# INPUT

# MANAGEMENT PLANNING PROGRAM FOR THE INFORMATION SERVICES INDUSTRY

MANAGEMENT BRIEF

INFORMATION SERVICES
IN 1990

SEPTEMBER 1981

# MANAGEMENT PLANNING PROGRAM FOR THE INFORMATION SERVICES INDUSTRY

**OBJECTIVE:** To provide Information Services Industry managment with on-going business and market information to support their planning and product decisions.

**DESCRIPTION:** Clients of this program receive the following services each year:

- Major Planning Reports - Six in-depth studies which address specific industry sectors, cross industry markets, or key management issues related to marketing, software, technology and personnel developments over the next five years.
- Management Briefs - Four reports which analyze important new techni quire timely attention by senior
- Annuc t contains five-year forec epth analysis of the inforn key industry issues includ
- Annuc tion held in the fall of th h client and is an impor praised of the key issue:
- Joint e spring, provides a vehic rocessing services trend ety of speakers and subje key issues facing comp
- Inqui T research staff on an as sits.

**RESEARCH METH** :h in information services, software

- Rese cussions with client repre
- Rese erviews with users, vend analysts.
- Conc the judgement of INPU
- Prof or more years of expe s, including senior manc



For further information on this report or program, please call or write:

INPUT
Park 80 Plaza West - 1
Saddle Brook, NJ 07662
(201) 368-9471

INPUT
2471 East Bayshore Road
Suite 600
Palo Alto, CA 94303
(415) 493-1600

# INPUT

# INFORMATION SERVICES INDUSTRY PROGRAM

MANAGEMENT BRIEF

INFORMATION SERVICES
IN 1990

SEPTEMBER 1981

# INFORMATION SERVICES IN 1990

## CONTENTS

# INFORMATION SERVICES IN 1990

## EXHIBITS

# I INTRODUCTION

- Produced as part of INPUT's 1981 Information Services Program, this report forecasts changes that will occur in the Information Services Industry (ISI) by 1990 based on an analysis of current changes, trends, and anticipated announce ments of products and services.

- Highlights of these forecasts include the following:

  - The number and kinds of users and the total demand for services will increase substantially through the decade.

  - Price competition caused by new technology will cause revenues for processing services and some software products to drop. This could expose vendors to the risk of declining profits.

  - Large-scale approaches to remote processing are being introduced now and will expand in the 1980s.

    . These approaches, such as the IBM Hydra, are presently based on hardware services offerings.

    . Fewer people will be required to handle user processing.

    . The use of professional services and network capabilities will be greatly expanded.

  - . The ability of software vendors to deliver products could be preempted.

- The delivery of software products and proprietary data bases will change substantially.

  - . Proprietary data bases will be made available on videodisks.

  - . Many software products will be delivered on chips.

- The emphasis in remote computing services (RCS) will be on value-added processing during the 1980s.

  - . Value may be added by having network services collect data which can be aggregated on the processing services.

  - . Value may be added through new proprietary data base services.

  - . Value could also be added through fast track development on remote processing.

- The addition of many value-added products will make RCS vendors seem like a supermarket of services.

- By 1990, most vendors in the information services industry will have to alter their services.

  - . RCS vendors will have to obtain sufficient revenues from services other than processing to stay alive.

  - . Software vendors will become more knowledgeable of chip design or form relationships with hardware vendors.

- Drawing from research contained in earlier INPUT reports listed in the Appendix, the study considers the implications of trends on products and services offered by the information services industry.

- The report provides management and technical recommendations to accommodate changing financial market conditions and to plan for emerging market opportunities.

# II STATUS OF THE INFORMATION SERVICES INDUSTRY AT THE BEGINNING OF THE 1980s

## A. 1970 TO 1980 GROWTH

- During the last decade, the Information Services Industry has grown by a factor of four, as shown in Exhibit II-1.

- This exhibit also shows that the composition of the computer services market changed significantly during the period.

  - Batch processing services contributed the greatest amount of revenue in 1970, but grew more slowly than other services during the decade.

  - Revenue from RCS moved ahead of batch processing by the mid-1970s.

  - By 1980, professional services produced more revenue than batch processing, and software products were close in volume.

- Many new products and applications were introduced by this industry during the 1970s including DBMS, user friendly software, proprietary data bases, graphics applications, and intelligent terminals.

- Software firms also played a vital role in the introduction of minicomputers by developing applications and systems software for minicomputers.

EXHIBIT II-1

COMPUTER SERVICES INDUSTRY
PERFORMANCE SUMMARY, 1970-1980

| COMPUTER SERVICE | COMPUTER SERVICES MARKET | | |
|---|---|---|---|
| | 1970 ($ millions) | 1980 ($ millions) | 1970-1980 AAGR (percent) |
| Processing Services | | | |
| RCS | $ 540 | $ 4,126 | 23% |
| Batch | 1,060 | 3,091 | 13 |
| FM | 390 | 1,121 | 11 |
| Subtotal | $1,990 | $ 8,338 | 15% |
| Software Products | | | |
| Systems | 150 | 1,401 | 25 |
| Applications | 100 | 1,325 | 29 |
| Subtotal | $ 250 | $ 2,726 | 27% |
| Professoinal Services | 930 | 3,751 | 15 |
| Total | $3,170 | $14,815 | 17% |

- During the decade, professional services, software products, and RCS vendors were called upon more frequently to develop applications or to alleviate the lack of technical expertise which delayed business plans.

  - This trend will be stronger in the 1980s due to more pronounced shortages of personnel and increasing demand for automation.

- During the 1970s, firms already in one area of the industry entered other areas, while many outside firms entered the industry.

  - Batch service and software firms as well as airlines, banks, insurance companies, and other data processing users acquired or developed data processing subsidiaries.

  - Many RCS firms started to offer software products and proprietary data bases.

  - Movement within and into the industry is at a high level at present and should continue.

## B. WHERE GROWTH CAME FROM

- Banking and finance industries contributed more revenue for information services than any other industrial sector during the 1970s.

  - This sector accounted for 22% of revenues for information services in 1976 and still accounted for 17% of revenues in 1980.

  - By 1980, other sectors were contributing substantial percentages of revenue in addition to banking and finance.

- Discrete and process manufacturing accounted for 22% of revenues in 1980.

- In that year, government at federal, state, and local levels generated 20% of revenues.

- Revenue can be analyzed by type of service, as well as by industrial sector.

  - As shown in Exhibit II-1, RCS processing was the leading source of revenue for the 1970s, growing to over 30% of total revenue by 1980.

  - Industry specific surpassed function and utility processing on RCS as well as on other categories of processing. Processing services were increasingly aimed at specific industries by the end of the 1970s.

  - Revenue from software products was growing more rapidly than from other services by the end of the 1970s and more specific industry applications had also emerged in applications software (e.g., general ledger for the shipping industry).

## C. SIGNIFICANT TRENDS IN THE LAST FIVE YEARS

- Trends of importance in the information services industry in this period included:

  - Further development and use of DBMS.

  - The growth of proprietary data bases.

  - The increase in network applications.

  - The growth in revenue of software products.

- DBMS have become an important source of revenue for software and RCS firms.

  - In a recent study of the federal government RCS market, INPUT found that DBMS ranked at the top of user selection criteria for RCS vendors.

- Rather than emphasizing DBMS as a means of storing and retrieving information, many vendors now emphasize it as a rapid development tool.

  - RCS vendors have used their DBMS capabilities to implement reporting systems for customers. Tapes of data from the user are fed into data bases that can be easily manipulated to produce reports or graphs.

- Recent developments in DBMS include the hardware service (a DBMS computer) offered by Software AG and the introduction of relational data base capabilities by several RCS vendors including Dartmouth Time-Sharing licensed systems.

- Proprietary data bases utilized on RCS accounted for $1.2 billion in revenue in 1979 and usage was growing at a 24% AAGR.

  - These data bases contain information of use to firms which can be collected apart from users.

    . Historical data on interest rates, security prices, and raw materials are available in proprietary data bases.

  - Proprietary data bases are used heavily by banking and finance, manufacturing services, and retail industries.

- Over 600 of these data bases are now available from RCS and other vendors.

- As more industries and business offices are automated, the number of proprietary data bases will increase.

- Vendors are considering data bases of tools, materials, supplies, etc. for several industries.

- Expanded data bases of interest rates, commodity futures, and security related information will continue to be offered.

- During the last five years, applications utilizing networks have grown in number and usage on RCS.

  - Cash management systems, one of the fastest growing network applications, use the capabilities of ADP, GEISCO, NDC, IDC, and other RCS vendors.

  - Network applications in the distribution and manufacturing industries use the capabilities of Xerox, Tymshare, GEISCO, and other vendors.

    . These applications link different computers, terminals, communication lines, and methods to gather and aggregate data from plants, divisions, and offices of companies.

    . Many of these applications serve dispersed processing needs within one firm as well as communication between separate firms.

  - The growing use of data processing in all levels and sizes of business will expand network applications.

- The growth in revenue of software products was a significant trend of the decade, but particularly of the late 1970s.

  - By 1980, software revenue was growing at an AAGR of nearly 30%.

- Three key factors contributed to this trend.

- Software continued to be unbundled by hardware vendors.

- Rapid growth of the minicomputer industry in the late 1970s produced a demand for software that could not be met in-house.

- Users became more willing to use software products due to the shortage and expense of programming personnel.

- Revenues from software products have grown more rapidly than the combined revenue from other ISI products, as shown in Exhibit II-2.

- This exhibit also suggests that a large part of the increased MIS budget for software is being spent on software products.

## D. SYNOPSIS OF 1981-1985 FORECASTS

- Total revenues of the Information Services Industry are expected to grow at an annual average rate of 23% between 1980 and 1985.

- The incremental revenue will be concentrated in certain industrial sectors and types of services, as shown in Exhibit II-3.

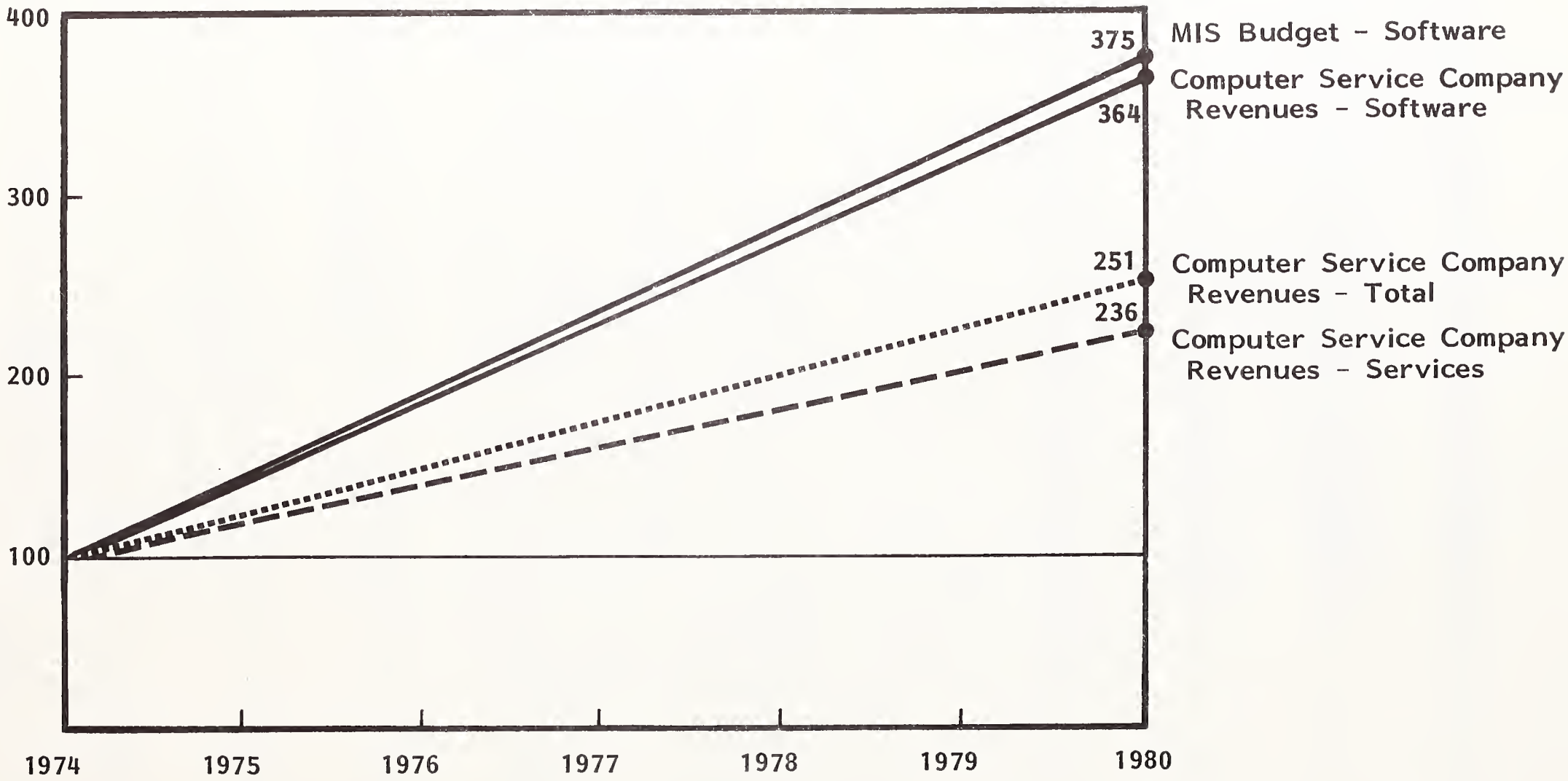
  - Revenues from the industry sectors of banking and manufacturing should contribute almost half the incremental growth in dollar volume.

  - A greater concentration can be found in types of services where software products, industry specific RCS processing, and professional services should account for over 70% of incremental revenue.

- On an absolute basis, banking and finance will remain the largest industry sector for processing services, accounting for 21% of total processing revenues by 1985.

EXHIBIT II-2

MIS BUDGETS VERSUS
COMPUTER SERVICE COMPANY REVENUES
(RELATIVE PERFORMANCE)

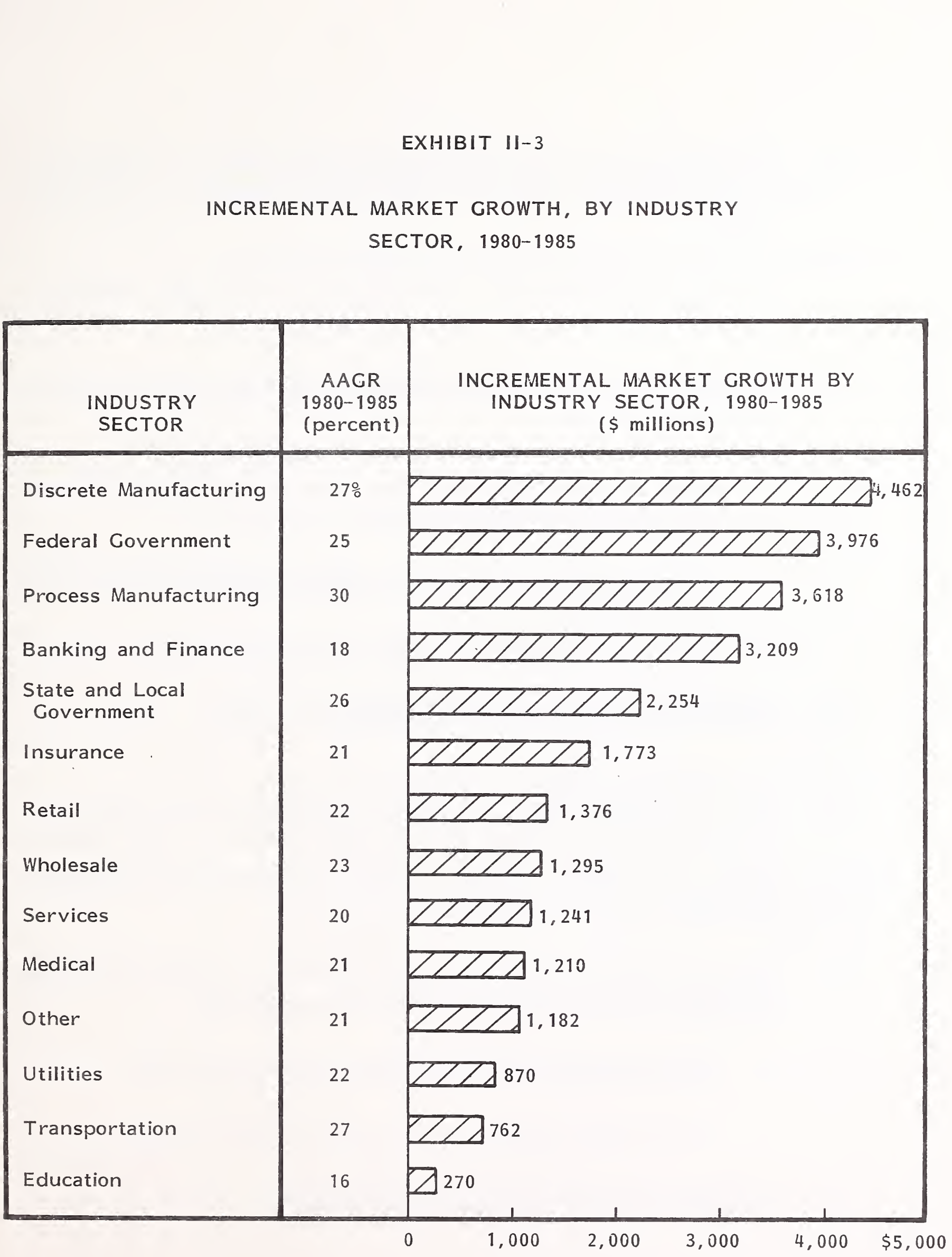



1974 = 100 - The Base Year

EXHIBIT II-3

INCREMENTAL MARKET GROWTH, BY INDUSTRY SECTOR, 1980-1985

| INDUSTRY SECTOR | AAGR 1980-1985 (percent) | INCREMENTAL MARKET GROWTH BY INDUSTRY SECTOR, 1980-1985 ($ millions) |
|---|---|---|
| Discrete Manufacturing | 27% | 4,462 |
| Federal Government | 25 | 3,976 |
| Process Manufacturing | 30 | 3,618 |
| Banking and Finance | 18 | 3,209 |
| State and Local Government | 26 | 2,254 |
| Insurance | 21 | 1,773 |
| Retail | 22 | 1,376 |
| Wholesale | 23 | 1,295 |
| Services | 20 | 1,241 |
| Medical | 21 | 1,210 |
| Other | 21 | 1,182 |
| Utilities | 22 | 870 |
| Transportation | 27 | 762 |
| Education | 16 | 270 |



- Manufacturing sectors (discrete and process) will generate over 38% of the revenue for software products by 1985, leading all sectors in use of this service.

- The federal government sector will continue to be the largest consumer of professional services in 1985.

- New application areas and products will be growing more rapidly during this period of time, however.

  - Graphical applications in general will be growing at a 44% AAGR and will amount to $774 million by 1985.

  - Hardware services are growing at a 55% AAGR and will amount to $1 billion by 1985.

## E. SIGNIFICANT CHANGES OCCURRING NOW

- The trends discussed earlier in Section C are continuing at the present time. In particular, the use of proprietary data bases continues to increase, and RCS firms, as well as firms outside the industry, are acquiring the rights to new data bases.

- Network capabilities of RCS vendors are expanding on both the international and national scenes to meet the needs of multinational firms.

  - Some vendors are utilizing or developing their own networks.

  - Other vendors interface to packet networks or other carriers.

- Significant changes in the current movement include:

- The merging of hardware and software offerings which is leading to large-scale offerings of processing services and software products.

- The offering of hardware services (or USHS) by RCS and other vendors.

- The expanding use of micros.

- Developments in communication networks and services.

- The financial climate that has developed for firms in the industry.

- The increase in acquisitions and new ventures during the last year.

- The impact of shortages of technical personnel.

• The merging of hardware and software provides a number of changes.

- Software functions are being replaced with hardware.

  . Specialized computers have been developed to do the work of data base and communication software.

  . Chips are being developed to make one computer compatible with another, run interpretive compilers, and perform groups of instructions.

- Software firms offer hardware as part of a turnkey solution.

- RCS and other firms are integrating hardware, software, and services in their offerings.

  . Citibank has done this with its MoneyFacts system which offers customers (other banks) the opportunity to earn fee income.

- Computer software to perform general ledger, accounting functions, personal money management, etc., and professional services, as needed, are supplied to the bank acquiring the service.

- The bank would use this package to sell services to its customers on a fee basis.

- Citibank is marketing a hardware/software capability on a large scale which can obtain processing business for correspondents.

- Hardware services have emerged as an aggressive market strategy during the last year, and recent announcements indicate that it can be one means of expanding processing services.

- These services were first seen by RCS vendors as a means of lowering RCS costs and helping customers to move work in-house.

  - A number of services are available which accomplish these purposes and help RCS vendors compete against mini and micro offerings.

- Some vendors have seen that these services can be sold with a more aggressive strategy.

  - The Marklink product of GE is being sold in quantity together with network capabilities, host processing, and professional services.

  - Boeing is following a similar strategy, marketing IBM 4300s, minis, and micros together with network use, host processing, and professional services.

  - IBM may be following the most aggressive strategy of this type by reentering the remote processing business with the Hydra concept.

- Unattended 4300s would be controlled by a host which down-loaded software and monitored operation.

- The 4300s would provide processing services in any regional or local market IBM wished.

- This concept would reduce the number of people involved with software maintenance and operation (people-less).

- Two types of changes occurring with micros are of interest to Information Services vendors.

  - The first concerns the increased capabilities that are being announced.

    - Xerox, IBM, Canon, Data General, and others have recently announced more powerful micros.

  - Computers such as the new Canon CBX2 are competitive with IBM System 34 computers.

    - A wave of new micros with 16-bit words and faster processing will be available in the next year. The peripherals available with some of these units will make them competitors with 370/148 systems.

    - Manufacturers are now planning 32-bit "micros."

    - Of greater importance, perhaps, systems are being introduced that incorporate multiple microcomputers to increase power and add redundancy. These systems will be very popular in financial and other sensitive applications.

  - The second change is that micros are being acquired by business.

. Many banks, insurance companies, publishers, aircraft manufacturers, etc. have acquired personal computers.

. INPUT estimated in its study, Selling Personal Computers to Large Companies, that 600,000 micros would be installed by 1985.

. In the same study, INPUT developed a list of over 20 applications where micros have been employed.

. RCS firms are installing micros in business offices as a hardware service.

. Software and professional services vendors have helped customers install and use micros.

- Data communications is a world of changes at this moment.

- Demand for national and international service is increasing greatly.

- Value-added network services (VANS) and RCS vendors are competing with different alternatives to serve local, national, and international needs.

  . Packet networks, dedicated lines, and mailgrams have been proposed as alternative delivery methods for financial reports.

- Many large corporations are developing their own voice and data systems. This could make it necesary for RCS vendors to interface to a number of different systems to distribute or collect data.

- The potential of satellite communication is just starting to be tapped.

  . Information can be collected from ships at sea using satellites.

  - Satellites could be used to transmit information to homes and businesses via cable TV.

- The economy of fiber optics transmission indicates that it will be used increasingly and may lead to changes in network design and lower costs.

- Many companies may decide to utilize data communication capabilities of RCS vendors such as BCS, GEISCO or Tymshare, or use carriers or value-added services such as Telenet, Graphic Scanning, EMCA, etc. rather than expose themselves to the risks of changing technology.

- The financial climate has changed to a very favorable one for the information services industry recently.

  - Firms such as MSA and Pansophic have found it profitable to go public.

  - Many firms outside the information service industry are anxious to acquire firms in the industry. In the last few years, Schlumberger, McGraw Hill, Dun and Bradstreet, and others have done so.

  - According to Venture Capital Journal, over $1 billion in venture capital will be invested in new firms in 1981 and much of it will be invested in firms in the data processing industry.

- There are a number of firms who specialize in finding candidates for acquisition in the Information Services Industry.

- In this climate, small firms are being organized and raising capital much more easily than they could have during the last five years.

- There is money available to bring people who have new technical knowledge or software into the market.

  - This will create more competition.

- This will also make more acquisition candidates available.

- At the beginning of the 1980s, the major problem of the ISI and of the data processing industry in general is acquiring and holding experienced people.

- The problem seems to have suddenly become worse.

  - One reason is certainly the proliferation of hardware and software that has taken place. This has increased demand.

  - Another reason is the demand for new systems by business.

    . Automation is being sought in many new areas such as small shipping companies and law offices to offset the effect of rising costs.

    . Processing is being dispersed further.

    . New application areas such as manufacturing are growing rapidly.

- The competition for available people has also intensified the problem.

  - Salaries have been bid up and turnover has increased.

  - Rather than train people for assignments next year, the emphasis has been on hiring people to address an immediate need.

- ISI firms will have to intensify their programs to train and hold on to people. They will also have to consider the availability of personnel with appropriate backgrounds when planning market activity.

# III SIGNIFICANT TRENDS IN THE COMING DECADE

## A. ECONOMIC FORECAST

- The economy as a whole is undergoing a restructuring in which older manufacturing industries are shrinking on a relative basis while food production, energy related and high-technology firms are growing rapidly.

- This restructuring is producing diversification so that slumps in the auto, steel, or housing industries do not pull down the economy as a whole.

  - According to Lawrence Klein, the 1980 Nobel prize winner in economics, this diversification will help the economy continue its growth in the 1980s.

- The major economic problem is continuing inflation, but the impact of inflation is different throughout the economy.

  - The increasing cost of labor is a factor in many older industries, particularly older manufacturing companies.

    - Cost of living and annual adjustments are built into contracts in these industries.

- Automation is being sought to reduce jobs as well as to improve methods of manufacture.

- The cost of energy is more of a factor in some large industries such as textiles, chemicals, and food production according to a study performed by D. Jorgenson of Harvard University.

  - In these industries, efforts are being made to reduce the use of energy and substitute labor.

  - This will not be a reversal in the recent trend to substitute computing for labor. Computing and labor will be substituted for the use of energy. The use of labor will be controlled and minimized.

  - New business and technical systems will be needed to support these changes.

## B. CHANGING STRUCTURE OF THE BUSINESS COMMUNITY

- Inflation will continue to encourage new consolidations, mergers, and business groupings.

  - Inflation makes it desirable to obtain assets through mergers, etc. rather than wait for them to be developed.

  - Inflation also encourages firms to seek acquisitions that will offer opportunities for cost reduction through combined operations.

  - Firms that will appreciate in value more rapidly during inflationary periods, such as firms with oil or other mineral reserves, will also be sought.

- ISI firms appear to be good acquisitions during such a period since they have been appreciating in value rapidly and may offer resources of interest (networks, data bases, people) to a large company.

- Continuing high interest rates and steady increases in costs and prices will impact all activities.

- Efforts by the administration to hold down inflation will prevent higher levels of cost increases, but will not lead to lower levels of inflation for any sustained period until the second half of the decade.

- Continuing inflation will encourage the present interest in cost reduction, productivity, and automation to continue.

  - More cost analysis and techniques for tracking costs will be utilized in business.

  - Automation will be sought in smaller offices and new areas.

- There will be a continuing expansion of responsibility for bottom line performance through middle and lower levels of business.

  - This will achieve more effectiveness and attention to performance at all levels of business.

    . A specific function, such as the management of a warehouse of supplies, will be handled as though it is a profit center competing with outside suppliers.

    . This will promote the effectivensss of office automation by treating office tasks as services which have to meet needs in the most cost-effective way.

- The expansion of responsibility for performance of a business activity will also be encouraged by reduction in the cost of computing.
  - Automation will be feasible in almost all business activities.
  - Small offices can find ways to reduce costs and increase productivity.
- There will be more integration of activities between businesses.
  - Oil companies now keep track of the purchases which they make from each other and make net payments to each other on a settlement basis.
  - Large manufacturers are tracking the receivables and payables between divisions and subsidiaries so that net settlements can be made and the processing of transactions can be simplified.
  - For the most part, cash management systems have reduced the activities of corporations and banks in handling banking transactions.
- The integration of activities between businesses utilizes data processing and communication to reduce costs and produce more timely information.
- There will continue to be a blurring of business activities similar to what has been happening in the computing industry.
  - This has been encouraged by a much broader interpretation of a company's mission or objectives.
  - There is an easing of regulations that facilitates this blurring of services and products in regulated industries such as banking.
- The blurring of services has already emerged as a trend in the banking, insurance, and brokerage industries.

- Firms in one of these industries are acquiring firms and offering services in the other two industries.

  . Brokerage houses such as Merrill Lynch and E.F. Hutton are offering the use of credit cards and checking accounts.

  . An insurance company, Prudential, has acquired the securities firm, Bache.

- Firms outside these industries are offering services associated with banking, insurance, and securities.

  . Insurance is offered by oil companies, retail chains, and baby food manufacturers as well as by banks.

- This expansion of services into other industries will not be confined to the industries discussed.

  - Firms in the real estate industry will offer new services to owners of property.

  - Large retail stores will offer processing services for customers.

  - Firms in manufacturing will apply CAD/CAM techniques in other industries.

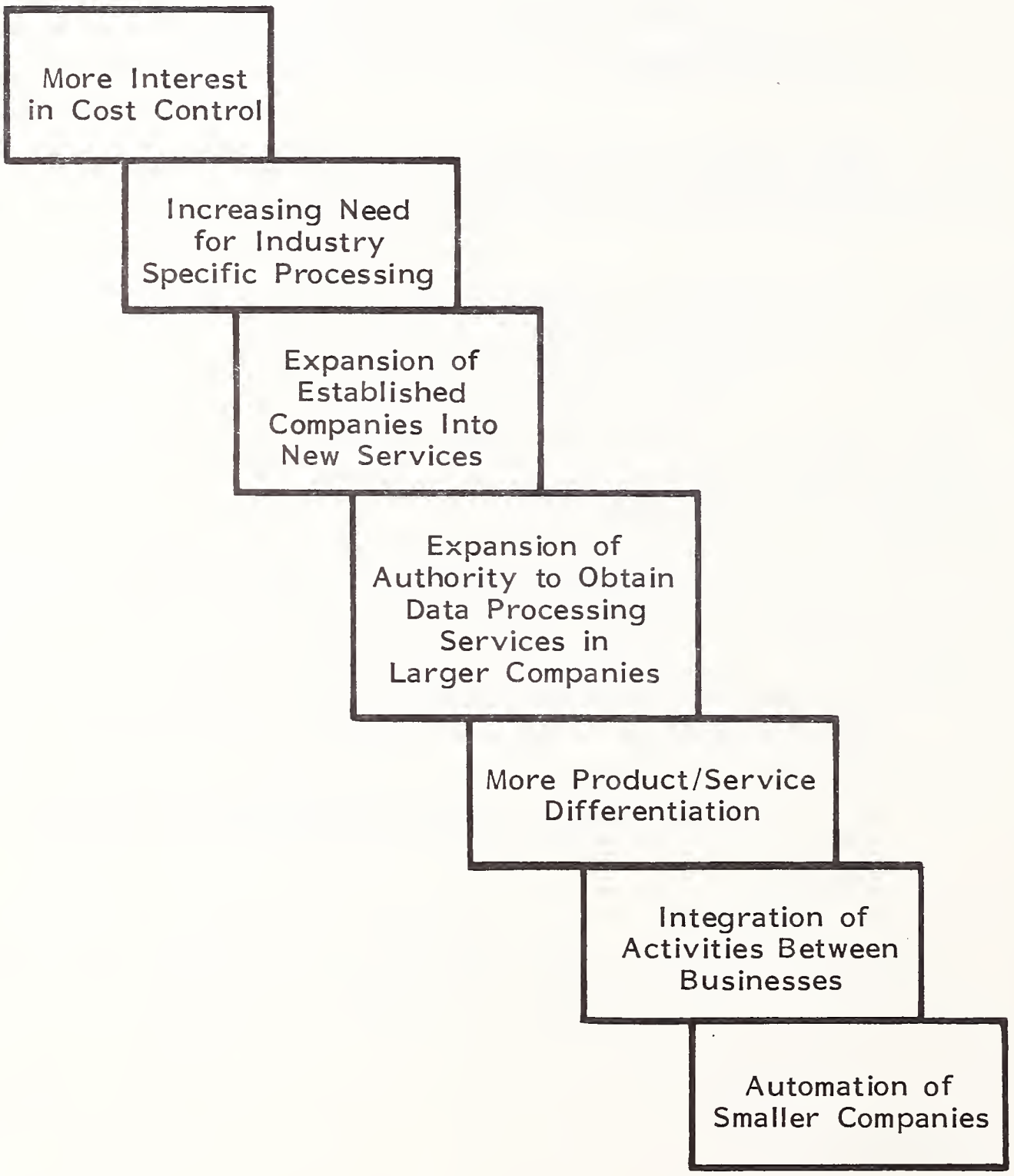
- The changes in business which have been mentioned will cause a substantial increase in the need for computing, as shown in Exhibit III-1.

## C. TECHNOLOGY

- Significant changes that are currently anticipated include:

EXHIBIT III-1

INCREASING DEMAND FOR
DATA PROCESSING/COMMUNICATION



- Developments in videodisk storage that will change the method of delivery for proprietary data bases as well as significantly increase the capability of computers.

- Increasing density of circuitry and storage in microelectronics that will lead to mainframes that are smaller than today's micros.

- Software on chips that will change the nature of the software business.

- Increased flexibility of data communications including the use of satellites and value-added services.

- Expanding use of fiber optics in data communication which will eventually lower costs.

- The appearance of new computer architecture.

- New developments in video storage technology should make an impact in the next four years.

  - Minicomputer systems are currently using read-only videodisks.

  - Minis and micros as well as mainframe computers will be equipped, by about 1985, with videodisks that can be updated.

  - Videodisks or related storage devices will make it possible to move much larger applications to a micro or small computer.

  - Copies of segments or all of a data base could be downloaded or delivered on a videodisk to a micro with an interface for these storage units.

    . Updates could be supplied by a dial-up connection to an RCS which managed the proprietary data base.

- The density of electronics or chips will increase throughout the decade leading to extremely powerful computers smaller than micros are today.

  - By 1990, internal speeds of large computers will be 100 times faster than the models of today and a single chip may store one million bits of data, according to industry sources.

- The cost of new computers and computer processing will drop rapidly through the 1980s as new chips are introduced.

- Improvements in micros will produce situations throughout the 1980s where a group or class of micros (or small computers) suddenly drops rapidly in value.

  - Eight-bit micros, particularly some personal computers, will drop rapidly in value during the imminent future. Business and home users of these machines will be anxious to dispose of them and move to 16-bit systems with larger disk storage units.

  - When videodisks are available that can be updated, units that cannot interface with them may be replaced rapidly in business and fall in value.

- In addition to the use of new chips to build smaller and more economic computers, chips will be used to replace software functions during the next few years.

  - There are now several software and RCS firms who have chips developed to replace communications software.

  - At least two software firms are developing specialized micros to replace financial modeling software.

  - Chips that handle systems software and applications functions will be introduced in the next few years.

- By 1990, application software packages will be available on chips.

- Enhancements or changes to software may be prepared by adjusting parameters or adding front- or back-end chips.

- Developments in communication technology and techniques will offer the possibility of lower costs during the 1980s, but increasing demand will probably offset improvements so that costs will inch upward.

- Competition to A.T.&T. from cooperative groups of users and value-added networks could result in reduced costs to users.

  - Cables, satellites, and other wireless transmission would offer the ability to transmit directly to homes and businesses without using A.T.&T. local lines.

  - The expansion of competitive services may keep costs (A.T.&T. charges) lower, but demand to serve homes with Teletext and other services as well as business demand will not provide an opportunity for competitors to lower costs during the 1980s.

- Throughout the decade, developments will occur that increase the flexibility of communications.

  - Audio input and conversion to digital form will be improved considerably in the next one to two years.

  - Satellite communications and fiber optics cables will increase in use through the 1980s.

  - New devices will be introduced to interface with different types of service to extend network capabilities.

- Fiber optics will add flexibility to data transmission but will not lead to greater bandwidth and an increase in the efficiency of data communication until about 1990. At that time, fiber optics will be used more effectively and reduce the costs of data communication by up to 50%.

- New approaches to computer architecture will evolve during the 1980s.

  - These systems will be based on improvements in microelectronics and the use of video or other optical storage.

  - Multiple computers (smaller than present micros) will provide high processing speeds and redundancy.

    . The MoneyFacts system anounced by Citibank exploits this concept.

  - These computers will divide functions and applications and achieve higher throughput.

  - Segments of application processing, line handling, and other functions will be burned into the chips of computers.

  - Functions of present operating systems will be handled by separate micros.

    . It will be possible to run some applications without the overhead of functions that are not required.

- Developments in audio and video input and output will enhance the use of computers in many applications.

  - Service firms will market and take orders using systems that handle clients on the phone, over television, or through special terminals located in supermarkets or other stores.

- Automatic Teller Machines (ATM) and other specialized terminals will exploit these developments.

## D. FACTORS EXTERNAL TO THE INDUSTRY

- During the next decade, many more firms will enter the information services industry.

  - Many of these firms will be anxious to capitalize on expertise they have acquired or developments they have made internally, which they feel can be used by other firms in the same industry or even in other industries.

  - Other firms will simply be seeking a means of participating in the growth potential of the information services industry.

- Firms in the banking, brokerage, and insurance industries particularly will be active in entering the information services industry.

  - A number of banks, including Citibank and Chase, already have substantial RCS components and are considering other data processing based services.

  - Insurance companies and brokerages offer RCS services and software packages as well.

- For large commercial banks, these activities may be a part of their activities for correspondent institutions.

- Part of the business of banking, insurance, and securities firms can involve processing for smaller firms in the same field or in the other two industries.

- Banks may handle data communication and processing of details on preauthorized drafts for insurance companies or receives and delivers on security trades for brokerage houses.

- Firms in these industries have begun to compete for RCS and software business within and outside banking, insurance, and securities.

  - Banks are offering accounting, financial modeling, etc. on RCS to firms in the oil, chemical, textile, and other industries.

  - Insurance companies have offered portfolio management and systems software products on a general basis.

  - Metropolitan Life has acquired Dartmouth Time-Sharing Services Inc. and offers all its products to other RCS processors on a licensing arrangement.

- There is great pressure to participate in expanding ISI revenue in the industries discussed as well as in other industries.

  - Airlines, publishers, oil companies, and a variety of other firms have entered the ISI.

  - Many firms have developed software for their own use and sold the rights to firms in the software industry for their sale elsewhere.

- Many factors will affect the ISI in the 1980s which have their origin in firms involved in information related products and services such as:

  - Computer manufacturers.

  - Communications (satellite and other media).

  - Television.

- Cable TV.

- Electronic publishing.

- Computer manufacturers presently offer processing services, software products, and professional services.

  - Processing is an important source of revenue for CDC.

  - Burroughs, NCR, and other manufacturers also offer processing.

  - IBM offers processing services overseas and may enter the processing business in the U.S. with the Hydra concept which is described in Chapter II.

    . This would allow IBM to market RCS services on a mass indirect basis.

    . It would involve less use of people by IBM and help to sell professional services and network services.

  - Computer manufacturers are also selling both systems and applications software.

    . Sperry Rand has just developed a package for the transportation industry.

  - Tandy is selling software products on a mass basis through its stores.

    . In addition to VISICALC, packages for brokerage processing and other industries are being sold to many firms.

- Communications carriers will try to offer VANS through subsidiaries or affiliated companies throughout the 1980s.

- There will be direct competition with RCS for network based systems.

- There will also be competition with RCS firms, manufacturers, and others over protocols, speeds, and devices used to interface different communication media.

- Carriers will offer hardware that interfaces other communication services and handles software functions.

  . These devices will also be offered by manufacturers and RCS firms.

- Television will be the basis of product information and ordering services, payment, information retrieval, home business, electronic mail, and other services in the 1980s.

  - RCS vendors will assist companies to take advantage of the medium.

  - One RCS vendor is now preparing graphical methods of presenting banking services such as money management and portfolio evaluation to individuals.

    . These services would be offered to individuals on behalf of banks.

- Cable TV and satellite transmission to television will provide means of communicating to homes and businesses that bypass the phone company, for local lines at least.

- Electronic publishing will be offered to the public in a variety of ways during the 1980s.

- Magazines will be offered to the consumer on video cassettes and disks that can be played back on TV sets or combinations of TV sets and micros.

  . The latter will allow the viewer to select topics and refer back to items of interest.

- Magazines will also be transmitted via television.

  . Provision will be made for a person to skim, select articles, or browse.

  . It will be possible by 1985 to store the magazine on videodisk and play it back or read it selectively as described.

- Capabilities will be provided for ordering products or obtaining information or magazine items via television based services.

- Subscribers to a magazine will be able to browse through prior copies, etc. for a fee.

- RCS services and value-added networks will compete to offer these services.

# IV EFFECT OF TRENDS ON THE INFORMATION SERVICES INDUSTRY

## A. GENERAL IMPACT OF TRENDS ON USER NEEDS

- The needs of data processing users and prospects will increase in general throughout the decade and there will be a much greater range of needs than in the past.

  - Staff groups in medium and larger companies (Fortune 500) will be engaged in studies on more complex cost control, financial planning, new venture, and other models and analyses including what are now called decision support systems.

  - Users of mature applications will still feel a high level of need for enhancements to current systems and in some cases for new systems.

  - Changes in and merged business activities, more product and service differentation, and the continuing impact of inflation will keep these needs at a high level.

  - New productivity approaches will aid but not solve the problem since needs will constantly be changing and the total numbers of users will be growing.

- Some users of mature applications will look to industry specific application software to break the reprogramming bottleneck.

- A significant number of new users in large companies will be seeking specialized software for smaller applications.

- These jobs could involve work that was never done in a routine way or that had been combined with longer jobs (e.g., local or department budgets, department pay data, individual department plan and performance data).

- The growth of business automation will also be spurred by an increase in movement of work to the home and in the total number of business activities.

  - The movement of business (other than manufacturing) to home locations with intelligent terminals will have grown throughout the 1980s.

  - Education, including business training, will increasingly be provided at home as well.

  - Many new services and small business offerings will be provided from home suppliers.

- Business services and products will be produced with more differentiation to suit a wider range of consumer needs.

  - There will be more entertainment, publishing, and information services directed to small groups of users.

- There will also be increased use of new services that cut across many industries and types of users such as those utilizing television:

- Improvements in bill-paying (by phone but without a person initiating the call) and other financial, insurance, and brokerage services will be introduced for home use through the television set or a small display.

  . RCS firms are now developing these types of services.

- Access to data bases of information and the other benefits of television-based services will be available.

- Shopping on the television set will be an established institution.

- Shopping on TV will be combined with entertainment and payment services that promote its use.

- There will also be demand for electronic mail and private network services which will cut across many industries.

  - RCS vendors will supply these needs in many cases.

  - Software to run these services will be developed by ISI vendors.

- In summary, there will be an increase of needs from experienced as well as new users.

  - New users will be found in large, medium, and smaller companies and in increasing numbers in the home.

  - New users in the home could be interested in proprietary data bases, specialized software, communication, and even hardware services.

- Both experienced and new users in larger companies will be affected by the changes taking place in data processing in their firms.

- The impact of changes will make it desirable or necessary to handle many ad hoc or rapid response needs with outside services.

## B. EFFECT OF TRENDS ON THE IN-HOUSE DATA PROCESSING ENVIRONMENT

- The following scenario indicates the likely environment of data processing use that will exist by 1990 according to equipment planning experts at several large companies.

- The decreasing cost of CPU and storage and the use of application software on chips will have changed the design of many business applications.

  - For instance, general ledger (accounts receivable and payable journal entries, financial reporting, etc.) will be provided in a hardware unit for many business users.

  - A potential user might select one of 10 or more system variations that will be available.

  - Reports will be prepared according to the needs of users by specifying parameters or English language commands.

  - The application computer will plug into a central computer like a back-end machine.

  - It will be possible to tailor applications by developing applications software for the central computer.

  - The cost of the applications computer will be significantly low.

- The cost and time involved in developing systems for business applications would be reduced significantly as well. (A reduction by a factor of 10 in both cost and time is feasible.)

- A variety of applications will be available on chips covering industry specific and functional needs (e.g., financial modeling).

  . Firms are now developing and planning the first hardware or chip applications.

- Data processing installations will interconnect application, data base, and other specialized processors to a general-purpose central computer.

  - The central computer will use structured English to program business applications, and specifications to program technical applications.

- Companies converting to the environment described will be interested in an orderly plan to handle existing data processing. New requirements may be difficult to accommodate.

- Many companies will find it desirable to use a hardware service or turnkey from an RCS vendor for changing and new applications.

## C. EFFECT OF TRENDS ON ISI SERVICES

- The technological trends that will impact the ISI most in the 1980s will be the succeeding waves of low-cost, more powerful micros, software on chips, videodisks that can be updated, more flexible data communication, and a variety of audio and video capabilities on new terminals and small computers.

- These developments will give ISI firms opportunities to expand into new business areas and to compete with firms entering their market segments.

- Processing and software firms will be competing to deliver a broader range of services.

  - RCS and software firms will offer specialized applications on micros with videodisk storage that can replace in-house or RCS processing.

  - Some hardware vendors will have increased their reliance on software firms to market micros for industry specific applications.

  - Software companies will enter the chip "manufacturing" business.

- RCS vendors will find that the videodisk and microtechnology offer them opportunities in hardware services as well as the capability to take RCS work in-house.

  - Hardware services will be used for the delivery of proprietary data bases.

  - The user would be sold or rented a micro with a videodisk storage unit which could be updated in unused areas of the videodisk. (The micro could also access changed data on an RCS host.)

  - A videodisk of data up to the present would be given to the user and arrangements would be made for periodic updates and less frequent replacements of videodisks.

  - This service would lessen the cost of using data bases for most users (who would access the data base on a regular basis) and thereby would create a greater market.

- Vendors of proprietary data bases who can deliver information on a videodisk will be in a favorable competitive position.

- A micro with videodisk storage will also be used by RCS and software firms to move large applications in-house which present hardware services cannot handle.

  - It will give RCS vendors an opportunity to offer cost-effective replacements for older minis in application areas where they have expertise.

- RCS processors will find that the value of host processing has been reduced greatly by the new micro systems unless the host is being used in certain types of applications such as:

  - Data communication applications that gather and aggregate data from dispersed operations.

  - The management and updating of proprietary data bases.

  - The rapid development of applications for delivery on hardware service.

- RCS vendors will be earning their revenues from networks, hardware services, software products, proprietary data bases, and professional services.

- RCS firms who do not develop any means to deliver these services during the 1980s to pick up the slack from shrinking processing revenues will be out of business by 1990.

- Software firms will be sought by hardware vendors to build application systems for industries with which they have familiarity and to act as vendor representatives in those industries.

  - The complexity of industry specific applications will make it uneconomic for almost all hardware vendors to attempt to work with a number of industries.

- An increasing number of software firms will be identified with areas of application.

- The revenue from software products will increase, but the business will change.

  - Many software products will be delivered in hardware (small computers and chips).

  - More hardware knowledge and arrangements with hardware vendors will be required.

- Software firms who do not position themselves to offer hardware may lose market share to hardware vendors or be driven out of business.

- Professional service firms will be able to continue operation in a manner closer to their 1981 services than other segments of the industry.

- More investment will have to be made in training, and research and development by these firms to stay abreast of technology.

- A greater understanding of equipment technology will be required.

- There will be new competition between ISI vendors as well as from outside vendors, as shown in Exhibit IV-1.

- Large-scale or bulk suppliers will include value added network suppliers (VANS), communication carriers, computer manufacturers, and firms in the ISI.

  - VANS, carriers and other suppliers will offer storage and processing capability distributed throughout their networks.

EXHIBIT IV-1

INCREASING COMPETITION IN
INFORMATION SERVICES INDUSTRY PRODUCT MARKETS

| VENDORS | PRODUCTS | | | | |
|---|---|---|---|---|---|
| | VALUE ADDED PROCESSING | NETWORK SERVICES | PRO-FESSIONAL SERVICES | SOFTWARE | PROPRIETARY DATA BASE |
| RCS | C | C | C | C | C |
| Software | N | - | C | C | N |
| Professional Services | - | - | C | C | - |
| Large-Scale or Bulk Services | N | N | N | N | N |
| Service Industry (Non-DP) | - | N | N | - | - |

C = Current Competition for Product
N = New Competition for Product

- When a request is sent out and data are collected on one of these networks, they will be automatically aggregated, plotted, and correlated with other data.

- The terminals or entry units for these services will be micros that can expand into user processors.

- Hardware and applications will be sold for these units as needed.

- Several RCS vendors with large networks will grow into bulk suppliers.

- Large-scale suppliers will be able to step into more industry specific processing or offer professional services through a subsidiary.

- IBM and other computer manufacturers will offer specialized hardware, such as the Hydra system, which offers unique advantages for the distribution of hardware on a network system; for example:

  . A hardware service that offers "people-less" (fewer people) operation.

  . The ability to offer a line of computers that will move work from the hardware service when desirable.

- Several manufacturers may also offer a large-scale set of services through computer stores.

## D. ALTERNATIVES FOR ISI VENDORS

- RCS vendors will be able to find remote processing work that does not involve the use of value-added services such as networks or fast track development, but it will be limited and provide little revenue.

- New chip technology will have driven the cost of raw processing further and further down.

- RCS vendors will have the alternatives of:

  - Providing value-added processing services.

  - Offering other industry products or services instead of processing.

- Some RCS firms will reduce or even drop RCS processing services and capitalize on their knowledge of certain industries by offering software products and professional services in those industries.

- RCS vendors who choose to offer value-added services may offer such a variety of services (hardware services, data bases, network, development, software products, professional services, etc.) that they become a supermarket of services.

- If RCS vendors decide to be a total service vendor, they will have to develop a strategy for the host processing that is utilized.

  - If older machines are maintained in use, their costs will make the vendor subject to severe price competition from newer computers.

- Vendors will develop strategies of migrating with regularity to new equipment.

  - The new equipment may be the same computer or part of the family offered in a hardware service.

- A small number of RCS vendors will have become large-scale or bulk suppliers of services, as discussed in Section IV-C. They may offer services to other ISI vendors.

- Their value-added networks will provide interfaces to the over 25 carriers available.

- They will have network capabilities, such as hardware that responds automatically to signals for customer hardware, reducing the need for interaction.

- For example, the update of a data base on a videodisk will be triggered by a phone call from the micro handling the videodisk connection to the network.

- They may have software and hardware products available for other RCS vendors on a license basis and/or education and training capabilities.

- These firms may offer services to other firms in the industry and to small firms that want to enter the industry on a franchise basis.

- Services offered to other ISI firms will include the use of value-added networks and licenses to use computers and software.

  - Both of these services are being sold to RCS firms today.

  - The complexity of network services will have increased sufficiently by 1990 to make it too costly for small firms to develop a capability.

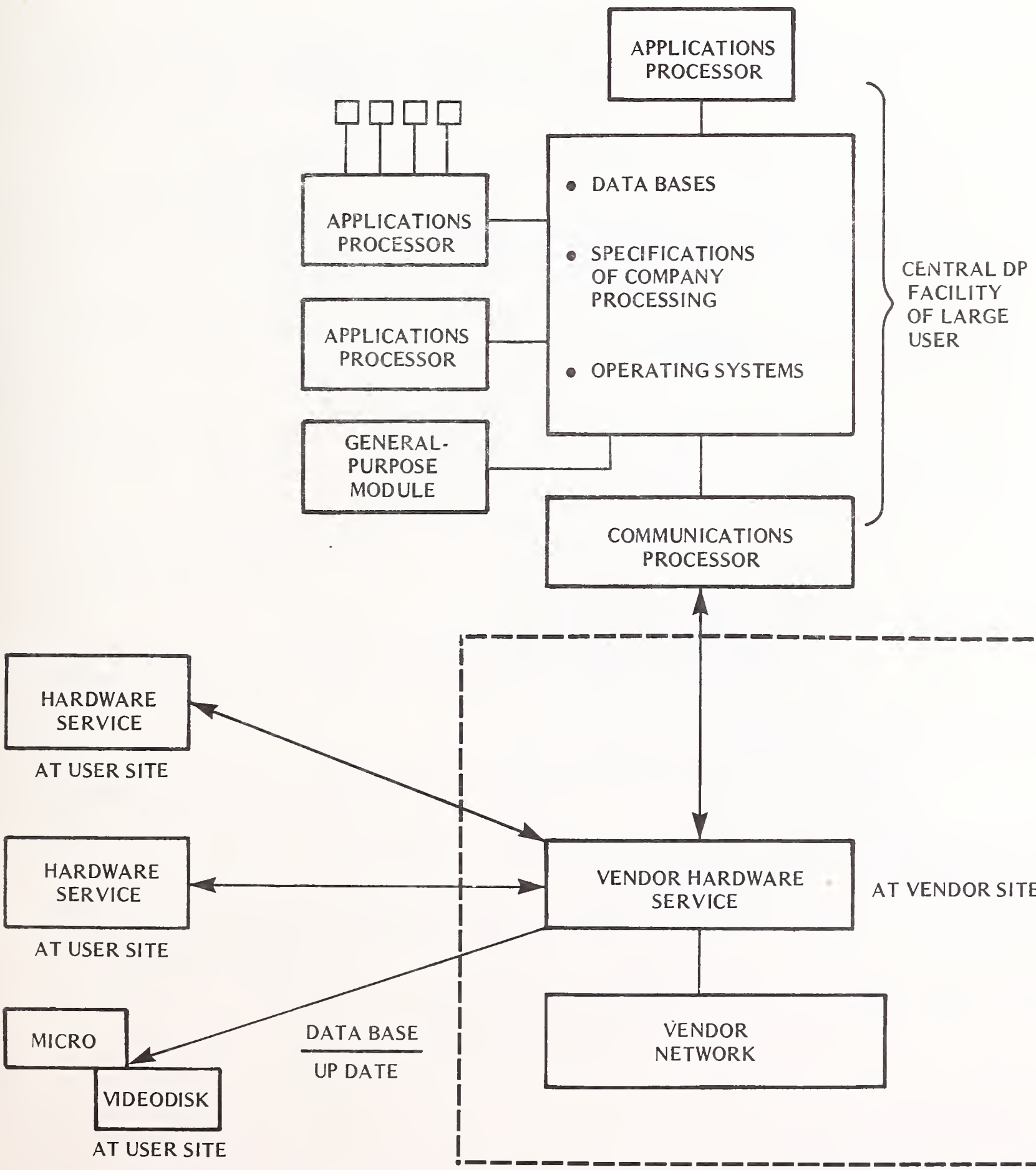
- These wholesale vendors could be the U.S. version of the information utilities of other countries.

- RCS or total service firms will combine their value-added services in some instances to aid user processing centers, as shown in Exhibit IV-2.

- Many in-house data processing centers will be fully occupied in upgrading hardware systems that use the new application processors.

EXHIBIT IV-2

## POSSIBLE USER/VENDOR HARDWARE INTERFACE



- Opportunities will increase for RCS vendors to met ad hoc needs in companies while changes are occurring.

- Also, there will be opportunities to market hardware and network services, proprietary data bases, and professional services to data processing organizations.

- RCS vendors may become facilities management vendors since this would give them an opportunity to use their operational experience as well as products and services.

- FM vendors will find that users expect them to anticipate changes in technology and to be prepared with alternatives for migration.

- Firms who offer software services will deliver their products in several new ways:

  - They will deliver traditional software in a high-level application language.

  - They will deliver specifications for new or changed chips which a hardware vendor could supply.

  - They will develop chips for very small computers that handle specialized applications.

- The cost/performance ratio of computers that use application chips will make it desirable for software firms to offer this capability.

  - Several firms who supply software products can offer one or more products in hardware at the present time (e.g., IBM, Software AG, Boeing, Ultimate, Perpetual Systems).

- Software firms will find it necessary to increase their knowledge of hardware and/or form close relationships with hardware vendors.

  - This situation is becoming more prevalent today. Software firms with knowledge of microelectronics are working with DEC, Tandem, Honeywell, etc.

  - These firms are helping to specify computer functions or are actually designing chips that are used with computing systems.

- A number of software vendors will become hardware representatives.

  - Their knowledge of industries will aid the sales of the computing system as well as the design of software for the industry.

  - The software firms will have advantages in selling standard application chips with a computer.

- Vendors of professional services will still find there is a demand for application and technical expertise, but their services will be complicated by several factors.

  - There will be a relatively small number of people with experience in recent technology compared to the demand.

  - The demand for work may favor companies that have the greatest opportunities to be involved with current technology.

- RCS or total service vendors offering hardware services and software vendors may have more opportunity to position themselves with knowlege of new technology than professional services vendors will have.

  - This may cause some professional services vendors to invest in a position in software products.

- The routes of change predicted for ISI vendors are shown in Exhibit IV-3.

## E. ESTIMATE OF INDUSTRY REVENUE

- The increased demand for computing illustrated in Exhibit III-1 suggests that there will be an increasing demand for ISI products and services throughout the 1980s.

  - The components of revenue in 1990 will be considerably different from the components of the service industry as it exists today.

  - Software and professional services will account for over 70% of ISI revenues.

- The demand for processing services as currently defined will fall between 1985 and 1990.

  - However, the sale of processing services in the form of value added packages including network capabilities, proprietary data bases and/or consulting and other services will keep the total revenues for processing services growing.

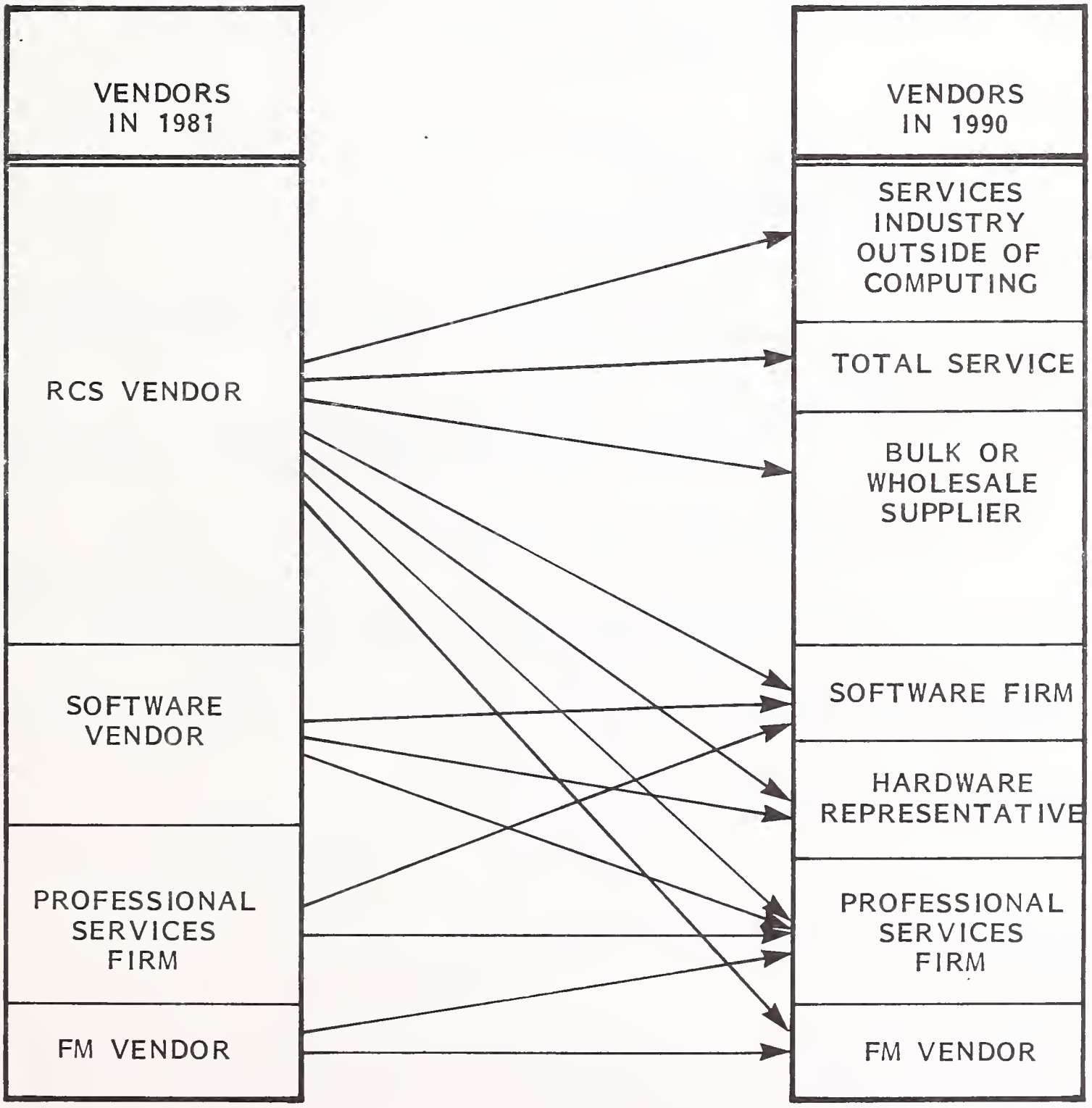
- The greater use of computers in industry as well as in individual offices and homes will create a large demand for software products.

  - The AAGR for revenue from software products should continue to be high through the decade.

  - The greatest increases in revenue will probably come from small firms who develop "hot" products such as VISICALC or large firms who have a breadth of products and large R&D budgets.

EXHIBIT IV-3

ROUTES OF CHANGE



- Both small high-technology firms and large firms with substantial research will obtain revenue from software on chips.

- Professional service revenues will grow more rapidly in the second half of the decade since there will be an increasing demand for expertise to aid users with the introduction of new technology and new systems architecture.

- A limiting factor on the growth of ISI revenue will be the availability of personnel and productivity tools.

## F. RECOMMENDATIONS

- In order to maintain or improve market position, ISI vendors will find it imperative to take actions early in the 1980s.

  - RCS firms must offer value-added processing services and plan a migration path to new computing equipment.

  - Software firms must establish R and D projects that are dedicated to supplying, or being prepared to supply, software on chips.

  - Professional services firms must obtain contracts that will provide experience with microcomputers.

  - All ISI firms must develop and improve plans to recruit, train, and retain people with expertise in technology and applications.

- RCS firms who do not offer value-added processing services such as network capabilities, hardware services, proprietary data bases, professional services, or software products should consider steps to change their business, as shown in Exhibit IV-3.

- Larger RCS vendors should consider the addition of value-added processing, developing (expanding) their own networks, and possibly becoming bulk or wholesale suppliers.

  - Large RCS vendors could consider becoming value-added network suppliers as well.

- The equipment migration path for RCS vendors who continue to offer processing services should include steps to:

  - Shift some work to hardware services or micros.

  - Change mainframes at intervals to take advantage of new developments in technology such as new optical storage devices, application software or chips, optical computer components, etc.

  - ISI firms, particularly software developers, must retain and expand their knowledge of one or more industries.

- ISI firms must also be prepared for new prospect opportunities.

  - Firms with large computing installations will become so occupied with technological changes during this decade that they have to farm out new and ad hoc system needs and seek aid with in-house programs.

  - Many more prospects will be found: small offices in large companies, small companies, and individuals.

    . Low-cost, high-volume products will earn significant revenues from these users.

  - RCS vendors should note that the succeeding waves of new micros make it advisable for corporations to use a micro supplied as a hardware service.

- Support and aid would be available from established vendors.

- Compatibility of products would be more likely.

- Other related services such as data communication or application development could be supplied by the same vendor.

- Marketing compaigns will be needed that take advantage of the changes in technology.

  - ISI firms should be prepared to help companies make a transition to the use of the new computers and software.

## APPENDIX: RELATED INPUT REPORTS

| TITLE | PUBLICATION DATE |
|---|---|
| Selling Personal Computers to Large Companies | September 1980 |
| User Communication Networks and Needs | November 1980 |
| New Storage Systems and Their Implications | August 1981 |
| User Operated Systems and Equipment | August 1981 |

**SUBSCRIPTION PROGRAMS:** Designed for clients with a continuing need for information about a range of subjects in a given area. All subscription programs are fixed-fee and run on a calendar-year basis:

- Management Planning Program in Information Systems - Provides managers of large computer/communications facilites with timely and accurate information on developments which affect today's decisions and plans for the future.

- Management Planning Program for the Information Services Industry - Provides market forecasts and business information to software and processing services companies to support planning and product decisions.

- Company Analysis and Monitoring Program for the Information Services Industry - Provides immediate access to detailed information on over 2,500 companies offering turnkey systems, software and processing services in the U.S. and Canada.

- Management Planning Program in Field Service - Provides senior field service managers in the U.S. and in Europe with basic information and data to support their planning and operational decisions.

**MULTICLIENT STUDIES:** Research shared by a group of sponsors on topics for which there is a need for in-depth "one-time" information and analysis. A multiclient study typically has a budget of over $200,000, yet the cost to an individual client is usually less than $30,000. Recent studies specified by clients include:

- Productivity Improvement, 1980-1983: Survival Strategies for EDP Executives

- Opportunities in Communications Services for Digital Information: A Study of User Networks and Needs

- Improving the Productivity of Engineering and Manufacturing Using CAD/CAM

- European Computer Services Markets

**CUSTOM STUDIES:** Custom studies are sponsored by a single client on a proprietary basis and are used to answer specific questions or to address unique problems. Fees are a function of the extent of the research work. Examples of recent assignments include:

- 1981 ADAPSO Survey of the Computer Services Industry
- Competitive Study of Government Bidding Rates for Software Development Contracts
- Analysis of Computer Services Opportunites for Personal Trust Systems
- Analysis of Disaster Recovery Services
- Survey of Computer and Financial Services Opportunities in the Health Care Industry
- Study of Supplemental Distributors for Sales of RCS to Small Businesses
- Analysis of Market Opportunities for VSI/VSLI CAD Products and Services

# ABOUT INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international consulting firm. Clients include over 100 of the world's largest and most technically advanced companies.

## OFFICES


**Headquarters**
2471 East Bayshore Road
Suite 600
Palo Alto, California 94303
(415) 493-1600
Telex 171407

**Dallas**
Campbell Center II
8150 N. Central Expressway
Dallas, Texas 75206
(214) 691-8565

**Detroit**
340 N. Main Street
Suite 204
Plymouth, Michigan 48170
(313) 459-8730

**Los Angeles**
4676 Admiralty Way
#401 C
Marina Del Rey, California 90291
(213) 823-1230

**New York**
Park 80 Plaza West-I
Saddle Brook, New Jersey 07662
(201) 368-9471

**Washington, D.C.**
1730 North Lynn Street
Suite 400
Arlington, Virginia 22209
(703) 522-2118

**UNITED KINGDOM**
INPUT, Ltd.
Airwork House (4th Floor)
35 Piccadilly
London, W.1.
England
01-439-4442
Telex 269776

**JAPAN**
INPUT Japan
Suite 1106
7-7-26 Nishi-Shinjuku
Tokyo
Japan 160
(03) 371-3082


## AFFILIATES


**Australia**
Infocom Australia
Highland Centre, 7-9 Merriwa St.,
P.O. Box 110,
Gordon N.S.W. 2072
(02) 498-8199
Telex AA 24434

**Italy**
PGP Sistema SRL
20127 Milano
Via Soperga 36
Italy
Milan 284-2850


INPUT Planning Services for Management