

# PERSONAL COMPUTER USE IN LARGE COMPANIES

INPUT



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PERSONAL COMPUTER USE IN  
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## CONTENTS

	<u>Page</u>
I INTRODUCTION .....	1
A. Purpose And Scope	1
B. Research And Methodology	2
II EXECUTIVE SUMMARY .....	5
A. Key Conclusions	5
1. Corporate EDP Support	5
2. Applications Software	6
3. Software Vendor Opportunities	6
4. Personal System Users And The EDP Department	7
B. Market Trends	8
C. Recommendations For Computer Services Companies	12
1. Training Vendors	12
2. Professional Services Companies	13
3. RCS Companies	14
III BACKGROUND INFORMATION .....	15
A. The Driving Force	15
B. Setting The Scene	19
IV APPLICATION ANALYSIS BY DEPARTMENT .....	21
A. Common Applications	22
1. Utility Programs	22
2. General Business Applications	26
B. Department Applications	27
1. Marketing Departments	29
2. Manufacturing Departments	31
3. Planning Departments	33
4. Finance Departments	34
V SOURCES OF SYSTEMS, SOFTWARE, AND SERVICES .....	39
A. Systems	39
B. Software	41
C. Services	45
1. Training	45
2. Maintenance	48
a. Hardware	48
b. Software	49

	<u>Page</u>
VI OPPORTUNITIES FOR THE SERVICES VENDOR .....	51
APPENDIX A: ORIGINAL INTERVIEW PROGRAM .....	57
APPENDIX B: RELATED INPUT REPORTS .....	59

## EXHIBITS

		<u>Page</u>
I	-1 Distribution Of Respondents By Department Size Within Industry	4
II	-1 Retail Product Life Cycle	9
	-2 Market Forecast For Personal Computers (Under \$15,000) In Large Corporations, 1980-1985	11
III	-1 Potential Users' Motivations For Acquiring A Personal Computer System, Listed In Order Of Importance	16
IV	-1 Applications Use	28
	-2 Marketing Department Personal Computer Applications	30
	-3 Manufacturing Department Personal Computer Applications	32
	-4 Planning Department Personal Computer Applications	35
	-5 Finance Department Personal Computer Applications	36
V	-1 Sources Of Personal Systems For The Corporate End User	40
	-2 Sources Of Application Software For Personal Systems	43
	-3 Comments On Training Provided	46





## I INTRODUCTION



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## I INTRODUCTION

### A. PURPOSE AND SCOPE

- This INPUT report, part of the 1981 Information Services Industry Program (ISIP), examines the use of personal computers in the large company environment and places special emphasis on departmental applications.
- This topic was selected by current ISIP clients as being of high interest and because of the potential threat perceived by INPUT stemming from the ability of personal computers to replace many traditional remote computing applications.
- The objectives of this study are to:
  - Describe the impact of personal computers in large companies.
  - Delineate some of the applications to which these systems are being applied.
  - Provide direction to information services companies considering entering the market.
- The scope of this study is limited to systems that cost less than \$15,000.

- This includes more than the commonly considered personal computers such as TRS-80 and Apple.
- Included are business personal systems such as the Datapoint 1500s and the low end of the Wang product lines such as the PCS II.
- This study considers systems that are used individually or shared by a relatively small group of functionally related people.
- In general there is no dedicated staff attending the system. Occasionally a programmer is assigned to "oversee" the system.

## **B. RESEARCH AND METHODOLOGY**

- Much of the research for this study was accomplished in 1980 for INPUT's multiclient report, Selling Personal Computers to Large Companies.
- Additional information has been gathered over the past year on a widespread basis and incorporated into this and a number of other INPUT reports.
- The original multiclient report research consisted of over 300 interviews with 40 large companies.
- Each of the interviews was with a computer output user in a different department. The departments included:
  - . EDP.
  - . Manufacturing.
  - . Personnel.

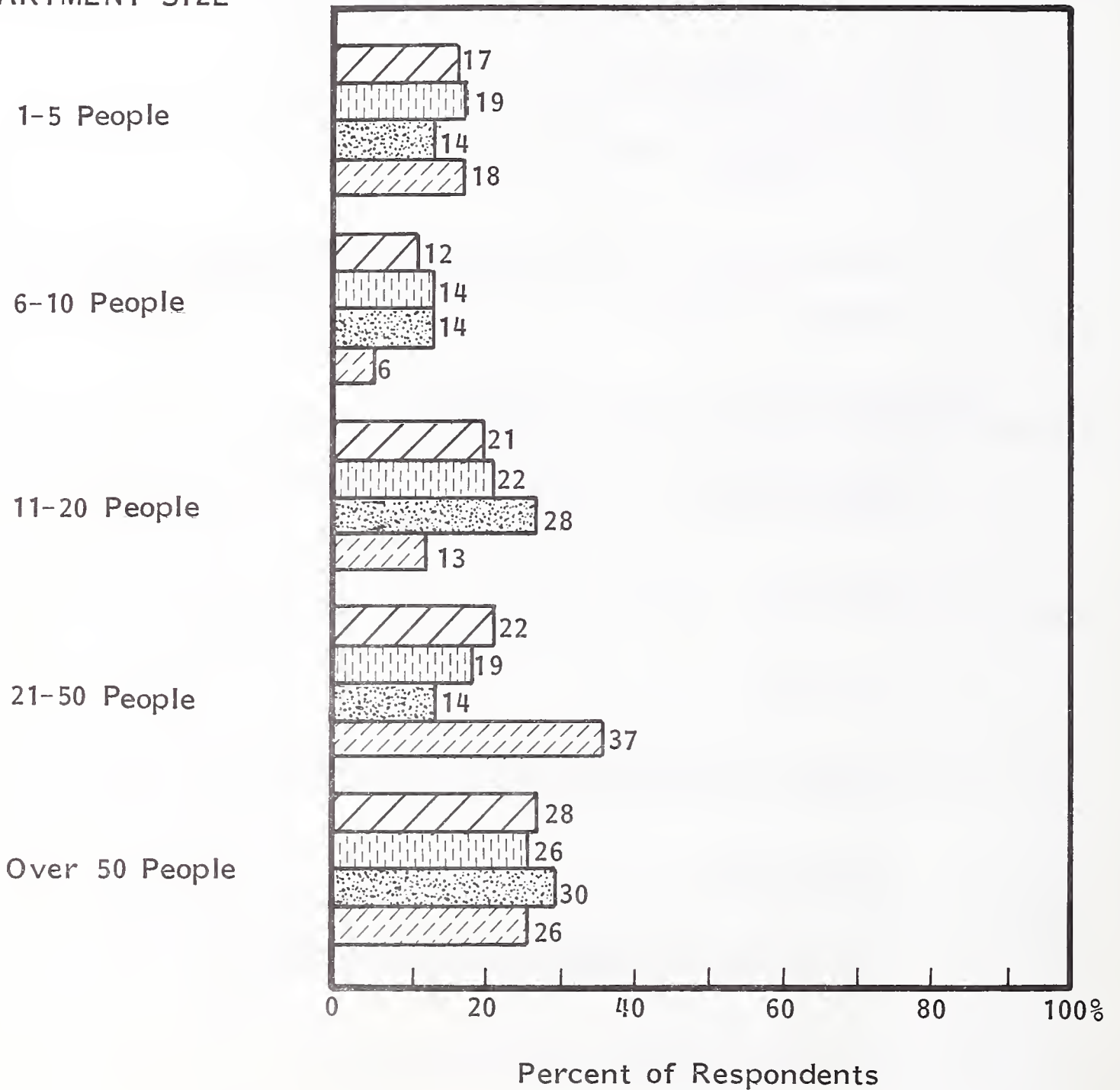


- . Finance.
  - . Planning.
  - . Marketing.
  - . Operations.
  - . Engineering.
  - . Legal.
- The distribution of these department interviews by department size is shown in Exhibit I-1.
- Three industries were chosen for the study:
    - Manufacturing.
    - Banking.
    - Insurance.
- The companies interviewed were from among the:
    - Fortune 500.
    - Top 100 life and/or general insurance companies.
    - Top 100 commercial and/or savings banks.
- One-third of the interviews were on site and the rest were by telephone.
    - The total interview program is shown in Appendix A.

## EXHIBIT I-1

### DISTRIBUTION OF RESPONDENTS BY DEPARTMENT SIZE WITHIN INDUSTRY

#### DEPARTMENT SIZE



## II EXECUTIVE SUMMARY





## II EXECUTIVE SUMMARY

### A. KEY CONCLUSIONS

#### I. CORPORATE EDP SUPPORT

- EDP departments are becoming increasingly supportive of personal computers. This encouragement has become the primary driving force in having personal systems enter large companies in comparatively large numbers.
  - Vendors of personal systems have altered their marketing practices and now have large account marketing programs to tap this moneyed market.
  - IBM and Xerox, traditional sellers to big companies, are selling personal systems directly to the large companies while using other channels for lesser markets. This activity tends to legitimize the market for personal systems in the corporate environment.
  - EDP acceptance of personal systems usage drastically reduces the selling effort necessary because each user will not have to be sold on a completely separate basis.
  - Corporate EDP support also gives encouragement to software product companies to convert their application programs to personal systems.

- Corporate EDP support is one key to the expansion of the markets for personal systems in the large companies.

## 2. APPLICATIONS SOFTWARE

- The second key to this marketplace is having the proper applications software for each end user.
  - Users of personal computers do not want to learn to program nor are they very interested in computers per se. Users simply want an easy-to-use tool that will make their job easier.
  - Users look at their jobs as unique; if they were writing the application program, they would create a very specific program that could not be used by anyone else.
  - The key is to find a method of writing generalized applications that can be user modified to meet "unique" requirements.
- Application programs will sell systems. The user will buy the "right" package and accept whatever hardware it runs on, assuming the total cost is reasonably competitive either with this same approach or with other approaches such as remote computing.

## 3. SOFTWARE VENDOR OPPORTUNITIES

- Since applications are a market key, those vendors with software libraries are in an excellent position to take advantage of this burgeoning market.
  - Remote computing services (RCS) companies and software product vendors with application program libraries are positioned for growth.

- . Personal computer use in large companies will impact RCS companies' processing revenues, but these can be made up by capitalizing on the opportunities in this new market.
- RCS companies have traditionally sold applications to corporate end users.
- . This puts these companies in an excellent position - they have a rapport with end users and know their applications, both current and future in many cases.

#### 4. PERSONAL SYSTEM USERS AND THE EDP DEPARTMENT

- Personal system users require the system to be reliable, easy to use, and cost effective.
- These users think of the system as a processing tool much as they look at the telephone as a communications tool.
- If something is wrong, the users want to make one telephone call to get the system repaired.
- . That phone call should go to the EDP department, according to the users.
- Users feel the EDP department should:
  - . Supply the system.
  - . Supply the applications programs.
  - . Take care of all maintenance.
  - . Provide a spare system in case of major failure.

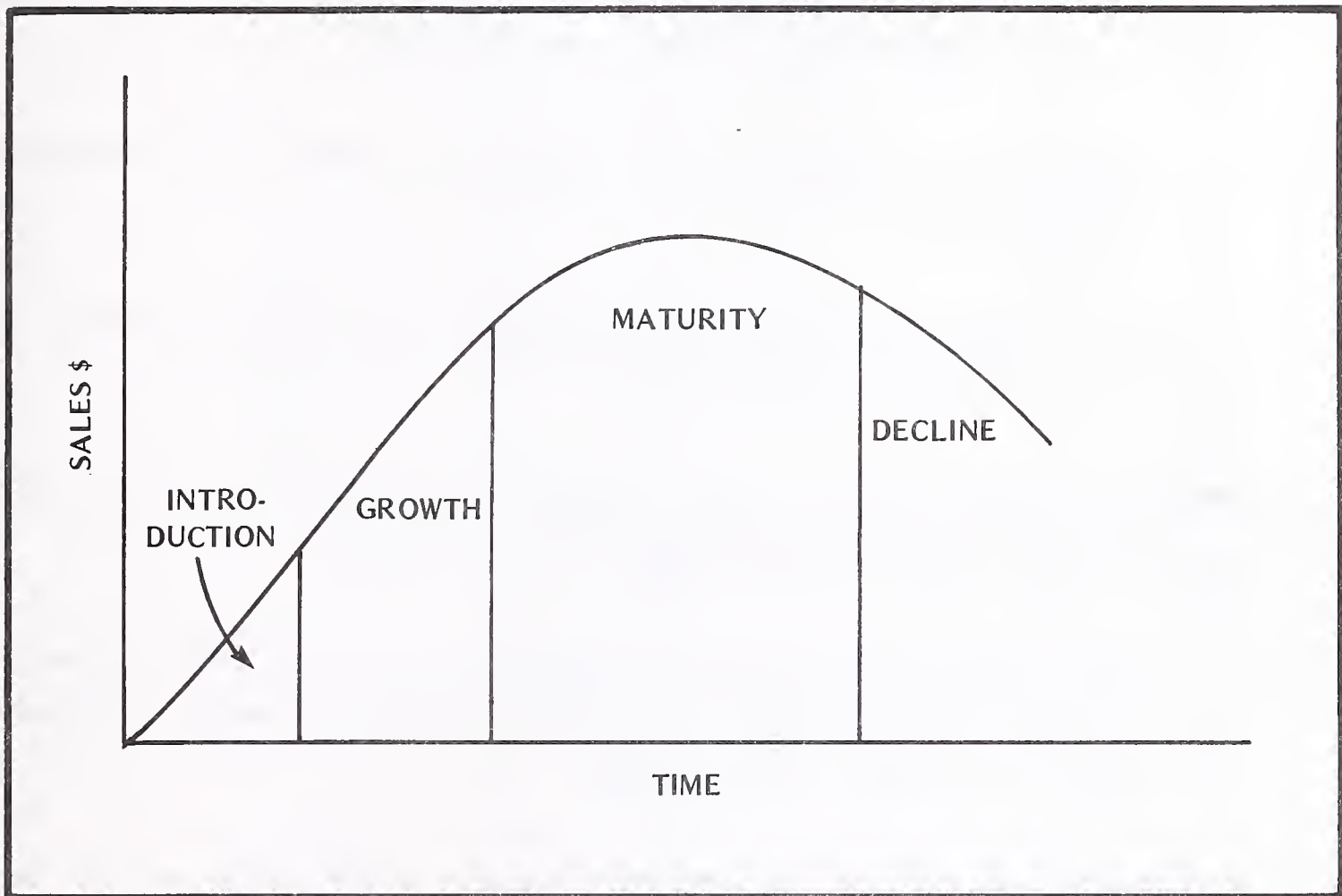
- . Train the users.
- . Evaluate competitive systems.
- This attitude may complicate the selling picture for those that have applications directed toward specific departments.
- . However, if the end user can be reached with the appropriate application he can be sold.

## B. MARKET TRENDS

- Personal computers were originally sold as a retail product to hobbyists. As microcomputers grew to microsystems, homeowners and small businesses were recognized as large markets.
- The corporate market was the last to be targeted, and it will probably turn out to be the easiest to sell and the largest growth market in the near term.
- Exhibit II-1 illustrates the typical life cycle of a retail product and some of the characteristics of the market at the various stages.
  - The hobbyist market grew quickly and is now considered to be in a late growth stage.
  - The other markets - homeowners, small businesses, and large company departments - are all in the introductory stage.
    - . The introductory stage for homeowners is apt to be a drawn-out period.



EXHIBIT II-1  
RETAIL PRODUCT LIFE CYCLE



STRATEGY VARIABLE	INTRODUCTION	GROWTH	MATURITY	DECLINE
TARGET MARKET	HIGH INCOME INNOVATORS	MIDDLE INCOME ADOPTERS	MASS MARKET	LOW INCOME AND LAGGARDS
PRODUCT	ONE BASIC MODEL	SOME VARIETY	GREATER VARIETY	A FEW STANDARD MODELS
DISTRIBUTION	LIMITED OR EXTENSIVE	MORE OUTLETS	MORE OUTLETS	FEWER OUTLETS
PRICE	PENETRATION OR SKIMMING	WIDE RANGE	LOWER PRICES	LOWER PRICES
PROMOTION	INFORMATIVE	PERSUASIVE	COMPETITIVE	LIMITED

- . The two business markets will grow rapidly and move into the growth stage before 1984.
- INPUT has forecast that the large company market for personal systems selling for less than \$15,000 will have an installed base by 1985 of 600,000 systems valued at \$4.8 billion, as shown in Exhibit II-2.
  - This forecast is conservative considering the current level of corporate EDP acceptance.
    - . However, if applications packages do not become available the forecast may be optimistic.
- Personal computers used in the corporate environment tend to be larger versions of the available personal computer product line.
  - Most systems have maximum internal memory, at least one random access file device, and a good printer. This keeps the price relatively high, in the \$5,000 to \$8,000 range.
- Recognizing the size of the corporate market and considering the large company their traditional domain, both IBM and Xerox have announced marketing programs for selling their personal computers directly to large companies. Other end users will be reached through a variety of distribution channels.
  - Apple and Tandy, early entrants at the retail end of the personal computer market, have initiated direct sales efforts to large companies.
- A large number of small software houses have sprung up to supply the market with programs. These companies generally aim their products at homeowners, games enthusiasts, and small businesses where the entrée is easier.

# EXHIBIT II-2

## MARKET FORECAST FOR PERSONAL COMPUTERS (UNDER \$15,000) IN LARGE CORPORATIONS, 1980-1985

ITEM	1980 (BASE)	1981	1982	1983	1984	1985	AAGR 1980-1985 (percent)
Installed Base (thousands)	85	125	185	275	400	600	48%
Shipments (thousands)	-	40	60	90	125	200	38
Value: Installed Base (\$ millions)	\$850	\$1,150	\$1,600	\$2,300	\$3,300	\$4,800	41
Value: Shipments (\$ millions)	-	\$300	\$450	\$700	\$1,000	\$1,500	38

- Very few have products aimed at corporate users.
- Software publishing houses are new companies created to mass market programs written by the computing public.
  - Their role is similar to a book publisher's role. They evaluate the product for market appeal, package and enhance it, and then market it to the widest possible audience.
  - They currently offer little to the corporate user.
    - Visicalc<sup>®</sup>, the largest selling software package in history, is being sold to all markets including the corporate market.

## C. RECOMMENDATIONS FOR COMPUTER SERVICES COMPANIES

### I. TRAINING VENDORS

- Develop education and training courses at all levels of personal computer use.
  - Corporate courses should be introductory and aimed at allaying potential user apprehension.
- Sell corporate programs to the EDP departments that are supportive of personal systems use.
  - These programs should be designed so that managerial, professional, and support personnel will be interested.
  - Once the program is endorsed by the EDP group, then it must be sold to each interested department. Some EDP groups will be willing to perform this task.



- Explore the possibility of creating front ends to software packages that will make them self-teaching.
  - Various libraries of programs will be converted to personal systems. A need exists to have them made self-teaching. A standardized approach that could be modified for each package would be an excellent value-added service.

## 2. PROFESSIONAL SERVICES COMPANIES

- Train a cadre of top flight personnel in personal computer use, capabilities, and programming.
  - Become thoroughly familiar with the major brands that are selling to large companies.
- Develop marketing programs aimed at EDP departments, providing services such as:
  - Evaluation of personal systems.
  - Evaluation of application packages.
  - Assistance with the development of feasibility studies.
  - Customizing of application packages.
- Develop flexible pricing schedules in line with the cost of the systems.
- Consider converting portions of a program library, if it exists, to run on a variety of personal systems.

### 3. RCS COMPANIES

- Capitalize on applications knowledge and relationship with the end user.
- Convert selected application programs to personal systems to determine the ease and speed with which this conversion can be accomplished.
- Consider buying personal systems in bulk at good discounts and selling a turnkey package to the people who were using the application package previously.
  - Consider leasing these turnkey systems to make it easier for the user to justify or substitute as an expense item.
  - Many of the applications programs can probably be split so that one part is done on the personal system while another part still requires the larger system.
- Create a variety of data bases that can be accessed by those corporate end users employing the personal computer as an intelligent terminal.
  - Portions of the data base can be down-loaded to the personal system creating a monetary saving for the user.
- Be sensitive to the relatively small number of features actually being used in many systems building tools currently provided by RCS firms, recognizing the ability of newer microcomputer systems to provide a highly usable subset of these features.

### III BACKGROUND INFORMATION





### III BACKGROUND INFORMATION

#### A. THE DRIVING FORCE

- The original research in 1980 developed one major and several minor driving forces leading potential corporate users to personal systems. Since that time, the introduction of more versatile systems by the major computer companies has changed some of the motivations.
  - Exhibit III-I compares the reasons given for being interested in personal systems in 1980 with the current set of motivations.
- Eighteen months ago the prime reason corporate users turned toward personal systems was the delay in getting their applications programmed at the corporate data center.
  - Delays of two years were found to be not uncommon.
- The state of dissatisfaction has not significantly changed. What has changed is the corporate attitude toward personal systems. That changed attitude is currently generating the sales to large corporations.
  - In addition, personal computer manufacturers have awakened to the existence of a corporate market and are organizing marketing groups for this particular segment.

EXHIBIT III-1

POTENTIAL USERS' MOTIVATIONS FOR ACQUIRING  
A PERSONAL COMPUTER SYSTEM,  
LISTED IN ORDER OF IMPORTANCE

SPRING 1980	FALL 1981
<ul style="list-style-type: none"><li>- Dissatisfaction with in-house computer service</li><li>- Curiosity and ease of justification</li><li>- Outside T/S service was getting expensive</li><li>- Cost efficient for application</li></ul>	<ul style="list-style-type: none"><li>- Corporate advocacy programs</li><li>- Application packages available</li><li>- Dissatisfaction with in-house computer service</li><li>- RCS costs increasing</li></ul>

- Also, two major information systems companies (Xerox and IBM) have announced personal systems and specifically targeted the large company market - their traditional stronghold.
- Corporate programs are currently taking three forms:
  - Outright bulk purchase of systems which are in turn given to specific groups within the company along with a basic application or set of applications.
    - . A brokerage house recently purchased a number of systems from a major manufacturer and issued one to each securities analyst in the company.
    - . Other examples of large purchases are:
      - Chase Manhattan Bank bought 100 Apples and have 150 IBM personal computers on order for 1982.
      - Citibank bought "very many" Apples, TRS-80s, and Xerox personal systems.
      - Touche Ross Corporation bought 65 Apple II Plus systems to "help increase productivity, lower costs, and in some cases to replace existing use of timesharing services."
  - Training and enlightenment programs for all who are interested in personal systems.
    - . Hardware and software classes are held in addition to help in defining the application and justifying the system.
    - . Guidelines are issued to define "acceptable" systems, with the realization that at some future not-too-distant time the personal

system users will want to communicate with each other or with the main system.

- Financial incentives such as discounts and easy payroll deduction plans encouraging employees to personally buy the systems.
  - . Employees will train themselves and be prepared when the companies buy the system.
  - . Many employees bring the systems into work to use after home use interest fades.
- The existence of corporate programs implies that the company has been convinced that the personal system can be efficient in certain applications with a real cost benefit.
- The curious always make up some portion of the sales in a new market and as their enthusiasm spreads so do sales.
  - While this usually does not lead to significant sales in the personal computer environment, these people open the door in many large companies.
    - . The very low cost of basic personal systems has made it easy for people to hide the purchase of such systems in other places in the budget.
- While time dulls the curious it also provides a window for applications programs to be written.
  - Corporate users are interested in buying as finished a tool as possible as an aid in doing their job.

- When timesharing services first became available, they were sold directly to the end user with very little corporate control.
  - At some point, management groups reviewed the total RCS costs and clamped down, instructing the DP group to provide the service. In some cases they permitted outside RCS only when the need could not be supplied in-house within the required timeframe.
- EDP management in many companies is trying to avoid a repetition of what happened with timesharing 10 years ago.
  - Personal computer use is growing in many companies without EDP being aware of its existence.
  - EDP realizes that at some point corporate management will recognize the overall expense and ask EDP management for an explanation.
    - In order to prevent that scenario, EDP management in an increasing number of companies is encouraging the exploration of the use of personal systems and thereby maintaining some control over their proliferation.
- Increasing corporate EDP activism in the area of individual computing will power the marketplace for the next two years provided current seeding proves cost effective.

## **B. SETTING THE SCENE**

- BASIC is the predominant language used to write application programs on these personal systems.



- FORTRAN is used in engineering departments when it is available for the system.
  - APL also is used for some programming by experienced programmers in various departments.
  - PASCAL was not used for writing applications programs by the respondents at the time of the original research. Currently it is used more frequently but chiefly by EDP departments or by vendors of those programs.
- Users of application programs do not want to have to know any language nor do they want to learn how to program.
    - Users want the package to be easy to use and to be able to interact with them in their own "jargon."
  - Sixty percent of the original personal system user departments had no "programmers" for the system.
    - The departments that had programmers using systems at the upper end of the price range, were using more sophisticated languages than BASIC, and had the programmer assigned to them in a support mode to get critical applications running.
      - . The programmer frequently supported more than one group.
    - Virtually no personal system under \$10,000 in a large company today has any dedicated programmers.
    - The increasing availability of packaged software from both the internal EDP department and outside sources will tend to make the use of such programmers cost ineffective.

#### IV APPLICATION ANALYSIS BY DEPARTMENT



#### IV APPLICATION ANALYSIS BY DEPARTMENT

- Specific applications are the key to this marketplace. Personal systems will be most useful if they can do a few very specific jobs without the mass of red tape and justifications usually associated with initiating a new application.
- Microcomputer system usage in very large companies is still in the exploratory stage.
  - The users of the initial systems were pioneers who had to learn much more about computers than they originally planned and also much more than today's user.
  - Many of the initial users bought the systems personally and then brought their systems into the office when home use turned trivial.
- Though applications packages designed to be run on personal systems are much more readily available today than even six months ago, the large majority of the packages are aimed at small businesses rather than at the corporate user.
- This section of the report describes applications in use by major departments within large companies.
  - The primary research was carried out in the manufacturing, banking, and insurance industries with supplementary material being drawn from other industries.

## A. COMMON APPLICATIONS

### I. UTILITY PROGRAMS

- Some applications that are common to most departments and most industries can almost be considered utility programs.
  - These programs are also used by small businesses as well as departments within large companies.
  - The prime example of this type of application package is Visicalc®. Visicalc® is a tool that can be used for many specific applications. Visicalc® permits the user to define relationships between the elements of a crossfooted worksheet so that a change in one element is automatically and consistently carried through the entire matrix.
  - This tool permits the users to ask a series of "what if" questions and immediately see the results.
  - Visicalc® is the largest selling software package in history.
  - Recently, similar programs with expanded functions have been announced for specific systems. If they are accepted then they will be converted to additional systems.
- Visicalc® is an essential element in a broad class of applications that fall under the grouping called "modeling and forecasting."
  - Modeling and forecasting was the most commonly mentioned "application" by users or potential users of personal systems in large companies.
  - Electronic worksheets are used most commonly in such applications as:



- . Budgeting.
  - . Balance sheets.
  - . Financial modeling.
  - . Forecasting sales/inventory/production.
- Supercalc<sup>®</sup>, another electronic worksheet, displays information in as many as 63 columns and 254 rows using 48K-bytes of memory on Zenith Data Systems.
- Modeling and forecasting cover a vast range of applications that frequently work together.
  - Once an acceptable model of some operation is built, the elements can be manipulated to forecast behavior under the new conditions.
  - Frequently, when models of the economy, a multinational corporation, or just a large corporation are built, hundreds of interrelationships must be described and very large computers are required.
  - Models of more mundane subjects such as a specific operation within the production process of a particular product or the teller department in a branch of a bank are less global in scope and manageable by an individual.
  - These models:
    - . Are predictive, answering "what if" questions.
    - . Fit within a personal computer.

- . Aid an individual or small department perform one aspect of a job more efficiently.
- Statistical programs constitute another set of application utility programs that are used across industries and departments.
  - The amount of data, the size of arrays, etc. are limited on many personal systems; however, small department use frequently limits the amount of data sufficiently so that personal systems are more than adequate.
- In addition to the usual set of statistical tests and analysis programs, extensive packages of curve-fitting routines are desired.
  - These are generally used as part of limited forecasting work, but usually these routines are part of a general statistical package.
  - The more equation types that are available to fit to a set of points, the more the set of programs will be used.
  - Mating with curve-fitting should be a plotting program capable of the gross plotting of the "best fit" equation with the output on the CRT and/or the printer.
- The communications application area also falls into the "utility program" designation.
  - Users and potential users rarely mentioned this as an application area because these functions were:
    - . Discouraged by EDP managers.
    - . Transparent to the end user.

- Not really required in the early days of corporate personal computer use.
- Recent research has indicated that this will become an important concern to the central EDP group as personal computers increasingly become used as terminals in many applications.
- Currently, when necessary, the personal systems connect to a front end that performs the services enabling communication with the host.
  - Current systems do not have the capacity to individually handle the software for communications in addition to the application.
  - The new IBM personal system will be SNA compatible indicating that IBM is placing some emphasis on the corporate market.
- As personal systems become larger, they will handle the communications work themselves.
  - A certain portion will be accomplished in hardware, but there will be attendant software.
- "Management graphics" is a term frequently employed by potential personal computer users to say, "please don't present us a book of numbers."
  - Users would prefer a rearrangement of the numbers into a picture clearly showing trends, differences, etc.
- The programs that manipulate the information and convert it into the desired pictorial form belong in the utility program category because they are tools used merely to increase the usefulness of the data and system.
  - Pictures in graph form (line, bar, etc.) using color are most desirable.

- Applications that are based upon a time series are most useful when the output is in graphical form. Some applications are:
  - . Comparing last year's budget to the current budget.
  - . Showing a five-year sales trend with each major product line in a different color.
- Applications that are useful in pictorial form that are not based upon time are:
  - . Machine arrangement on a shop floor used in planning for maximum productivity.
  - . Bank teller floor arrangement for minimizing queues.
  - . Network planning layouts.

## 2. GENERAL BUSINESS APPLICATIONS

- Since departments within a large company have many of the elements of a small business, some of the general small business applications can be adapted for corporate use.
  - Programs that track budgets and inventory are the most generally useful.
  - Accounting programs can be used in many departments depending upon the overall P&L organization of the company.
  - Pricing programs are useful in order departments, at division levels, or in lower levels such as product groups, depending upon the range of products and the nature of the industry.



- . The most useful general pricing programs are those developed for the various small wholesalers in an analogous industry.

## **B. DEPARTMENT APPLICATIONS**

- Accumulating each department's overall involvement with data processing into broad application classes emphasizes the point that departments within a company frequently use general business applications.
  - The usage found in the departments under study in this report is shown in Exhibit IV-1.
  - The base for the percentages can be found in Appendix A.
- Personal computers, even though currently shared, are used for very personal or job specific applications.
  - Two people in the same industry, in the same department, with the same title, use their system for quite different applications.
  - The joy of the personal system is apparent when one can turn to this tool and quickly use it for some new job or problem that has just come along.
- Uses of these systems by department, then, can be misleading in that some applications cannot easily be applied to others in similar departments or industries.
  - The applications listed in the following section have been culled from the responses and are generally felt to be useful to others in similar job functions in other companies - sometimes within the industry and sometimes across industries.



# EXHIBIT IV-1

## APPLICATIONS USE

APPLICATION	PERCENT OF EACH DEPARTMENT			
	MARKETING	MANU- FACTURING	PLANNING	FINANCE
Accounting/Finance	33%	6%	77%	100%
Marketing/Sales	100	0	57	13
Scientific/Engineering	7	38	26	5
Personnel/Payroll	12	13	20	31
Purchasing	7	19	9	0
Inventory/Control	19	69	29	18
Order Entry/Billing	29	44	11	15
Modeling/Forecasting	33	38	91	36
Cost Systems	19	50	26	28
Performance Measurement	29	31	43	21

## I. MARKETING DEPARTMENTS

- The marketing applications shown in Exhibit IV-2 have been grouped by type across industry lines in broad functional areas.
  - They have been listed by the respondents according to their usefulness to the individual job function.
- There are departments within marketing that do not interface with the customers in the same fashion as many of the respondents do.
  - Similarly, the amount of quantitative planning done within marketing varies considerably and so will the importance of planning applications.
- Certain industries, banking in particular, have marketing groups charged with selling large bank services to smaller banks.
  - Currently, the very largest of the banks are packaging specific applications on large micros or on specially designed microsystems (fail safe, for example) and marketing the hardware, software, and service as a package to smaller institutions.
- While such an application is not a "personal" use, it is an application on a microsystem and it is in use by marketing groups.
  - It is also a way of adding value to a basically inexpensive product and, if the total package is leased, of providing continuing income.
- Within the general categories listed in Exhibit IV-2 are very specific individual needs that are in part being satisfied by using a personal system.
  - For example, customer service analysis would include an analysis of teller queues on a bank floor as well as an analysis of customer satisfaction with a service department's service.

## EXHIBIT IV-2

### MARKETING DEPARTMENT PERSONAL COMPUTER APPLICATIONS

APPLICATIONS	IMPORTANCE RANK
<ul style="list-style-type: none"> <li>● Planning <ul style="list-style-type: none"> <li>- Market Forecasting</li> <li>- Market Information Systems</li> <li>- Purchase Analysis</li> <li>- Management Graphics</li> <li>- Market Research</li> <li>- Inventory Analysis</li> </ul> </li> <li>● Customer Services <ul style="list-style-type: none"> <li>- Billing and Collection</li> <li>- Sales Proposals</li> <li>- Customer Service Analysis</li> </ul> </li> <li>● Department Management <ul style="list-style-type: none"> <li>- Personnel Status</li> <li>- Cost Systems</li> <li>- Budget Planning</li> <li>- Scheduling</li> </ul> </li> <li>● Industry-Specific <ul style="list-style-type: none"> <li>- Centralized Information System</li> <li>- Sales Services for Agents</li> <li>- Personal Financial Services</li> <li>- Pension Administration</li> <li>- Tax Services</li> <li>- Estate Planning</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Primary</li> <li>Primary</li> <li>Secondary</li> <li>Primary</li> <li>Primary</li> <li>Secondary</li> <li>Secondary</li> <li>Primary</li> <li>Primary</li> <li>Primary</li> <li>Secondary</li> <li>Primary</li> <li>Primary</li> <li>Primary</li> <li>Primary</li> <li>Secondary</li> <li>Secondary</li> <li>Secondary</li> <li>Primary</li> <li>Primary</li> <li>Primary</li> <li>Primary</li> <li>Secondary</li> <li>Secondary</li> </ul>

## 2. MANUFACTURING DEPARTMENTS

- Manufacturing department respondents felt that they had the freedom to purchase any tools necessary to increase productivity in their particular area.
  - Therefore, there was less intervention from EDP management, if EDP even found out, when these respondents purchased personal systems.
- Production control managers found that a small system could be used to model a portion of the shop floor and production could be scheduled to maximize the desired variable on a daily basis, if necessary.
  - In one company, the program was written in BASIC by the head of production control on a small personal system. When the application proved successful, four identical systems were purchased and sent to each of four factories with the identical program to do the same application.
  - Like a standardized language, variations grow with time. The systems in each of the factories are being used for different applications peculiar to each production control manager in the individual plants, but corporate production control has not permitted individual changes in the initial program unless the suggested change is approved by all four production control managers.
- Exhibit IV-3 shows the variety of applications.
  - Graphics applications were mentioned most frequently by manufacturing respondents. While CAD/CAM immediately comes to mind, small personal systems are not yet capable of handling and manipulating three-dimensional drawings.
  - However, there is a need for two-dimensional graphic programs in all industries that use patterns.



# EXHIBIT IV-3

## MANUFACTURING DEPARTMENT PERSONAL COMPUTER APPLICATIONS

APPLICATIONS	IMPORTANCE RANK
<ul style="list-style-type: none"> <li>● Planning <ul style="list-style-type: none"> <li>- Management Graphics</li> <li>- Budget Planning</li> <li>- Material Requirements Planning</li> <li>- Cost Modeling</li> <li>- Manufacturing Forecasting</li> </ul> </li> <li>● Department Management <ul style="list-style-type: none"> <li>- Purchasing System</li> <li>- Inventory Control System</li> <li>- Performance Management</li> </ul> </li> <li>● Industry-Specific <ul style="list-style-type: none"> <li>- Pattern Marking</li> <li>- Paper Mix Calculations</li> <li>- Shop Floor Control</li> <li>- Operator Assignments</li> <li>- Structural Analysis</li> <li>- Dough Mix Calculations</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Primary</li> <li>Primary</li> <li>Secondary</li> <li>Secondary</li> <li>Primary</li> <li>Secondary</li> <li>Secondary</li> <li>Primary</li> <li>Primary</li> <li>Primary</li> <li>Primary</li> <li>Primary</li> <li>Secondary</li> <li>Primary</li> </ul>



- . Textile design (color).
  - . Clothing design and pattern-making.
  - . Carton design.
  - . Forms layout.
  - . Newspaper layout.
  - . Advertisement layout.
  - . Sheet metal patterns.
- In manufacturing departments, productivity improvements are more easily measured than in other departments within a large company.
    - Programs and systems that will measurably increase productivity will be more easily sold than some ancillary programs.

### 3. PLANNING DEPARTMENTS

- Planning department applications are highly dependent upon the organizational level of the department within the large company.
  - A corporate planning department that is financially oriented has different needs than a planning department in the manufacturing division.
- Economic forecasting and corporate modeling were high on the planners' list of applications that they would like to do within their departments. At this time these applications are limited by available memory size and programs.

- Economic forecasting using global variables plus corporate data is most frequently accomplished by using an RCS company with an appropriate data base.
- There are questions concerning the approach used by some of the respondents in using personal systems for some of the applications shown in Exhibit IV-4.
  - Some of the applications are limited versions of broader applications using the same name and implemented on much larger machines.
  - The abbreviated version, however, provides sufficient information in a timely manner so that the user is very satisfied.
- Planning groups are heavy users of statistical packages and are generally familiar with their use and applicability.
  - User friendliness is not as important as is an integrated set of programs that use common files such that the output of one program can be used by the other where appropriate.

#### 4. FINANCE DEPARTMENTS

- Recent INPUT studies have indicated that no matter how strongly a large company strives to keep all data processing in-house, finance departments usually do financial and economic forecasting using the services of various RCS companies.
  - This occurs because much of the data used are non-company-specific. The data instead reflect national and international conditions, which are available in the RCS company's data base.
- The applications shown in Exhibit IV-5 are those that require corporate data primarily.

# EXHIBIT IV-4

## PLANNING DEPARTMENT PERSONAL COMPUTER APPLICATIONS

APPLICATIONS	IMPORTANCE RANK
<b>Planning</b> <ul style="list-style-type: none"> <li>- Budget Planning</li> <li>- Supply Cost and Inventory System</li> <li>- Capital Investment Program</li> <li>- Internal Pricing System</li> <li>- Quarterly Financial Planning</li> <li>- Management Graphics</li> <li>- Capacity Planning</li> </ul>	Primary Secondary Secondary Secondary Secondary Primary Primary
<b>Corporate Systems</b> <ul style="list-style-type: none"> <li>- Hardware Performance Measurement</li> <li>- Programmer Performance Measurement</li> <li>- On-line Labor Reporting</li> <li>- On-line Routing</li> </ul>	Primary Primary Secondary Secondary
<b>Industry-Specific</b> <ul style="list-style-type: none"> <li>- Cash Flow Analysis</li> <li>- Shop Flow Control Dispatching System</li> </ul>	Primary Secondary

# EXHIBIT IV-5

## FINANCE DEPARTMENT PERSONAL COMPUTER APPLICATIONS

APPLICATIONS	IMPORTANCE RANK
<ul style="list-style-type: none"> <li>● Planning <ul style="list-style-type: none"> <li>- Earnings Models</li> <li>- Stock Options Planning</li> <li>- Management Graphics</li> <li>- Job Schedule Analysis</li> <li>- Payroll Forecasting</li> <li>- General Statistical Analyses</li> <li>- Profit Planning</li> <li>- Working Capital Analysis</li> <li>- Sales Analysis</li> </ul> </li> <li>● General Financial <ul style="list-style-type: none"> <li>- Asset and Liability Accounting</li> <li>- General Ledger Summary</li> <li>- Budget Control</li> <li>- International and Domestic Consolidations</li> </ul> </li> <li>● Industry-Specific <ul style="list-style-type: none"> <li>- Real Estate Accounting</li> <li>- Portfolio and Loan Officer Reports</li> <li>- Secondary Market Mortgage Information Analysis</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Primary</li> <li>Primary</li> <li>Primary</li> <li>Primary</li> <li>Primary</li> <li>Primary</li> <li>Secondary</li> <li>Secondary</li> <li>Secondary</li> <li>Secondary</li> <li>Secondary</li> <li>Secondary</li> <li>Secondary</li> <li>Secondary</li> <li>Secondary</li> <li>Secondary</li> <li>Secondary</li> </ul>

- Finance departments are heavy users of computers in general and have come to rely on the large systems.
  - Central EDP departments frequently still report to the finance department.
  - Finance departments are still strong supporters of centralized information systems.
- Although small groups with finance departments use personal systems, the applications of primary importance are nonmainstream functions such as:
  - Stock options planning.
  - Earnings models.
- Other high-priority applications are generic in nature and are used on an ad hoc basis:
  - Management graphics.
  - Statistical analysis programs.
- The secondary applications are usually successfully implemented on central systems but have been attempted for smaller divisions or separate subdepartments, such as mortgage loan accounting on the larger personal systems.





V SOURCES OF SYSTEMS, SOFTWARE, AND SERVICES



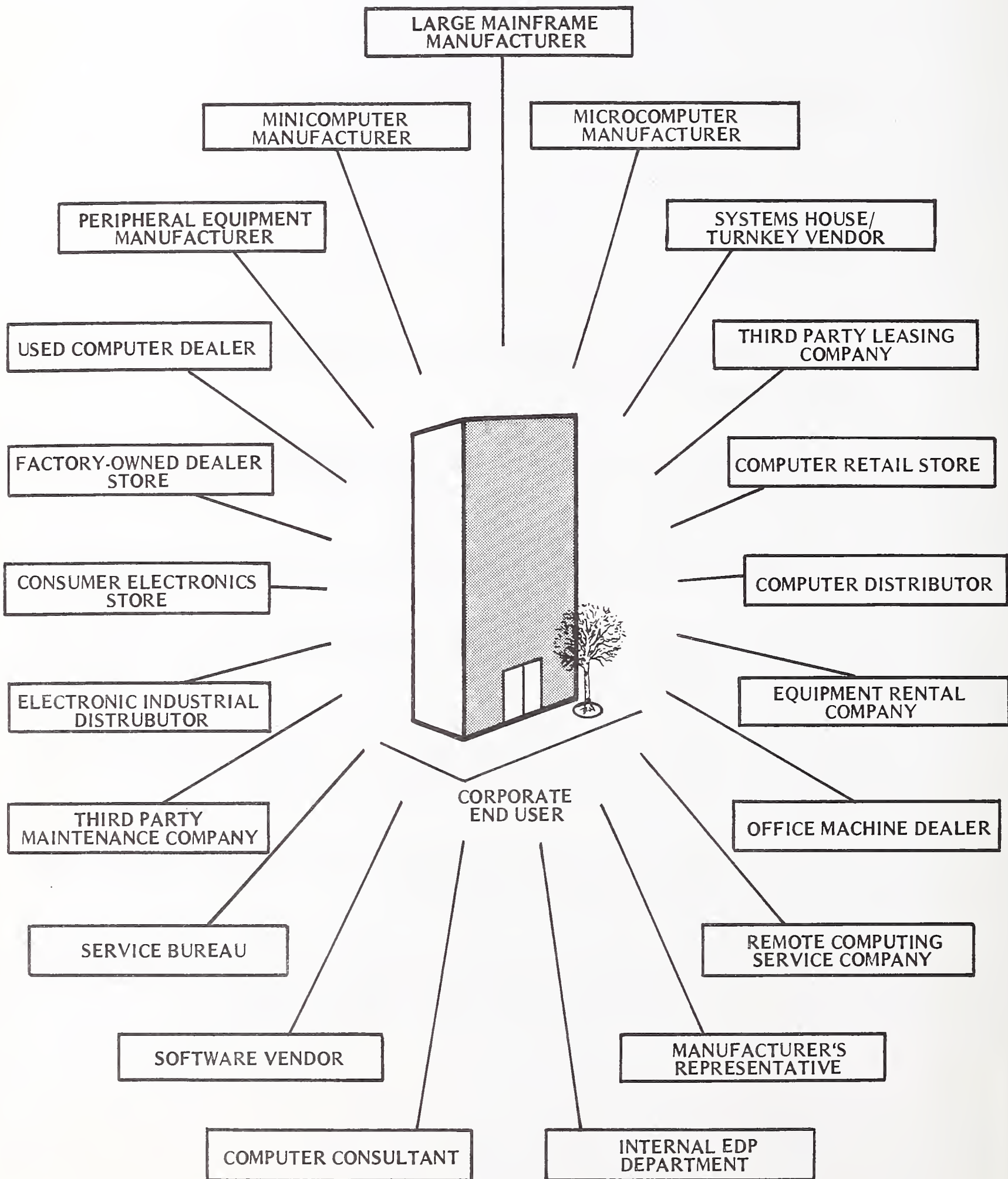
## V SOURCES OF SYSTEMS, SOFTWARE, AND SERVICES

### A. SYSTEMS

- A bewildering number of different types of organizations are selling personal computers, as shown in Exhibit V-1.
  - Theoretically, the corporate end user could obtain his system from any of the sources.
  - Realistically, the choice of vendor is much narrower, constrained by:
    - . The user himself who will not make the effort to go to all the sources.
    - . The vendor, who may not know how to reach the end user or who may be intimidated by a "large corporation."
    - . Corporate purchasing practices of only dealing with other large financially stable organizations.
    - . The EDP department who may only sanction a limited number of systems as being "acceptable" to the central system.

EXHIBIT V-1

SOURCES OF PERSONAL SYSTEMS FOR THE CORPORATE END USER





- In the original research, all the under \$10,000 systems were purchased at a local store while all of the over \$10,000 systems were purchased directly from the manufacturer.
- The trend toward purchasing all corporate systems directly from the manufacturer is accelerating because:
  - Personal computer manufacturers are establishing marketing groups to sell to large accounts.
  - Large companies are making bulk purchases of systems in order to derive the benefits of discounting and certain bundled support.
  - Major mainframe companies have entered the personal computer marketplace and they are selling as they always have - directly to the large companies.
- Users and potential users have expressed a desire to go to one source for their systems - the EDP department.
  - The consistent attitude among corporate users is, "The EDP group is chartered to provide information processing services and so if I need a system I should be able to go to EDP to get one."
  - EDP departments, as mentioned before, are becoming more involved with personal systems. Certainly, corporate EDP is aiding and abetting personal system use, but few EDP groups are actively marketing personal systems within the corporation.

## B. SOFTWARE

- Users would prefer the software for the personal system to be supplied by the EDP department along with the system.

- Users would like a complete package that would be immediately useful.
- However, users also recognize that having EDP supply the applications program would not be helpful if the problem is an EDP log jam.
- In the original research, over 50% of the personal system users had written their own programs or had them written by someone else within the user's department.
  - Thirty-two percent had the applications program written by software package vendors, custom software houses, or software consultants, as shown in Exhibit V-2.
  - In spite of user preferences, the EDP department, 18 months ago, provided virtually none of the applications programs.
- Currently, more packages are available for personal systems than were available to users in early 1980.
  - How many of these packages will meet the particular needs of the corporate user is unknown.
  - Corporate users have no efficient way of finding packages that might be useful to them.
  - Corporate users would prefer to have EDP evaluate the packages and give them the accepted one. This again throws the burden back on the overburdened EDP group.
- Packages solve the "too personal" software problem mentioned by a few companies as a caution in using personal systems.
  - A user writing his own program makes it fit his approach to the job. Such a program may not be useful or even understood by the next

## EXHIBIT V-2

### SOURCES OF APPLICATION SOFTWARE FOR PERSONAL SYSTEMS

APPLICATION	SOFTWARE SOURCE
<u>MARKETING DEPARTMENTS</u>	
Leasing Calculations	User
Sales Proposal Word Processing	Software House
Inventory Control	Systems Vendor
Modeling	Software Vendor
Market Share Analysis	Software Vendor
Sort	Software Consultant
Letter Writing	Software Consultant
Word Processing	Systems Vendor
Group Health Rates	User
<u>MANUFACTURING DEPARTMENTS</u>	
Machine Control	User Department
Modeling/Forecasting	User Department
Scheduling, Planning	User
<u>PLANNING DEPARTMENTS</u>	
Statistical Analyses	User Department
Experimental Analyses	User Department
Inventory Control	Software Vendor
<u>FINANCE DEPARTMENTS</u>	
Modeling	User Department
Graphics	Systems Vendor
Data Entry	Systems Vendor
Credit Sales	Summer Student
Payables	User Department

person filling that function, and the program may not be useful to the originator in his next job.

- A package is usually produced in more general terms so it will be salable to a wide audience. The package has a better chance of being useful to more than one person filling a particular job, and so the investment will not be lost, as it might be with a very personal program.
- Systems software is generally provided with the system, though these programs may not have originated with the systems manufacturer.
  - The operating system (if one is available) is supplied by the system manufacturer even though it was generally written by a software house.
  - Basic utilities such as file manipulation routines, screen manipulation programs, and graphics presentation programs are usually supplied and purchased separately from the system. The systems manufacturer may supply them, or the user can go to a variety of other types of vendors such as those shown in Exhibit V-1.
- The early corporate users of personal systems were more computer knowledgeable than the general corporate user should have to be. These early users had minimal difficulty in modifying applications packages to more precisely fit the intended use.
  - New users will expect the software package vendor or originator to make modifications to the package for particular uses. The user generally is willing to pay reasonable fees, consistent with the price of the system and package, for such modifications.



## C. SERVICES

### I. TRAINING

- Training in the use of these personal systems varies widely, and its perceived adequacy is very dependent upon the end users' previous experience and apprehension level with respect to computers.
- The training received also depends upon the size of the sale and who is doing the buying.
  - If the company EDP department purchases a number of systems to place in multiple locations, then EDP personnel and key departmental user personnel receive sufficient training so that they can support the system and train others within the company to use the system fully.
  - The purchase of a single system usually comes with manuals. Instruction is generally available, if needed, for a fee. Some users in the past felt these courses should have been more complete.
- The selected comments given in early 1980 on training, shown in Exhibit V-3, are grouped by system to facilitate comparisons between "adequate" training and training considered lacking.
  - It is interesting to note that similar sources of training on similar systems received vastly different adequacy ratings.
- Training approaches must be developed that are totally responsive to the background and learning rate of the person being trained.
  - One-on-one training by the system itself, if properly done, is the most responsive training method.



EXHIBIT V-3  
COMMENTS ON TRAINING PROVIDED

SOURCE OF TRAINING	HOURS PROVIDED	COMMENTS	COMPUTER SYSTEM
Manuals	-	"Adequate"	Apple
Computer Store	25 Hours Ea. 2 People	"Adequate"	Apple II
EDP Department	32 Hours/ Agency	"Inadequate, EDP trainer wasn't knowledgeable"	Datapoint 1800
EDP Department	12	"Adequate"	Datapoint 1800
Manuals	-	"Inadequate - 8 More Hours Needed"	Datapoint 1500
User	3 Hours/ Person	"Adequate"	HP 85
Manuals	-	"Adequate"	HP 85
Manuals	-	"Inadequate - 12 Hours Needed"	HP 35
Vendor	8	"Adequate"	IBM 5110
Manuals	Continuing Process	"Course on BASIC Would Have Been Nice"	IBM 5110
Vendor	40	"40 More Would Have Helped"	IBM 5110
Manuals	-	"Adequate"	TRS-80
Manuals + EDP Department	12	"Inadequate"	Wang PCS-2
Software Vendor	2	"Adequate-Will Also Provide 4 Hours/New Person"	Wang 2200
Software + Hardware Vendors	20	"Adequate for 2 People Who Will Then Train Others"	Wang 2200

- Overall, three-quarters of the respondents found the training they received adequate.
  - Virtually all the formal training was provided in a standard classroom environment.
    - . In 10% of the cases, some training material was presented directly on the personal system.
    - . One vendor trained the initial few people. New people learn by means of audio cassettes.
- During the next five years, the typical end user will need formal training in the use of personal systems if a positive attitude toward the new tool is to be generated.
  - Inadequate training given to a person who is apprehensive anyway is a sure way to guarantee that the system will not be used.
- The amount of training necessary will vary depending upon the turnkey capability of the total system.
  - More training is required for those who must understand the system fully.
  - If the user is to program the system and has no experience with computers, two language courses will be required.
    - . The first course is an introduction to the language and computers, and how to use the tools for useful work.
    - . The second course should take place sometime after the user has worked with the system for a while, and should be very specific to his problems and applications.

- Sixty percent of the respondents expect the vendor to provide the training initially.
  - The vendor referred to is not necessarily the hardware vendor, but rather the vendor who negotiates the sale to the end users. This could be a systems house, the hardware vendor, or the hardware vendor working in conjunction with the software vendor.
  - About one in four expect the training to come from the corporate EDP department, and 15% expect to be self-taught or trained by others within the using department.
- As the EDP department becomes involved with personal systems, users will expect training to come from EDP.
  - Users will not care if EDP trainers teach or if the job is contracted out to a training company.

## 2. MAINTENANCE

- Reliability in both hardware and software is a key selling attribute of these systems. The active promoting of maintenance contracts and software services fees will be detrimental to the growth of the systems in the corporate milieu.
  - a. Hardware
- Corporate users of personal systems do not want to be bothered with maintenance.
  - The problem should be handled as telephone maintenance is handled - one telephone call brings the repairman.

- Users would like to call EDP and have the EDP group arrange for maintenance.
- Users would prefer a complete system swap in order to minimize the non-utility of the system.
- Users do not care if depot maintenance, on-site maintenance, or any other popular form of maintenance is provided so long as it does not involve them.
  - Corporate users cannot be expected to "box" a system and ship it.
  - Corporate users cannot be expected to swap boards.
  - Corporate users can only be expected to call "maintenance" and have "maintenance" do the rest.

b. Software

- "Laissez-faire" best describes the users' attitude toward software maintenance.
  - If the system is running for a particular application or limited set of applications, then the user is satisfied and has no interest in a new version that has a corrected bug that he did not use anyway.
  - If a purchased application package has a bug or if a newly written program uncovers an operating system bug, the user will accept a bug-free version of the program at no charge.
- Personal system users in a corporate environment, in general, are not willing to subscribe to a software maintenance program for a fee.
- Software maintenance is important in environments where the system continually grows.

- Personal systems are sold in the full configuration necessary for a set of applications. Individual system growth will be minimal.
- If a larger system is needed, usually a new system with the latest features will be purchased and the old system will be passed on to a new user.



## VI OPPORTUNITIES FOR THE SERVICES VENDOR

2



## VI OPPORTUNITIES FOR THE SERVICES VENDOR

- As a market expands, the opportunities for growth generally increase for those initially participating in that market.
  - The product or services offered must often be modified to fit the new set of potential customers.
- The potential customers in a corporate environment must be considered first-time computer users. They typically have had some experience with computer generated reports but little or no real experience with systems.
  - These users cannot be expected to define their problem in such a way as to expedite the selection of a hardware/software package that will be most appropriate for them.
- These users will need help and a substantial part of the help can come from or through the EDP department.
- Each service vendor must examine the services offered and evaluate to whom within the large company such services are sold.
  - Training is usually sold centrally through the EDP department while RCS companies frequently sell application and system use to the individual user.

- Training services vendors will have a new level of person to train.
  - Access to these new people may not be through traditional channels.
  - Several personal system training vendors may be approved by the EDP department, leaving it to the individual training vendor to sell the services to the department manager where the personal systems are located.
  - Each department may have to be sold separately.
- Unless the department is planning to do its own programming, the training programs are apt to be less extensive.
  - As self-teaching application packages become prevalent, the training program thrust will be toward allaying new users' apprehensions concerning the system and its use.
- Courses will have to be informative, friendly, and with hands-on experience.
  - Course material can be provided on videotape or on the personal system itself.
  - Formal classroom sessions should not be necessary unless it is felt that a camaraderie about this new experience can be developed that will ease fear and encourage system use.
- The opportunities for training vendors lie in having a new group of people to train and new people to whom they must sell their services.
  - Instead of having only one selling point in a company, there may be many.

- The opportunities for software services companies are directly related to the large company's EDP department involvement with personal systems.
  - Individual user departments will generally find it uneconomic to have custom programs written or have packages customized for their limited use.
- If EDP departments provide software services to the user departments, the software services vendor can be used to:
  - Evaluate packages.
  - Customize broadly used packages.
  - Write packages for companywide use.
  - Assist user departments in getting started.
  - Evaluate a department's requirements.
  - Perform feasibility studies.
- The services offered must be priced to fit the personal system environment. Providing services centrally can bring the per system price down to an acceptable level.
- The large company customer base for software service companies will not increase due to the influx of personal systems, but the range of services offered should increase.
- Remote computer services companies provide processing in a batch mode or in an interactive mode.



- Batch processing companies should not be impacted by the growth of personal computing nor should their opportunities for business increase significantly.
- Interactive remote computing services will be severely impacted by the advent of the personal computer in large companies.
  - Interactive services are frequently used by an individual or small departments to aid in solving a limited set of problems. This is precisely the environment of the personal system.
  - Many personal systems are being purchased with money that was budgeted for timesharing services.
  - Some pertinent comments from responding users of personal systems illustrate the potential impact.
    - "Substantially reduced outside RCS expense from \$35,000/year."
    - "RCS was not well accepted by our engineers - too impersonal."
    - "Our own system is more flexible than an outside service."
    - "Our outside service was not meeting our department's specific needs."
    - "Letters on an RCS system are expensive - 500 letters cost \$400 and 1,000 letters cost \$800. Much less on our own system."
- Revenue from processing that is not value added can be expected to decline during the 1980s.
  - The lessened income due to personal systems can be offset by addressing some new opportunities.

- The personal system market is an application driven market.
  - The end user will buy a good package that fits the need without being concerned about the specific hardware involved.
- Applications are the key to the total business market, but specific applications are the key to the corporate market.
- Interactive processing companies have been selling applications to end users in large companies for at least 10 years.
  - A rapport has been established between vendor and user that can be continued as the user considers personal systems.
- The opportunities arise because RCS companies have the applications required by the end user and also know the end user personally, having established a positive relationship over a period of years.
  - These two attributes of interactive services vendors that service large companies present the best opportunities for growth in the personal computer corporate marketplace.



## APPENDIX A: ORIGINAL INTERVIEW PROGRAM





APPENDIX A

ORIGINAL INTERVIEW PROGRAM

USERS, BY INDUSTRY	DEPARTMENT TYPE											
	MAR- KET- ING	MANU- FAC- TURING	PLANN- ING	ENGI- NEER- ING	LEGAL	PER- SON- NEL	FIN- ANCE	OPERA- TIONS	EDP	OTHER	TOTAL	
Manufacturing	20	16	19	20	18	17	21	14	24	6	175	
Banking	10	0	8	5	7	8	9	7	10	7	71	
Insurance	12	0	8	10	8	10	9	10	11	5	83	
Total Users	42	16	35	35	33	35	39	31	45	18	329	
										Vendors	25	
										Total Interviews	354	



## APPENDIX B: RELATED INPUT REPORTS



APPENDIX B: RELATED INPUT REPORTS

<u>Title</u>	<u>Publication Date</u>
● <u>Merging of Hardware, Software, and Services</u>	May 1981
● <u>Selling Personal Computers to Large Companies</u>	September 1980
- Volume 1 - <u>Analysis of User Requirements</u>	
- Volume 2 - <u>Market Forecasts and Product Strategies</u>	
● <u>Market Opportunities for User Site Hardware Services from Remote Computing Services Companies</u>	March 1980
● <u>Turnkey Systems Opportunities - 1979-1984</u>	January 1980
● <u>Office of the Future</u>	December 1979









