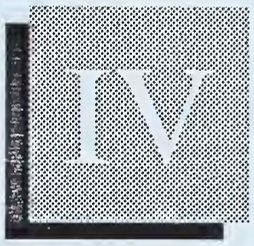
- Matrix Management (Dallas, TX) to perform management consulting in the financial services segment
- Chanin Consulting Services (New York, NY), which provides software for securities-lending applications for large trust departments.

Systematics is extremely committed to the education and training of its personnel and clients. Its plans are to spend $20 million over the next five years for continuing education and training. This could be turned into a P+L activity, given the appropriate circumstances and business basis.

Major competitors are:

- Processing (FM) : EDS (Dallas, TX).
- Applications Software : Kirchman Corporation (Orlando, FL), Hogan Systems (Dallas, TX), and Computer Associates (UCCEL – Dallas, TX).
- Turnkey Systems : Kirchman Corporation (Orlando, FL).

Systematics operates 51 data centers in 24 states. All the data centers house IBM equipment ranging from 4341s to 308X's. Systematics also provides network support for automated teller machines, point-of-sale terminals, audio response units, and other generally available banking peripheral equipment. The majority of Systematics' 56 FM clients are commercial banks with deposits of over $250 million. These are clients that account for approximately 74% of Systematics revenue.



On-Line Data Base Services Market

On-Line Data Base Services Market

A

Market Trends—Overview

The On-Line Data Base Services market has continued to grow at above-average rates within the Processing/Network Services delivery mode. The market in 1986 was $3.2 billion, representing 17% of the Processing/Network Services delivery mode. The market will grow by 20% to $3.8 billion in 1987 and continue growing at an AAGR of 18% to reach $8.8 billion in 1992. The On-Line Data Base Services market will represent 27% of the Processing/Network Services market in 1992.

The major factors stimulating this growth include:

- The propensity to obtain data, information, and knowledge that can be quickly processed to provide a competitive advantage in a business environment. The need for timely data is especially true for numerous PC users who have sophisticated LOTUS 1-2-3 models that need "live" data to provide information for an informed decision to execute. An example of an important application is the timing of the purchase of securities, i.e., portfolio insurance, based on imbalances between stock futures and the underlying stock prices making up stock future averages.

- The competitive posture of Information Producers and Information Vendors to bring to the market special data bases that were not generally accessible except in hardcopy form. Using communication network capabilities makes information available on an instantaneous basis. There are now some 3300 data bases available from 1480 information producers and 450 information vendors.

- The availability of PCs that can easily access information and then conveniently process or use it without having to re-enter the data or information. Thus the ability to communicate easily and then use the data in a dynamic fashion provides additional value to the information.

This additional value translates into access/information charges that can be highly value-added or premium priced.

- Key vendors have become large-scale distributors of numerous and diverse data bases providing common user interfaces. This distribution allows data base information users to have convenience and comfort in accessing multiple data bases. Previously, each data base had its own command language and interface, a situation that presented great difficulties for casual users.

B

Market Forecast - On-Line Data Base 1987-1992

The largest industry-specific user of on-line data bases continues to be the Banking and Finance sector, which expended $876 million in 1986. The majority of these expenditures were for credit card and check verification processing and for on-line stock quotation systems. Exhibit IV-1 shows the industry-specific expenditures in revenue order for 1986.

The next largest industry sector, was the Services sector which used $299 million for data base information, primarily by lawyers and real estate professionals.

In the cross-industry sector of on-line data bases, the largest expenditures were for credit-reporting services. The fastest-growing on-line data bases category is News-Based services, growing at 30% AAGR. Many major newspaper chains are experimenting with providing on-line delivery forms to apprise institutions and users of news pertinent to the institution/users. For example, certain news topics or company names would be selected and news on those topics or companies would be made available and effectively down-loaded to the user's computer system. Cross-Industry sectors are shown in Exhibit IV-2.

The continued growth of the Banking and Finance sector is based on the sustained activity of the stock market, sophisticated computer applications attempting to forecast winning investment scenarios, and the overall positive confidence of the consumer. As a result of the stock market crash INPUT believes there will be a slight increase in the use of stock quotation data as institutions and individuals track the stock and commodity markets with an increased interest.

C

Competitive Environment

INPUT believes there are far too many Information Providers and Information Vendors even though the market is growing at an above-average rate. Information Providers are companies that manufacture or process the data to provide useful value-added information. Information Vendors are enterprises that make the information available and market it to the information user.

EXHIBIT IV-1

ON-LINE DATA BASE INFORMATION SERVICES BY INDUSTRY SECTOR FORECAST EXPENDITURES FOR 1987-1992

INDUSTRY SECTOR	USER OLDB EXPENDITURES			AAGR 1987/1992 (Percent)
	1986	1987	1992	
Banking and Finance	876	1,010	2,124	16
Services	299	337	670	15
Distribution	235	296	747	20
Process Manufacturing	200	231	408	12
Medical	149	189	483	21
Discrete Manufacturing	149	178	416	19
Insurance	92	103	182	12
Telecommunications	75	95	265	23
Transportation	67	74	155	16
Education	56	62	107	12
Utilites	28	32	50	9
Federal Government	16	20	60	25
State & Local Gov't	14	19	41	16
Other	65	81	167	16
Total	2,321	2,727	5,875	17

EXHIBIT IV-2

ON-LINE DATA BASE INFORMATION SERVICES BY CROSS-INDUSTRY SECTOR 1987-1992 User Expenditure Forecast

CROSS-INDUSTRY SECTOR	USER OLDB EXPENDITURES			AAGR 1987/1992 (Percent)
	1986	1987	1992	
Credit	274	322	585	13
Securities	183	237	747	26
News	180	243	906	30
Economic/Other	104	133	376	23
Text/Bibliography	92	110	278	20
Total	833	1,045	2,892	23

A rough analogy would be that of a typical manufacturing company building a product. The product is then delivered to a distributor who in turn puts it into a retail environment to sell to an end user. In the on-line data base environment there is only one intermediary (generally) between the information producer and the end user. However, several organizations recently have been offering the ability to subscribe to specific data bases and through them relieving the user of the need to individually access different data base providers.

Information Producers are companies/organizations such the AP news wire, Standard and Poors, Reuters, Dow Jones, Data Resources, the AMA (American Medical Association), McGraw-Hill, Dunn & Bradsteet, etc.

These companies have special expertise in tracking the data and provide the appropriate attention to collecting, scrubbing, and validating of the data. These companies make the data available to the information vendors.

Information Vendors put the data on their computer systems, tie in or provide a network, and market the OLDB products to end users. Examples are Lockheed's DIALOG (Palo Alto, CA) , MEAD Data (Columbus, OH), Telerate (New York, NY), and the National Library of Medicine (Bethseda, MD).

With the number of companies already established in both segments of the data chain, there is little likelihood of a new producer or vendor emerging. INPUT believes there will be a market shake-out, mostly in the vendor segment, as many vendors are already duplicating the information of other vendors. In other words, there is no market need for more than a handful of vendors for any specific data. For example, there is little to differentiate stock data among vendors. Thus price and user interface and support issues become important. Vendors will want to have more product (i.e. more data bases) to encourage better networks, computer resource utilization, and the ability to amortize fixed costs over several products.

A key factor in the growth of on-line data base usage will be the FCC's recently proposed access charge, which would increase the costs of the VANs to access the communication lines of the phone companies. If the VANs incur additional costs, it is logical to assume they would pass these charges to customers (generally information vendors). Likewise the information vendors will pass the charges along to users.

The increased charges will have a major effect on the current lower-priced OLDB services. INPUT (which considers the inexpensive bulletin board services an OLDB service) foresees that certain low-priced, low-value-added data bases would have a difficult time raising their rates by a factor of two or three. [Note that the proposed access charge is in the $4.50 to $5.00 per hour area.] However high-priced, high-value-added data that cost hundreds of dollars per hour would have little trouble getting their clients to pay a few additional dollars.

Interestingly, the access charges being proposed are really a rescinding of an exemption from the idea of "enhanced services" paying these charges in the original tariffs proposed. The exemption was primarily based on the desire of the Federal government not to choke an emerging industry, i.e. OLDBS.

INPUT believes that the FCC may continue the exemption for several more years, based on the groundswell of letters and comments being made in the OLDB market by Information Providers, Information Vendors, VANs and many users. However, what seems inevitable is the fair application of the tariff structure, which suggests that the exemption will be rescinded and those businesses that were barely successful will consolidate or cease to exist.

INPUT has written a major report providing a comprehensive view of the on-line data base market entitled "On-Line Data Base Markets 1987-1992," which should be consulted for significantly more information on this high-growth market.

D Videotex Status

Videotex is a market opportunity that was identified almost a decade ago and has yet to materialize. The current strategy is to become more focused.

There are a number of organizations and joint ventures that are looking for participation when and if something happens – these organizations do not want to miss something. So far there has not been much to miss.

Examples of ventures or investment in this area are:

- AT&T, Chemical Bank, Time, and The Bank of America.
- Several major newspaper chains have invested tens of millions of dollars in trying to enter the market. Examples are Knight-Ridder in Florida (Viewtron Service) and Times-Mirror in Los Angeles (Gateway Service). None has had any success.
- IBM, CBS, and Sears have formed TRINTEX.
- NYNEX, RCA (now GE), and CITICORP have a joint operation.

The concept and technology have been around for almost a decade, and the expectation is that it will be the next decade before any appreciable revenue is expended. The technology has not as yet exhibited a cost-effectiveness nor the ability to meet a user requirement. Although significant success has been observed in France, it should be noted that the underlying basis was not by choice.

The French government gave away the terminals and provided services through the Minitel network – services such as phone directory services, shopping, banking, and insurance that were no longer duplicated by traditional methods. For example, the printed phone directories were no longer provided "for free," so the government forced users to utilize the services. There is no doubt that the forceful technique the French government used has become quite successful and has acted as a catalyst to promote some 4400 service providers for shopping, banking, insurance, and other services. There are 2.5 million users that spent $137 million in 1986.

INPUT believes the French Government's giving away over 1.5 million terminals was a bold move that is paying off. It is analogous to the razor/

razorblade concept. It is unlikely that the U.S. government would duplicate such a strategy and only remotely possible that a large U.S. Information Services vendor would do so as well.

However, a test-marketing of an American Videotex project is occurring in Houston, TX; the project is provided by U.S. Videotel. The goal is to place some 30,000 terminals per year in conjunction with Southwestern Bell Telephone. The subscription fee will be $18/month (terminal from TELIC-ALCATEL included) and $0.10/minute for the network's basic services. Videotex for one more year is still on the verge of happening.

Value-Added Networks

Value-Added Networks

A

Market Trends—Overview

VANs are selling their services using a vertical market emphasis, such as oil and gas, medical supplies, and telecommunications interchange.

Traditional VANs such as GE Information Service, Tymnet, and Telenet are being threatened by some Fortune 500 companies that are reselling a portion of their private networks. Examples include American Airlines and Sears Communications. Advanced Micro Devices switched to Sears from Telenet for enhanced SNA support at a lower price. IBM shops have used VANs but can get more service out of tieing into existing SNA nets.

New marketing techniques are being tried in an effort to promote increased networking services. GE Information Services has added a value-added reseller program. This is a reinforcement to the recent years' vertical marketing approach wherein VAR organizations, which generally have industry expertise, will create applications and/or focus in new important markets such as insurance, travel, medicine, and distribution.

VANs are working hard at ways to increase sales and enhance services:

- Improved price/performance for modes, e.g., McDonnell Douglas's developing new Tymnet engines.
- Improved software to support IBM protocols, faster devices, and X.25.

New competitive pressures are occurring wherein VANs are seeing an encroachment into their private network sales by the T1 box vendors in terms of providing a networking backbone. On the other front LAN vendors such as Novell and 3Com are providing intrafacility sharing and local terminal interaction; both capabilities are provided by VANs.

The proposed FCC access charge for enhanced network services will have a negative effect if implemented. The VANs are used for access to

on-line data bases, public information carriers, and bulletin board services. Some of these applications may be in serious jeopardy if the $4 to $5 per hour access charge needs to be passed along to the ultimate user. Bulletin Boards and User Forum Services are predicated on inexpensive network access. The proposed access charge will more than double the current rates for access and, in INPUT's view will exceed the threshold level for these services.

INPUT believes the proposed charges will go through on some compromised basis in the interest of "fairness" to the rest of the VAN and telecommunications users that currently are paying access charges. The proposed access charges are actually ones that were postponed several years ago in an effort not to thwart the enhanced-network services business formation.

B

Market Forecast – VANs 1987-1992

In 1987 the VANs sector of Processing/Network Services will account for $539 million in user expenditures. This sector will grow to $1.7 billion in 1992, representing an average annual growth of 26%.

Although the largest segment of the VAN sector is cross-industry oriented, INPUT is forecasting that there will be continued efforts to approach industry-specific markets. Thus there will be increased growth in the industry-specific segment of the business (33% AAGR), as contrasted to the 24% AAGR of cross-industry expenditures.

C

Competitive Environment

The major value-added vendors have been impacted in their private network sales by the emerging T1 box vendors such as Digital Communications Associates (Cohesive acquisition), Network Equipment Technologies, Timeplex, and General Datacom. Users are able to lease T1 facilities, buy the T1 hardware, and in effect build a network to their custom requirements.

McDonnell Douglas (Tymnet) is in the midst of a major Tymnet engine development that will allow it to provide new functionality on the network with more performance and flexibility. Tymnet believes its new platform for network services (based on a VME bus, 68000 family processor, Unix, and C) will allow it to be able to capture the private network sales business that is being garnered by the new T1 vendors.

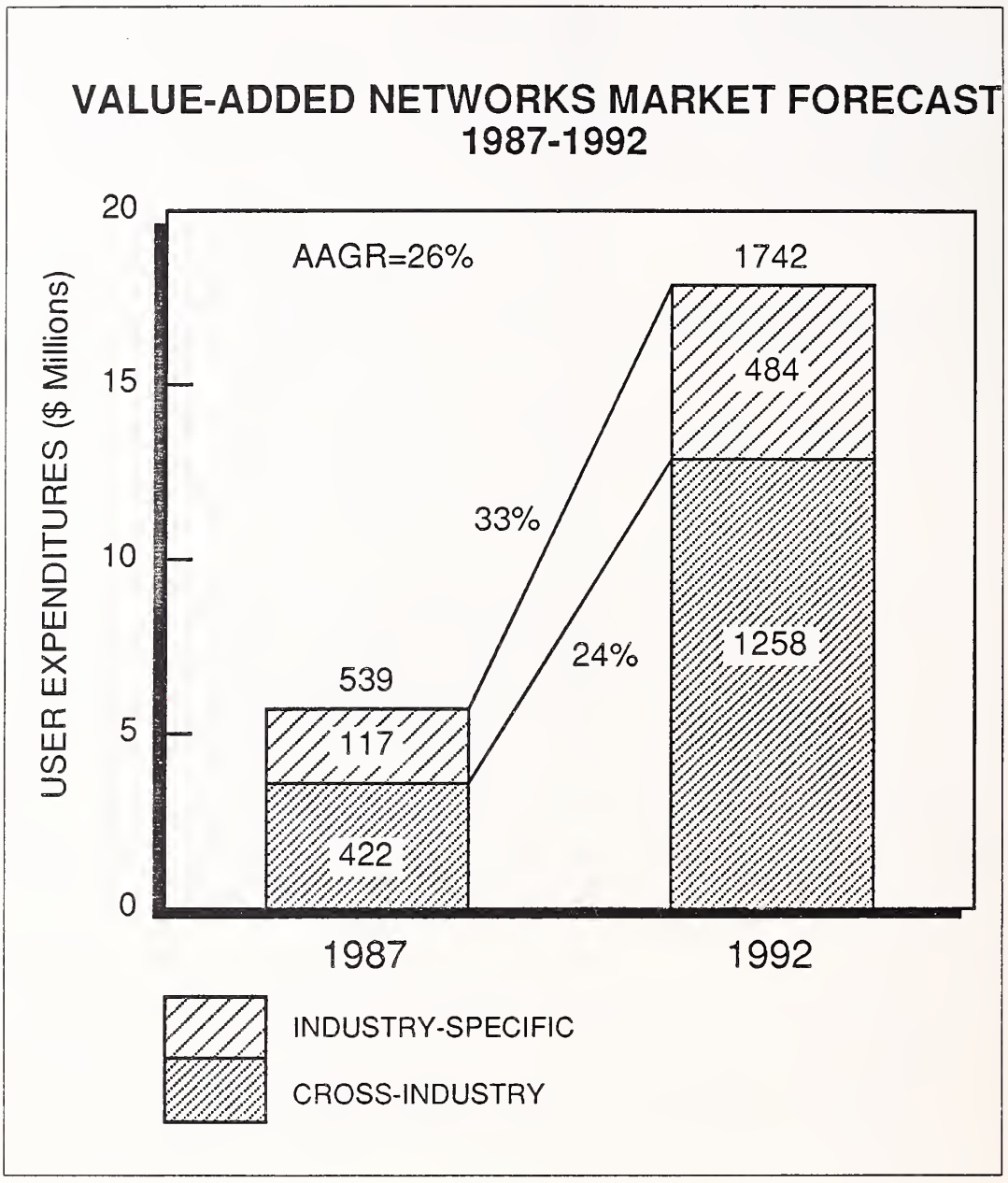
Bolt, Beranek and Newman (BBN) acquired the T1 vendor Network Switching Systems (NSS) for $18 million, taking a financial loss in the quarter of the acquisition. BBN has long supplied backbone switches for the ARPA net nodes and must have believed the acquisition was worth the price. NSS had not been shipping product in great volume at the time of the acquisition.

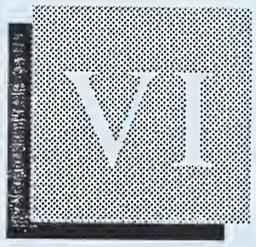
IBM entered into an OEM relationship with Network Equipment Technologies (NET) to have its products available for the forthcoming network explosion. (See INPUT's report on Network Integration 1987-1992, which describes the market for the combining of voice, data, text, and graphics through an integrated network.)

UNISYS announced its intention to acquire Timeplex for roughly $30 per share, a deal worth $300 million. This is one of the first major deals announced by UNISYS since its formation, and may be the forerunner of a strategy to become more vertical to meet the needs of the market. Almost a decade ago NCR acquired COMTEN, the leading data communications plug-compatible vendor in the IBM market. This acquisition proved to be quite successful and provided NCR with a strong communications presence, allowing NCR to have further success in the Banking and Financial markets, as well as in point-of-sale environments.

This would be a very positive entry for UNISYS into the overall data communications market and would provide the ability to integrate UNISYS hardware into multivendor environments. INPUT believes this move can be as beneficial to UNISYS as the NCR/Comten move many years ago was for NCR.

EXHIBIT V-1





Utility Processing

Utility Processing

A

Market Trends — Overview

Utility Processing is generally thought of as the use of raw computing power in cases where tailored applications or uses are developed specific to the user's personal requirements. Utility Processing is used in very large government, engineering, or manufacturing environments. The IS vendor provides access to the computer through some communications (or a network), software tools, and perhaps some consultive support to enable the user to develop and run the specific application being created. The software tools usually include compilers (languages), DBMS, 4GLs, Sorts, terminal hardware support, scientific and statistical libraries, graphics capabilities, financial modeling systems, and other system software application development tools.

Utility processing continues to be a means for a vendor to obtain incremental revenue from its RCS and Batch services customers. Many vendors have a passive attitude toward utility processing and merely accept the incremental business if and when it occurs.

- Some astute vendors, however, are proactive and provide specialized software tools and consulting aid to encourage customers to use utility processing.

- Proactive vendors market to user personnel who can develop the adhoc software that would effectively use the enhanced resources of a "large" computer. "Large" can mean memory, processing, or disk storage support.

Utility processing can increase vendor revenue without having a significant impact on the requirement to obtain additional resources. In other words, the vendor cost basis does not need to increase linearly with the added revenue.

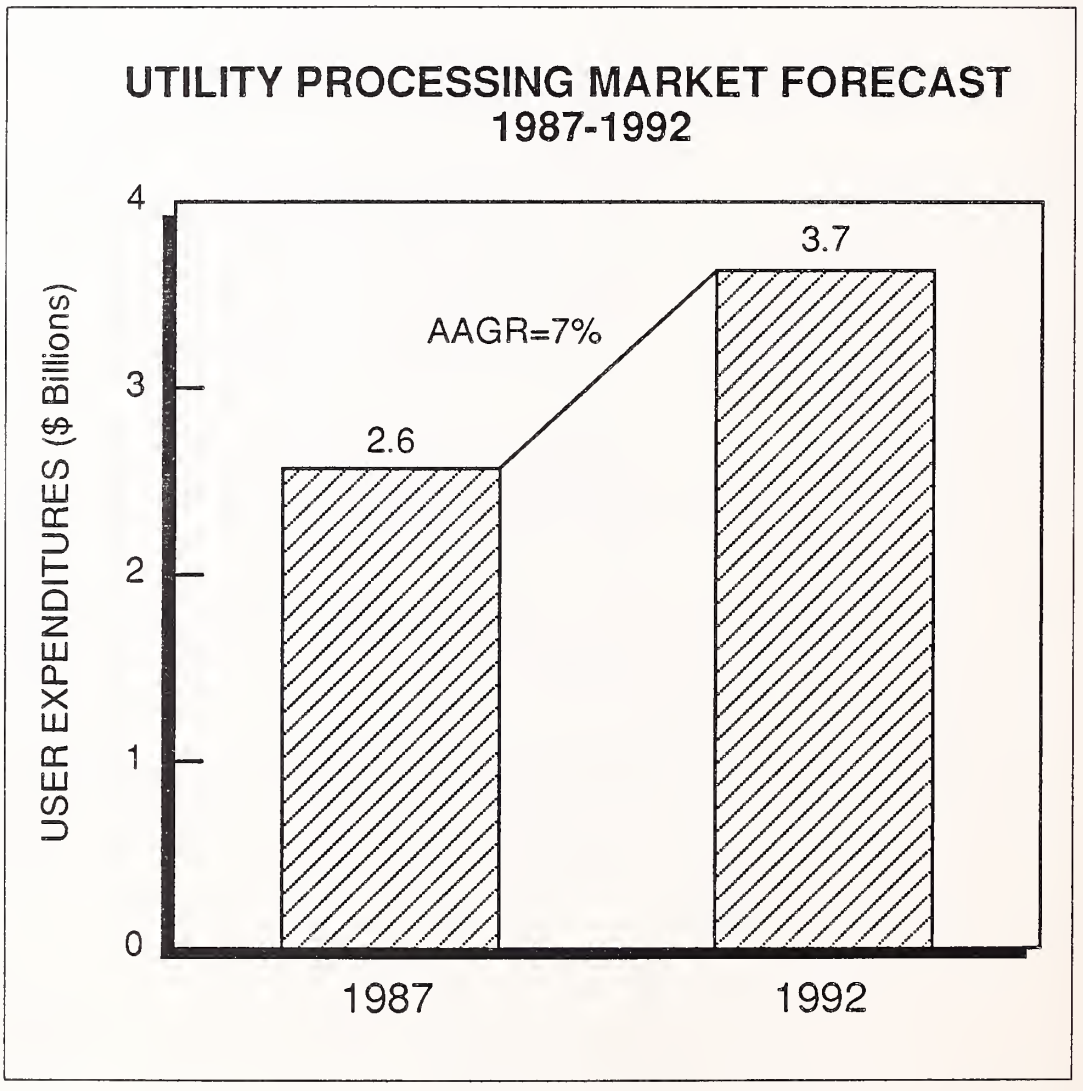
B

Market Forecast—Utility Processing 1987-1992

A utility Processing growth and market forecast is shown in Exhibit VI-1. Revenue was $24 billion in 1986, increasing to $2.6 billion in 1987 and reaching $3.7 billion in 1992. This increase represents an annual average growth rate of 7%. Although this growth is considerably below the average for the entire Processing/Network Services delivery mode, it is still growing at a faster rate than the GNP.

Although growth is forecast by INPUT, Utility Processing is not a business segment that a vendor should generally consider entering at this time. That is, it is a segment of Processing/Network Services that is fairly captive to existing vendors that have the capital already invested in the computer hardware, communications network, and storage medium.

EXHIBIT VI-1



C

Market Factors

Utility Processing has suffered significantly since the advent and acceptance of microcomputer products. The success of the IBM PC and PC-compatibles has had an incredible impact on utility processing in the past six to seven years. Many users have moved work to PCs that was formerly developed, modified, and run through the use of utility processing on a remote computing service.

1. PC Limitations Create Utility Processing Opportunity

Without major hardware enhancements the typical PC has too little memory, disk storage, and processing power to handle large-scale utility processing needs. This limitation leads to remote computing or batch processing usage that can satisfy the increased resources required by the application.

Furthermore, most PCs are not networked (however, this trend is reversing) and reside on a standalone basis. Applications that require intercompany or interlocation interaction are not readily satisfied by the typical PC hardware environment. Although many PCs have modems and can communicate point-to-point, a fair amount of coordination is generally required.

PC environments generally have peripheral hardware constraints such as special plotters, magnetic tape drives, and microfilm output. These devices may be required on an intermittent basis and cannot be cost-justified by the typical user.

An example would be special large-scale plotters to support map creation or seismology applications that are necessary on a project-oriented basis. In many instances these special-purpose peripherals are the output media of specialized software the typical user could not afford.

2. Corporate Overflow or Project Support

Utility Processing can be used to accommodate overload conditions on in-house equipment, support changes in hardware configurations (i.e. temporary down situations), or use specialized software obtained by users from a research lab, university, or other company. Handling peak loads or special-project work is a very useful alternative for executing this workload (versus adding additional resources on a permanent basis).

Utility Processing in the Federal market can result from limitations in obtaining budget approval or from a slowed procurement process tif the work is to be performed by in-house. The Federal agency may find it

necessary and practical to use the Utility Processing capabilities of a remote computing or batch services vendor while awaiting its anticipated computing environment.

Current pressure on controlling costs at banks, brokerage houses, and other financial institutions suggests a strong inclination to use less Utility Processing. It is clear that the continuing trend toward developing complex models and special analytical systems exceeds the resource levels of the PC. This excess warrants the use of a computing environment larger than a PC. Some of the need for larger-scale resources will result in the use of Utility Processing.

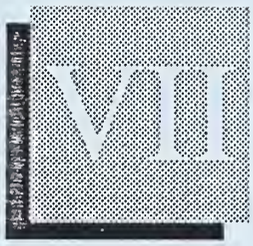
Manufacturing environments and Engineering environments will require large-scale simulation systems that may be only available in older programming languages on older equipment. Several RCS/Batch vendors have fully amortized older hardware/software systems that can meet these special needs.

3. Specialized Requirements/Niches

In addition there are several special libraries of statistical subroutines or specialized graphics software support that are necessary to support utility processing applications. It does not make sense to accommodate a handful of users that need special software or libraries on an intermittent basis.

Some users, on occasion, may require access to a supercomputer – such as a CRAY, ETA, or CDC 7600 – to satisfy processing power. Several companies have risen to the need by having a supercomputer available for Utility Processing or by obtaining access to a supercomputer.

Brokering of supercomputer time is an effective way of matching a user with an unusual need with a corporate computing environment that may have excess time available. Since most companies procure computer systems that they can grow into, it is likely that new supercomputer environments will have excess time. OPTICOM (San Jose, CA) is a company that has grown quite nicely by offering supercomputing brokerage services.



Electronic Data Interchange

Electronic Data Interchange

A

Market Trend—Overview

In an effort to stem erosion and slowing growth in several delivery modes, RCS and VAN vendors increasingly are looking for promising new applications. Electronic Data Interchange (EDI) is one of these.

- EDI is the computer-to-computer (and preferably, application-to-application) communication of business document data between companies in an agreed format.

- Translations between the user's internal data formats, as created by, for example, a purchasing system and a public standard (such as ANSI X.12), can be accomplished by translation software, or by a third-party service provider.

EDI – an emerging, rapidly growing area – addresses a fundamental business problem: paperwork reduction in the routine transfer of business documents such as purchase orders, invoices, and logistics data. Approximately 30 industries are now using or piloting EDI implementations.

In addition to purchasing and logistics-related activities, EDI is also being used in Electronic Medical Claims (EMC) applications, agent-insurance company interfacing, and others. Several federal agencies are also implementing EDI; this implementation creates implications for government contractors and opportunities for service providers.

The major third-party EDI providers are:

- General Electric Information Services Co. (GEISCO).
- McDonnell Douglas Applied Communications (MDAC).
- Sterling Software's Ordernet Division (SSW).
- Kleinschmidt, Inc.
- IBM's Information Network (IIN).
- Control Data Corporation (CDC).

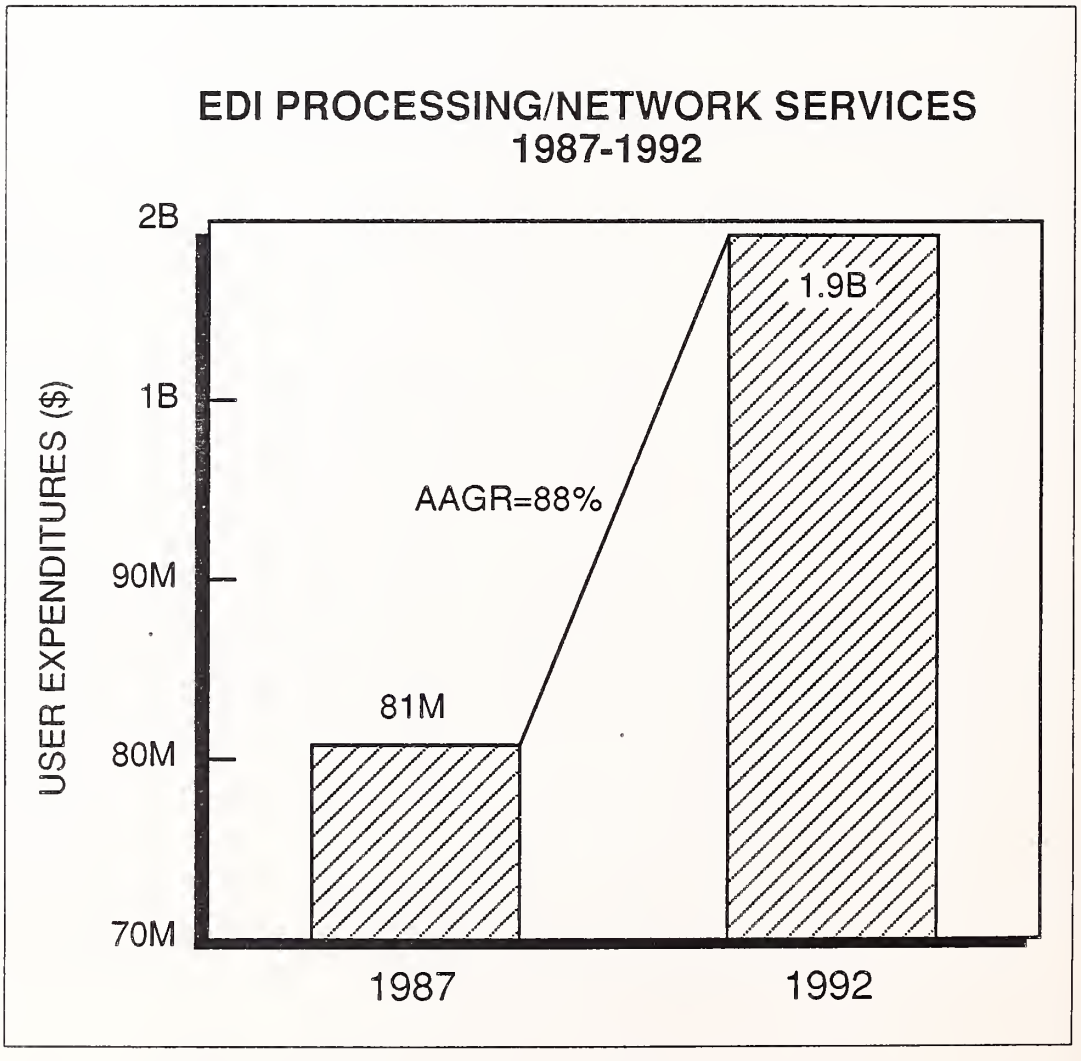
New 1987/1988 market entrants are CompuServe and Western Union, with ADP and other firms believed to be evaluating their options. In addition, several second-tier processing firms participate, typically within market niches such as rail or truck transportation. These companies include Railinc (a subsidiary of the American Railroad Association), and Transettlements (a subsidiary of Transus, a trucking firm). Industry associations also manage EDI clearinghouses, the best example of which is Transnet, operated by a unit of the Motor Equipment Manufacturer's Association using GEISCO'S facilities.

B

Market Forecast—Electronic Data Interchange 1987-1992

In 1986, the market for EDI network/processing services, software, and professional services reached $46 million. INPUT expects the market to grow to nearly $1.9 billion by 1992, representing an Average Annual Growth Rate of 88% from 1987 expenditures of $81 million. See Exhibit VII-1.

EXHIBIT VII-1



Approximately 86% of the 1986 market, or nearly $40 million, was derived from network/processing services, largely consisting of VAN services (networking, switching, protocol/speed conversions, store and forward mailboxing, etc.) and batch processing (format translations, consolidations, reporting, and data basing), with an estimated $3 million derived from "pure" networking in support of private network implementations.

By 1992, the relative size of the segments will likely change. The ten percent of the 1986 market now representing software will decline to 4-5%. The professional services will remain fairly constant in the 3-5% range, with gains made in networking/processing services. EDI is a transaction/communications-intensive application.

The high rate of forecast growth is due to several key factors:

- EDI addresses a fundamental business function. For users, it ultimately means lower costs by reducing manual procedures, improved productivity through reduced inventory, enhanced management reporting through application integration, fewer errors from re-keying information, improved customer service due to improved information, and faster turnaround due to less reliance on mail for delivery of business documents.

- In many instances, large companies are requiring their trading partners to adopt EDI as a condition of continued business. In some cases, discounts are offered to EDI users. This is a "domino effect." IBM has encouraged its vendors to interact with IBM for more effective communications through IN (Information Network) Services. DEC has introduced the "Electronic Store" to allow its customers to do order processing through a terminal.

- The nature of traditional business transactions does not stop with the exchange of a purchase order and an invoice. There may be 12 or more documents exchanged between trading partners; the documents can be requests for quotations, change notices, shipping notices etc. Additionally involved are agents such as transportation carriers, banks, insurers, brokers, and the like. This multiplicity of transactions is called "the cascade effect."

C

Competitive Environment

In 1986-1987, the following events and trends are having a bearing on the marketplace.

- The emergence of GEISCO as the most aggressive player, with marketing specialists targeting specific industries and alliances with vertical market software companies and others as agents for EDI*Express and

related services. This is a part of the service that is being marketed through VARs.

- The withdrawal of McDonnell Douglas (MDC) from on-network translations, and from distributing software. Instead, MDC is certifying software for use on its EDI*Net service, and is developing a fault-tolerant Tandem-based service called EDI II with additional functionality.

- The first of what may become several resale/private labelling agreements. Telenet will offer Sterling Software's Ordernet services under the name TEDI and Southern New England Telephone will also be reselling EDI services by 1988 through its ConnNet packet network that serves users in Connecticut.

- The enhancement of services such as advanced reporting, and including electronic mail, hard-copy, or facsimile delivery of EDI-created documents in human-readable form, obviating users' need to maintain parallel systems, one paper-based, the other EDI.

Trends foreseen include:

- Increasing emphasis on international EDI, targeted to multinational corporations and international traders.

- Enhancements to EDI services with graphics capabilities for industries requiring visual product specifications and CAD/CAM images as part of purchasing documents.

- Additional resale agreements.

- Acquisition of faltering participants and secondary players by leading companies that are attempting to gather market share.

- Involvement of the Bell Operating Companies as gateway providers and billing agents for EDI services, and, pending waivers by the federal courts, as service providers in their own right, or through joint ventures.

- A decline in the number of private implementations as users opt for third parties to manage EDI networks, and to make accessible larger numbers of trading partners than possible through a private system.

- The involvement of Canadian service providers such as Crowntek and Telecom Canada due to the US/Canadian free-trade agreement.

- Increasing willingness by third-party services to internetwork. Third-party services EDI data between services to obviate users' need to maintain multiple accounts and equipment settings in order to trade with partners.

VIII

Some New Opportunities/ Recommendations and Summary

Some New Opportunities/ Recommendations and Summary

A Remote Computing Service

1. Portion of a Machine

McDonnell Douglas announced the Star-Trec 90 Business System featuring access to a 3090 running MSA software for integrated business systems requirements. McDonnell Douglas is positioning this service as an alternative to a 4341 model 1.

Users access the services through IBM 3270-compatible peripherals. Prospects/customers are expected to be in the $25 to $50 million range, but not desiring the responsibility of an in-house data processing department.

INPUT believes this new version of an old idea may be marketable. In the mid-1970s some of the fast-growing time-sharing companies like Tymshare (now McDonnell Douglas), Cyphernetics (now ADP), and National CSS (recently Dun and Bradstreet and now Must Software) offered a similar concept wherein a minicomputer was placed at the user's site. Similar software capabilities and the time-sharing services were used for additional resources, large data bases, and connectivity capabilities. Much of the problem in the previous offering was the price and the fact that the local operator needed to monitor the hardware. In McDonnell's new service the reverse is true; prices have come down considerably.

2. Software Product Trial

Remote computing services provide users with the ability to try expensive software for a limited period of time without having to make a major purchase commitment. Therefore the RCS vendor can easily install popular software products to offer to new users or existing customers. IBMs IN offers only IBM software on its network, whereas the other

RCS vendors will offer the most popular tools and application-enabling products.

Remote Computing Services are acting as intermediary between diverse on-line data base vendors and the specific data bases therein to allow users the convenience of pulling over data to one "rental" site to use in processing reports, etc.

An example of a company offering this gateway-type function is IBM Information Network with its DB-View facility.

3. International Usage

RCS vendors are encouraging their users to use the international scope of the service to tie multinational working groups together. Applications are as generic as electronic mail, order entry, manufacturing information systems, etc.

The RCS vendors and VAN vendors have, over the years, put in place substantial networks to allow the end user to receive "local access" worldwide. There is significant cooperation with the PTTs in Europe and with NDD in Japan to effect this. One VAN vendor, McDonnell Douglas, has approximately 2800 network modes in the United States.

4. Electronic Authorization

Processing/Network vendors can participate in this fast-growing application requirement to electronically provide authorization for credit card and check transactions. McDonnell Douglas (Tymnet) handled 350,000,000 transactions in 1986 and is believed to have approximately 50% of the market share. Competitors are National Data, First Data, CompuServe and Visa (captive, however), which use the switching intelligence of their networks.

INPUT estimates that only 10-15% of the transactions being made are performed electronically. Thus there is a large opportunity to take advantage of the untapped market potential.

5. Electronic Vaulting

Electronic vaulting is an emerging application to provide real-time back-up critical files after a catastrophic failure. The application is predicated on extremely high bandwidth transmission mediums (at least T1, if not T3) and high-capacity storage devices such as optical disk devices and/or high-speed tape support to match the dynamic needs of the users.

Backing up to tape and physically transporting to offsite locations or shadow copying to different disk storage systems or to separate hardware onsite has been a technique to accomplish the back-up requirement. Electronic vaulting has tremendous promise, especially as higher-speed channels become available and transmission line costs continue to decrease.

Key applications that require this back-up support are those in credit card approval/transaction, brokerage, and medical information systems, as well as in airline reservations and other reservation-type systems.

Shown in Exhibit VIII-1 are companies that have staked out a claim in this new area or are in a position to add this service to complement similar existing services.

EXHIBIT VIII-1

COMPANIES IN DISASTER RECOVERY AND ELECTRONIC VAULTING SERVICES

COMPANY	LOCATION
Data Port Corp.	New York, NY
E-Net	San Francisco, CA
Sungard Recovery Services	Wayne, PA
ComDisco Disaster Recovery	Rosemont, IL
Digital Equipment	Stowe, MA
El Camino Resources	Sherman Oaks, CA
Iron Mountain Group	Boston, MA
ARCUS	Union City, CA
AT&T Data Security	Orlando, FL
Off-site Storage	Lowell, MA

B

Electronic Data Interchange

INPUT believes EDI is a key market opportunity for RCS and VAN services and recommends that such firms evaluate ways of participating in the market.

The vendors without EDI capabilities of functionality should consider various approaches to offering such services as a means of preventing churn, which is the loss of current customers to competing VANs who do offer EDI.

Providers of E-mail services should consider adding EDI functionality, perhaps by converting on-line forms and fill-in data to EDI data-oriented applications. Much of what is occurring in EDI revolves around "standards" that have been or are in the process of being finalized.

Although the market is new, there are already several firms involved. The risks of a late entry relate to the chances of success in gathering sufficient market share to ensure profitability. Accordingly, INPUT recommends caution in EDI technical development and marketing. Many RCS firms should consider remarketing agreements and other forms of joint ventures as a ways of gaining entry, particularly if the RCS firm is supporting unserved markets with applications that may be enhanced through EDI functionality.

Key opportunity areas are differentiated services such as those providing relevant data bases supporting EDI functions (such as product catalogues from a variety of suppliers), graphics support for industries requiring visuals as part of a purchasing and specification document (such as aerospace and electronics), and services supporting links between financial services and/or insurance applications, and EDI purchasing-related functions.

Additional information about the EDI market can be found in a series of continuing reports and newsletters produced by INPUT's EDI Planning Service.

C

Recommendations

1. Look for new niches that provide cost/performance advantages for Processing Services:

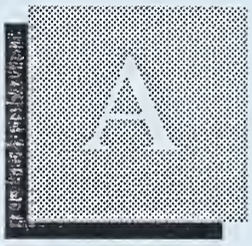
- New applications.
- New markets.
- New services.
- Other delivery modes.

2. Develop relationships that couple corporate strengths with those of other vendors in other delivery modes.

A recent example is Mtech, which works closely with UCCEL to sell new banking applications to new customers (for both parties). The new applications will become a showcase installation if the scenario unfolds as planned. Then both parties can jointly attract new prospects or existing clients to these banking applications.

Processing vendors, like all other vendors in the other delivery modes, derive some revenues from services that fall into another delivery mode. For example consulting, which is a professional services delivery mode segment, can be used to develop an application that the client may not have had the expertise in-house to develop. The consulting is performed by the processing/network services vendor as a means to an end, the end being an application that uses the vendor's core business capabilities.

The choice is then of developing the resources in-house to effect this marketing strategy, or to form an alliance with a vendor in the other delivery mode to attempt to build the synergy from the expertise of both organizations.



Appendix: Definitions

Appendix: Definitions

The following pages contain two appendixes.

Appendix A contains the definitions used by INPUT to describe the Information Services Industry.

Appendix B contains the Processing/Network Services user expenditure forecast for 1986-1992.

Information Services - Computer-related services involving one or more of the following:

- Processing of computer-based applications using vendor computers (called "processing services").
- Services that assist users in performing functions on their own computers or vendor computer (called "software products" and/or "professional services").
- Services that utilize a combination of hardware and software, integrated into a total system (called "turnkey systems").

A

User Expenditures

All user expenditures reported are "available" (i.e., noncaptive, as defined below).

Noncaptive Information Services User Expenditures - Expenditures paid for information services provided by a vendor that is not part of the same parent corporation as the user.

Captive Information Services User Expenditures - Expenditures received from users who are part of the same parent corporation as the vendor.

B

Delivery Modes

Processing services - This category includes remote computing services, batch services, processing facilities management, on-line data bases, and value-added networks.

- *Remote Computing Services (RCS)* - Provision of data processing to a user by means of terminals at the user's site(s). Terminals are connected by a data communications network to the vendor's central computer. RCS includes four submodes.

  - *Interactive* - Characterized by the interaction of the user with the system, primarily for problem-solving timesharing, but also for data entry and transaction processing; the user is on-line to the program/files. Computer response is usually measured in seconds or fractions of a second.

  - *Remote Batch* - Where the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements. Computer response is measured in minutes or hours.

  - *Proprietary Data Base* - Characterized by the retrieval and processing of information from a vendor-maintained data base. The data base may be owned by the vendor or by a third party.

  - *User Site Hardware Services (USHS)* - Those offerings provided by RCS vendors that place programmable hardware at the user's site rather than at the vendor's data center. Some vendors in the federal government market provide this service under the label of distributed data services. USHS offers:

    ° Access to a communications network.

    ° Access through the network to the RCS vendor's larger computers.

    ° Local management and storage of a data base subset that will service local terminal users via the connection of a data base processor to the network.

    ° Significant software as part of the service.

- *Batch Services* - These include data processing at vendors' sites for user programs and/or data that are physically transported (as opposed to transported electronically by telecommunications media) to and/or from

those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing.

- *Processing Facilities Management (PFM)* - Also referred to as "Resource Management," "Systems Management," or "COCO" (contractor-owned, contractor-operated). PFM is the management of all or part of a user's data processing functions under a long-term contract of not less than one year. This would include remote computing and batch services. To qualify as PFM, the contractor must directly plan, control, operate, and own the facility provided to the user–either onsite, through communications lines, or in a mixed mode.

- *Value-Added Networks (VANs)* - VANs typically involve common carrier network transmission facilities that are augmented with computerized switching. These networks have become associated with packet-switching technology because the public VANs that have received the most attention (e.g., Telenet and TYMNET) employ packet-switching techniques. However, other added data service features such as store-and-forward message switching, terminal interfacing, error detection and correction, and host computer interfacing are of equal importance.

Processing services are further differentiated as follows:

- *Cross-industry* services involve the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but that cut across industry lines. Most general-ledger, accounts receivable, payroll, and personnel applications fall into this category. Cross-industry data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. However, when the application, tool, or data base is designed for specific industry use, then the service is industry-specific (see below).

- *Industry-specific* services provide processing for particular functions or problems unique to an industry or industry group. Specialty applications can be either business or scientific in orientation. Industry-specific data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry-specialty applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.

- *Utility* services are those for which the vendor provides access to a computer and/or communications network with basic software that enables users to develop and/or process their own systems. These basic tools often include terminal-handling software, sorts, language compilers, data base management systems, information retrieval software, scientific library routines, and other systems software.

Software products - This category includes user purchases of applications and systems software packages for in-house computer systems. Included are lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement and maintain the package at the user's sites. Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself. There are several subcategories of software products, as indicated below.

- *Applications Products* - Software that performs processing that services user functions directly related to solving a business or organizational need. The products can be:

  - *Cross industry Products* - Used in multiple-industry applications as well as the federal government sector. Examples are payroll, inventory control, and financial planning.

  - *Industry-Specific Products* - Used in a specific industry sector, such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting, airline scheduling, and material resource planning.

- *Systems Software Products* - Software that enables the computer/communications system to perform basic functions. These products include:

  - *System Control Products* - Function during applications program execution to manage the computer system resources. Examples include operating systems, communication monitors, emulators, and spoolers.

  - *Data Center Management Products* - Used by operations personnel to manage the computer systems resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, and utilities.

  - *Applications Development Products* - Used to prepare applications for execution by assisting in designing, programming, testing, and

related functions. Examples include languages, sorts, productivity aids, compilers, data dictionaries, data base management systems, report writers, project control systems, and retrieval systems.

Professional Services - This category includes consulting, education and training, programming and analysis, and some facilities management as defined below.

- *Software development* - This service develops a software system on a custom basis. It includes one or more of the following: user requirements, system design, contract, and programming.

- *Education and Training* - Products and/or services related to information systems and services for the user, including computer-aided instruction (CAI), computer-based education (CBE), and vendor instruction of user personnel in operations, programming, and maintenance.

- *Consulting Services* - Information systems and/or services management consulting, program assistance (technical and/or management), feasibility analyses, and cost-effectiveness trade-off studies.

- *Professional Services Facilities Management (PSFM)* - This is a counterpart to processing facilities management, except the computing equipment is owned or leased by the client, not by the vendor. The vendor provides the staff to operate, maintain, and manage the client's facility.

Turnkey Systems (also known as integrated systems) - A turnkey system is an integration of systems and applications software with CPU hardware and peripherals, packaged as a single applications solution. The value added by the vendor is primarily in the software and support. Most CAD/CAM systems and many small-business systems are turnkey systems. This does not include specialized hardware systems such as word processors, cash registers, or process control systems, nor does it include Embedded Computer Resources for military applications. Turnkey systems are available either as custom or packaged systems.

- Hardware vendors that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors.

- Turnkey systems revenue is divided into two categories.

  - *Industry-specific systems* - that is, systems that serve a specific function for a given industry sector such as automobile dealer parts inventory, CAD/CAM systems, or discrete manufacturing control systems.

- *Cross-industry systems* - that is, systems that provide a specific function that is applicable to a wide range of industry sectors such as financial planning systems, payroll systems, or personnel management systems.

- Revenue includes hardware, software, and support functions.

Systems Integration - Services associated with systems design, integration of computing components, installation, and acceptance of computer/communication systems. Systems integration can include one or more of the major information services delivery modes - professional services, turnkey systems, and software products. System components may be furnished by separate vendors (not as an integrated system by one vendor, called the prime contractor); services may be furnished by a vendor or by a not-for-profit organization. Integration services also may be provided with related engineering activities, such as SE&I (Systems Engineering and Integration) or SETA (Systems Engineering and Technical Assistance).

C

Hardware/Hardware Systems

Hardware - Includes all computer and telecommunications equipment that can be separately acquired with or without installation by the vendor and not acquired as part of an integrated system.

- *Peripherals* - Includes all input, output, communications, and storage devices other than main memory that can be connected locally to the main processor and generally cannot be included in other categories such as terminals.

- *Input Devices* - Includes keyboards, numeric pads, card readers, light pens and track balls, tape readers, position and motion sensors, and analog-to-digital converters.

- *Output Devices* - Includes printers, CRTs, projection television screens, micrographics processors, digital graphics, and plotters.

- *Communication Devices* - Includes modems, encryption equipment, special interfaces, and error control.

- *Storage Devices* - Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories.

Terminals - There are three types of terminals as described below:

- *User-Programmable* - Also called intelligent terminals, including:

  - Single-station or standalone.
  - Multistation shared processor.
  - Teleprinter.
  - Remote batch.

- *User Nonprogrammable*

  - Single-station.
  - Multistation shared processor.
  - Teleprinter.

- *Limited Function* - Originally developed for specific needs, such as point-of-sale (POS), inventory data collection, controlled access, and other applications.

Hardware Systems - Includes all processors from microcomputers to supercomputers. Hardware systems may require type- or model-unique operating software to be functional, but this category excludes applications software and peripheral devices, other than main memory and processors or CPUs not provided as part of an integrated (turnkey) system.

- *Microcomputer* - Combines all of the CPU, memory, and peripheral functions of an 8- or 16-bit computer on a chip in the form of:

  - Integrated circuit package.
  - Plug-in board with more memory and peripheral circuits.
  - Console including keyboard and interfacing connectors.
  - Personal computer with at least one external storage device directly addressable by the CPU.

- *Minicomputer* - Usually a 12-, 16- or 32-bit computer that may be provided with limited applications software and support and may represent a portion of a complete large system.

  - Personal business computer.
  - Small laboratory computer.
  - Nodal computer in a distributed data network, remote data collection network, or connected network, or connected to remote microcomputers.

- *Mainframe* - Typically a 32- or 64-bit computer with extensive applications software and a number of peripherals in standalone or multiple-CPU configurations for business (administrative, personnel, and logistics) applications; also called a general-purpose computer.

  - *Large Computer* - Presently centered around storage controllers but likely to become bus-oriented and to consist of multiple processors or parallel processors. Intended for structured mathematical and signal processing and typically used with general-purpose, von-Neumann-type processors for system control.

  - *Supercomputer* - High-powered processors with numerical processing throughout that is significantly greater than the fastest general-purpose computers, with capacities in the vicinity of 10-50 million floating point operations per second (MFLOPS). Supercomputers fit in one of two categories:

- *Real Time* - Generally used for signal processing in military applications.

- *Non-Real Time* - For scientific use in one of three configurations:

  - Parallel processors.
  - Pipeline processor.
  - Vector processor.

- *Newer Supercomputers* - with burst modes approaching 300 MFLOPS, main storage size up to 10 million words, and on-line storage in the one- to three-gigabyte class are also becoming more common.

- *Embedded Computer* - Dedicated computer system designed and implemented as an integral part of a weapon, weapon system, or platform; critical to a military or intelligence mission such as command and control, cryptological activities, or intelligence activities. Characterized by military specifications (MIL SPEC) appearance and operation, limited but reprogrammable applications software, and permanent or semipermanent interfaces. May vary in capacity from microcomputers to parallel processor computer systems.

D

Telecommunications

Networks - Electronic interconnection between sites or locations that may incorporate links between central computer sites and remote locations and switching and/or regional data processing nodes. Network services typically are provided on a leased basis by a vendor to move data, voice, video, or textual information between locations. Networks can be categorized in several different ways.

- *Common Carrier Network* - A public access network, such as provided by AT&T, consisting of conventional voice-grade circuits and regular switching facilities accessed through dial-up calling with leased or user-owned modems for transfer rates between 150 and 1200 baud.

- *Value-Added Network (VAN)* - (See listing under Section B, Delivery Modes.)

- *Local Area Network (LAN)* - Limited-access network between computing resources in a relatively small (but not necessarily contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. Uses one of two signaling methods.

  - *Baseband* - Signaling using digital waveforms on a single frequency band, usually at voice frequencies and bandwidth, and limited to a single sender at any given moment. When used for local-area networks, typically implemented with TDM to permit multiple access.

  - *Broadband* - Transmission facilities that use frequencies greater than normal voice-grade, supported in local-area networks with RF modems and AC signaling. Also known as wideband. Employs multiplexing techniques that increase carrier frequency between terminals to provide:

    ° Multiple (simultaneous) channels via FDM (Frequency Division Multiplexing).

    ° Multiple (time-sequenced) channels via TDM (Time Division Multiplexing).

    ° High-speed data transfer rate via parallel mode at rates of up to 96,000 baud (or higher, depending on media).

Transmission Facilities - Includes wire, carrier, coaxial cable, microwave, optical fiber, satellites, cellular radio, and marine cable operating in one of two modes depending on the vendor and the distribution of the network.

- *Mode* - may be either:

  - *Analog* - Transmission or signal with continuous-waveform representation, typified by AT&T's predominantly voice-grade DDD network and most telephone operating company distribution systems.

  - *Digital* - Transmission or signal using discontinuous, discrete quantities to represent data, which may be voice, data, record, video, or text, in binary form.

- *Media*- May be any of the following:
  - *Wire* - Varies from earlier single-line teletype networks, to two-wire standard telephone (twisted pair), to four-wire full- duplex balanced lines.
  - *Carrier* - A wave, pulse train, or other signal suitable for modulation by an information-bearing signal to be transmitted over a communications system, used in multiplexing applications to increase network capacity.
  - *Coaxial Cable* - A cable used in HF (high-frequency) and VHF (very high frequency), single-frequency, or carrier-based systems; requires frequent reamplification (repeaters) to carry the signal any distance.
  - *Microwave* - UHF (ultra-high-frequency) multichannel, point-to-point, repeated radio transmission, also capable of wide frequency channels.
  - *Optical Fiber* - Local signal distribution systems employed in limited areas, using light-transmitting glass fibers and TDM for multichannel applications.
  - *Communications Satellites* - Synchronous earth-orbiting systems that provide point-to-point, two-way service over significant distances without intermediate amplification (repeaters), but requiring suitable groundstation facilities for up- and down-link operation.
  - *Cellular Radio* - Network of fixed, low-powered two-way radios that are linked by a computer system to track mobile phone/data set units. Each radio serves a small area called a cell. The computer switches service connections to the mobile unit from cell to cell.

E

Other Considerations

When questions arise about the proper place to count certain user expenditures, INPUT addresses them from the user viewpoint. Expenditures are then categorized according to what users perceive they are buying.

The standard industrial classification (SIC) codes are used to define the economic activity contained in generic sectors such as process manufacturing, insurance, or transportation.

The specific industries (and their SIC codes) included under these generic industry sectors are detailed in the exhibit.

EXHIBIT A-1

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Discrete Manufacturing	23	Apparel
	25	Furniture
	27	Printing
	31	Leather
	34	Metal
	35	Machinery
	36	Electronics
	37	Transportation
	38	Scientific and Control Instruments
	39	Miscellaneous
Process Manufacturing	10	Metal Mining
	11	Anthracite Mining
	12	Coal Mining
	13	Oil and Gas Extraction
	14	Mining/Quarrying of Non-Metallic Minerals, except Fuels
	20	Food Products
	21	Tobacco
	22	Textile Products
	24	Lumber and Wood Products
	26	Paper Products
	28	Chemicals
	29	Petroleum
	30	Rubber and Plastics
	32	Stone, Glass, Clay
	33	Primary Metals
Transportation	40	Railroads
	41	Local Transit
	42	Motor Freight
	43	U.S. Postal Service
	44	Water Transportation
	45	Air
	46	Pipelines
	47	Transportation Services

EXHIBIT A-2

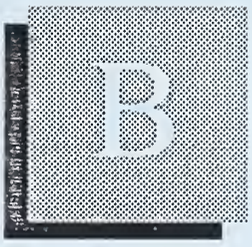
INDUSTRY SECTOR DEFINITIONS (Cont.)

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Utilities	49	Electric, Gas, and Sanitary
Telecommunications	48	Communications
Wholesale Distribution	50	Durable Goods
	51	Nondurable Goods
Retail Distribution	52	Building Materials, Hardware
	53	General Merchandise
	54	Food
	55	Automotive and Gas Stations
	56	Apparel
	57	Furniture
	58	Eating and Drinking
	59	Miscellaneous Retail
Banking and Finance	60	Banks
	61	Credit Agencies
	62	Security and Commodity Brokers
	67	Holding and Investment Offices
Insurance	63	Insurance (Life, Health, Etc.)
	64	Insurance Agents
Medical	80	Health Services
Education	82	Educational Services

EXHIBIT A-3

INDUSTRY SECTOR DEFINITIONS (Cont.)

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Services	72	Personal Services
	73	Business Services (Excluding Information Services Companies Themselves)
	89	Miscellaneous Services
	66	Combinations of Real Estate, Insurance, Loans, Law Offices
	81	Legal Services
	76	Miscellaneous Repair
Federal Government	N/A	As Appropriate
State and Local Government	N/A	As Appropriate
Other Industries	01-09	Agriculture, Forestry, and Fishing
	15-17	Construction
	70	Hotels, Rooming Houses, Camps, and Other Lodging Places
	75	Automotive Repair, Services, and Garages
	78	Motion Pictures
	79	Amusement and Recreation Services, Except Motion Pictures
	83	Social Services
	84	Museums, Art Galleries, Botanical and Zoological Gardens
	86	Membership Organizations



Appendix: Forecast Data Base

EXHIBIT B-1

TOTAL PROCESSING/NETWORK SERVICES USER EXPENDITURE FORECAST BY MARKET SEGMENT, 1986-1992

SEGMENTATION	1986 ($M)	1986-1987 Growth (%)	1987 ($M)	1988 ($M)	1989 ($M)	1990 ($M)	1991 ($M)	1992 ($M)	AAGR 1987-1992 (%)
Industry-Specific									
Discrete Manufacturing	683	15	785	895	1010	1132	1259	1386	12
Process Manufacturing	805	15	927	1061	1210	1374	1547	1728	13
Transportation	239	10	264	298	341	394	461	536	15
Utilities	140	10	154	171	190	209	230	255	11
Telecommunications	420	21	510	611	726	857	1002	1147	18
Distribution	949	16	1102	1265	1443	1646	1863	2109	14
Banking and Finance	3790	16	4387	5066	5850	6735	7780	8865	15
Insurance	705	12	792	887	989	1089	1219	1346	11
Medical	1102	17	1289	1503	1738	1999	2281	2616	15
Education	134	11	149	163	179	197	215	234	9
Services	991	15	1136	1295	1475	1667	1866	2061	13
Federal Government	536	7	573	588	620	659	702	745	5
State & Local Government	481	19	570	665	768	882	1008	1146	15
Other Industry-Specific	571	13	648	725	805	886	966	1050	10
Subtotal	11546	15	13286	15193	17344	19735	22399	25224	14
Cross Industry									
Planning and Analysis	235	0	235	239	235	234	232	229	-1
Accounting	988	4	1042	1048	1086	1105	1132	1142	2
Human Resources	932	14	1061	1221	1386	1552	1746	1934	13
Engineering/Scientific	247	6	263	181	297	309	327	339	5
Education/Training	84	11	93	104	113	119	127	132	7
On-Line Data Bases	833	25	1045	1283	1545	1964	2377	2892	23
Other Cross-Industry	664	5	696	740	772	808	857	896	5
Subtotal	3983	11	4417	4916	5434	6091	6798	7564	11
Other									
Utility Processing	2402	9	2618	2856	3050	3264	3496	3713	7
Value-Added Networks	409	32	539	705	907	1132	1414	1742	26
Grand Total	18340	14	20860	23670	26735	30222	34107	38243	13

EXHIBIT B-2

REMOTE COMPUTING/BATCH SERVICES USER EXPENDITURE FORECAST BY MARKET SEGMENT, 1986-1992

SEGMENTATION	1986 ($M)	1986-1987 Growth (%)	1987 ($M)	1988 ($M)	1989 ($M)	1990 ($M)	1991 ($M)	1992 ($M)	AAGR 1987-1992 (%)
Industry-Specific									
Discrete Manufacturing	631	15	726	828	935	1047	1163	1279	12
Process Manufacturing	761	16	880	1012	1159	1321	1493	1673	14
Transportation	212	11	236	269	312	365	431	506	16
Utilities	119	10	131	145	161	177	194	214	10
Telecommunications	400	22	487	584	695	821	960	1098	18
Distribution	897	16	1045	1201	1370	1562	1765	1994	14
Banking and Finance	2800	16	3256	3777	4381	5060	5870	6714	16
Insurance	344	15	395	450	509	570	638	707	12
Medical	719	18	847	999	1169	1356	1560	1805	16
Education	114	12	128	142	158	175	193	212	11
Services	984	15	1128	1286	1466	1657	1856	2050	13
Federal Government	323	8	350	341	357	373	391	408	3
State & Local Government	134	22	164	198	240	291	352	424	21
Other Industry-Specific	561	14	637	713	792	871	950	1032	10
Subtotal	8999	16	10410	11945	13704	15646	17816	20116	14
Cross Industry									
Planning and Analysis	235	0	235	239	235	234	232	229	-1
Accounting	988	4	1024	1048	1086	1105	1132	1142	2
Human Resources	932	14	1061	1221	1386	1552	1746	1934	13
Engineering/Scientific	247	6	263	181	297	309	327	339	5
Education/Training	84	11	93	104	113	119	127	132	7
On-Line Data Bases	833	25	1045	1283	1545	1964	2377	2892	23
Other Cross-Industry	602	5	634	676	708	743	791	828	5
Subtotal	3921	11	4355	4852	5370	6026	6732	7496	11
Other									
Utility Processing	2221	9	2410	2620	2787	2964	3153	3324	7
Value-Added Networks	409	32	539	705	907	1132	1414	1742	26
Grand Total	15550	14	17714	20122	22768	25768	29115	32678	13

EXHIBIT B-3

PROCESSING FACILITIES MANAGEMENT SERVICES USER EXPENDITURE FORECAST BY MARKET SEGMENT, 1986-1992

SEGMENTATION	1986 ($M)	1986-1987 Growth (%)	1987 ($M)	1988 ($M)	1989 ($M)	1990 ($M)	1991 ($M)	1992 ($M)	AAGR 1987-1992 (%)
Industry-Specific									
Discrete Manufacturing	52	13	59	67	75	85	96	107	13
Process Manufacturing	44	7	47	49	51	53	54	55	3
Transportation	27	4	28	29	29	29	30	30	1
Utilities	21	10	23	26	29	32	36	41	12
Telecommunications	20	15	23	27	31	36	42	49	16
Distribution	52	10	57	64	73	84	98	115	15
Banking and Finance	990	14	1131	1289	1469	1675	1910	2151	14
Insurance	361	10	397	437	480	528	581	639	10
Medical	383	15	442	504	569	643	721	811	13
Education	20	5	21	21	21	22	22	22	1
Services	7	8	8	9	9	10	10	11	8
Federal Government	213	5	223	247	263	286	311	337	9
State & Local Government	247	17	406	467	528	591	656	722	12
Other Industry-Specific	10	10	11	12	13	15	16	18	10
Subtotal	2547	13	2876	3248	3640	4089	4583	5108	12
Cross Industry Total	62	0	62	64	64	65	66	68	2
Utility Processing Sector	181	15	208	236	263	300	343	389	13
Grand Total	2790	13	3146	3548	3967	4454	4992	5565	12

EXHIBIT B-4

ON-LINE DATA BASE SERVICES USER EXPENDITURE FORECAST BY MARKET SEGMENT, 1986-1992

SEGMENTATION	1986 ($M)	1986-1987 Growth (%)	1987 ($M)	1988 ($M)	1989 ($M)	1990 ($M)	1991 ($M)	1992 ($M)	AAGR 1987-1992 (%)
Industry-Specific									
Discrete Manufacturing	149	19	178	209	257	291	348	416	19
Process Manufacturing	200	16	231	278	305	364	385	408	12
Transportation	67	10	74	85	99	114	133	155	16
Utilities	28	14	32	33	38	43	46	50	9
Telecommunications	75	27	95	121	138	175	215	265	23
Distribution	235	26	296	363	444	538	634	747	20
Banking and Finance	876	15	1010	1217	1381	1647	1869	2124	16
Insurance	92	12	103	114	132	151	165	182	12
Medical	149	27	189	213	267	309	386	483	21
Education	56	11	62	69	75	84	94	107	12
Services	299	13	337	390	434	488	571	670	15
Federal Government	16	25	20	25	30	36	45	60	25
State & Local Government	14	36	19	23	27	31	36	41	17
Other Industry-Specific	65	25	81	100	122	148	157	167	16
Subtotal	2321	17	2727	3240	3749	4419	5084	5875	17
Cross Industry									
Securities	183	30	237	300	377	509	615	747	26
Credit	274	18	322	362	407	467	523	585	13
Text/Bibliography	92	20	110	133	159	191	231	278	20
News	180	35	243	312	380	525	688	906	30
Economic/Other	104	28	133	176	222	272	320	376	23
Subtotal	833	25	1045	1283	1545	1964	2377	2892	23
Grand Total	3154	20	3772	4523	5294	6383	7461	8767	18
Balancing to b-3	0		0	0	0	0	0	0	