MANAGING THE INTEGRATION OF OFFICE AUTOMATION IN THE EDP ENVIRONMENT

Tyler, Tim.

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TABLE OF CONTENTS

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LIST OF EXHIBITS

1 INTRODUCTION

I INTRODUCTION

A. BACKGROUND

- A simple observation of the operation of any office will discern a very fundamental problem that has not been diminished by the application of advanced technology. The term "paper mill" was applied to office work even before computers existed. During the last several decades, increasing numbers of workers have migrated from farms and factories to "push" the mountains of paper associated with the current office environment.

- In fact, the overhead burden of paper work is the most significant factor contributing to problems of productivity in the U.S. Automation has been applied successfully to agriculture and manufacturing, but it has not yet effectively addressed problems of the office.

- A very good argument can be made that technology has done much to create many of the problems associated with office work.

  - Computer technology and advances in high-speed printers have produced enormous volumes of printed data - much of it of questionable value.

  - Office copiers have fired an explosion in the distribution of information that ignores not only the "need to know" but also the desire to know.

- Word processing systems permit more reports and correspondence to be produced more rapidly and economically, even though the true expense has never been in the production of the documents but in their later handling and analysis. Personalized correspondence (regardless of importance) requires more attention than form letters.

- The combined effect of the above has been to automate the production of paper that must be moved, analyzed and disposed of by people. In short, the "solution" has added to the problem.

B. RESEARCH

- This report is supported by:

  - Over 50 telephone interviews with EDP managers and vendors of office automation products and services.

  - More than 900 responses from INPUT's 1980 User Panel.

  - Extensive past research conducted as part of other INPUT studies, and the efforts of individual staff members.

C. DEFINITIONS

- The analysis phase of this study encountered a great deal of confusion concerning terminology associated with the application of technology to the office environment. Office automation, "office of the future," distributed data processing, information resource management and various other terms are used somewhat interchangeably to describe various approaches and strategies to support white collar workers with new products and services. While

the terms themselves proliferate, there are few clear concepts to back them up.

- The following are two definitions INPUT will employ in this and future studies:

  - Office automation is defined as the application of a set of products and services to improve existing, paper-based office systems and procedures.

  - "Office of the future" will be used to describe the application of new products and services that will cause fundamental changes in existing office systems and procedures.

- This report will concentrate on the management of office automation as a necessary step toward the "office of the future." To a certain degree, it will address tactics rather than strategies.

- The concept of the "office of the future" is considered of sufficient importance to be the subject for this year's Management Issue Report. That report will stress the potential impact of the integration of communications, data processing and office systems on the EDP organization and functions.

II EXECUTIVE SUMMARY

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A. OFFICE AUTOMATION - A PRODUCTIVITY PROBLEM

- There is national concern about productivity in all segments of the economy. Even superficial analysis isolates the office as one of the most significant areas requiring attention.

  - In 1978, over $800 billion was paid in direct wages and salaries to white collar workers, and this figure will probably exceed $1 trillion this year.

  - This is by far the largest and most rapidly growing segment of the economy, yet it is impossible to associate a tangible product with office work. In fact, there is little understanding of exactly what most office workers do.

- It is also apparent that technology has not had as significant an impact on the office as it has on the productivities of blue collar and agricultural workers. In fact, the total expenditures on computer and communications products and services to support the office is less than 10% of personnel costs ($72.3 billion in 1978).

- This highly visible productivity problem also represents an enormous potential market for both current and future technology. Vendors of products and services recognize that future growth will be in automating the office, and

there is intense competition to penetrate the market rapidly. This has resulted in a variety of competing products, services and even strategies for automating the office.

- This concentration on office automation has created substantial confusion not only in the marketplace but throughout user organizations. As mentioned in the introduction to this report, INPUT has attempted to clarify some of this confusion by distinguishing between two terms that are normally used interchangeably: office automation and "office of the future." INPUT considers this a substantial distinction rather than a semantic exercise.

B. THE CURRENT DIRECTION OF OFFICE AUTOMATION

- Office automation products are currently directed toward speeding up the production of paper. Word processing systems and office copiers have been extremely helpful in this regard, and it is now possible to add communications capability and speed the flow of paper between offices. These products are aimed at improving the productivity of secretarial and clerical activities, which represent approximately 26% of office personnel costs.

- However, the improved rate of production of paper documents does nothing to improve the handling and processing of these documents. In fact, a good argument can be made that automating this phase of office operations contributes to the current paperwork problem and actually increases costs.

- While the most prevalent office automation products address the production of paper (and EDP managers think primarily about word processing when asked about office automation), there are developments that have significant potential to address more complex and promising areas.

- The availability of cheap processors and storage have prompted the development of multifunction equipment, which extends the capability of office products into the data processing systems area.

- The application of the same technology in communications systems gives promise of improving the productivity of managerial, administrative and technical personnel where a substantial portion of their time is spent in voice communications (either face-to-face or on the telephone). Extended and improved communications facilities will impact both current data processing systems and traditional office systems.

- INPUT has concluded that the future potential of the "office of the future" would present such fundamental changes in the way that offices function that it should be isolated from current office automation problems. These problems present a significant enough immediate challenge to EDP management to warrant concentration in this report.

C. CHALLENGES TO EDP MANAGEMENT

- EDP management is being buffeted from all sides by developments in office automation.

  - Executive management expects EDP involvement and results.

  - End users frequently want to keep data processing involvement to a minimum.

  - Vendors bypass everyone.

- The problems associated with the challenges to EDP management are fundamental and serious.

- There are traditional organizational responsibilities for office systems that exclude EDP involvement.

- Most EDP organizations have not analyzed routine office systems and functions in any detail and are not currently qualified to pass judgement on equipment requirements.

- Rapidly changing and merging technologies are extremely difficult to keep up with, especially between data processing and communications systems.

- There is a strong possibility that current office automation products will become obsolete because they cannot be integrated with distributed data processing. (Or, worse yet, that distributed data processing cannot be implemented because it cannot incorporate office automation systems.)

- There are substantial human factor problems regardless of the approach taken.

- Most data processing organizations have more than enough work to do without addressing the office automation problems.

D. WHAT EDP MANAGEMENT IS CURRENTLY DOING

- From INPUT's research, it would not be unfair to say that EDP management is generally doing as little as possible about office automation.

- Essentially, EDP has a narrow perspective that addresses only word processing, and few companies have plans for the data processing function to assume responsibility for communications functions other than data communications.

- Few companies currently have a plan for office automation even in its more restricted form of word processing.

  - Only four of thirty respondents to telephone interviews had a documented plan.

  - Another 16 stated they would develop a plan during the 1980-1982 timeframe.

  - However, there are currently 13 companies proceeding with the implementation of office automation without a plan.

- INPUT concludes that most companies are not adequately addressing the problems associated with office automation at the present time. This may be because of failure to understand the problems, lack of resources or the misplaced hope that vendors will solve the problems. Under any circumstances, EDP management runs substantial risk of being held responsible for any failure in office automation, regardless of the degree of involvement: The problems will not go away.

E. CONCLUSIONS CONCERNING OFFICE AUTOMATION

- There is a tremendous need for EDP management to become involved in all aspects of office automation as soon as possible. The current emphasis on "information resource management" implies that all forms of communication must be addressed when considering office automation.

- This in turn requires extensive involvement and analysis not only of office systems, but of all functions associated with the office. Specifically, the following products and/or services must be analyzed and understood because they represent integral parts of the total information process:

- Word processing systems and their products: reports and correspondence.

- Office copiers, because of their contribution to information flow and because of their impact on document control (privacy and security).

- Computerized telephone systems, which are destined to become integrated with message and data transmission as digital networks develop and voice becomes a recognized form of systems input and output.

- Manual systems, including document storage and retrieval systems of all types, including file cabinets.

- Personal computers, insofar as they represent an alternative information source.

- Mail and courier service, as an obvious tributary to the information flow.

- While the above list is imposing and poses a threat to already extended data processing resources, the problem can probably be simplified by the following:

  - View the entire office environment as a communications function.

  - Concede that end users will become much more actively involved in the systems analysis and implementation process.

  - Concentrate on the links between systems rather than on the systems themselves.

- The trend toward integration of data processing, communications and office systems is inevitable because of advances in technology. This will force drastic changes in the role of the data processing function - either increased or decreased responsibility.

- INPUT believes that data processing management is best qualified to assume responsibility for office automation and that it must assume that responsibility even though significant risk is involved.

- In most companies, organizational changes will be required before any significant progress can be made, and it will probably be necessary to establish a hierarchical structure (as opposed to a matrix type of organizational structure).

F. RECOMMENDATIONS

- The proposed organization depicted in Exhibit II-1 is designed primarily to bring together necessary functions into an information resources organization. While infinite variety is possible in terms of specific "lines and boxes," the most important attribute of the organization is to eliminate the great diffusion of responsibility for office automation found in most enterprises today.

- The question of where the data processing function should report has been argued for many years when in truth it was usually not terribly important. The corporate information resources function is quite another matter. If it is to be effective, it should report to the chief executive officer.

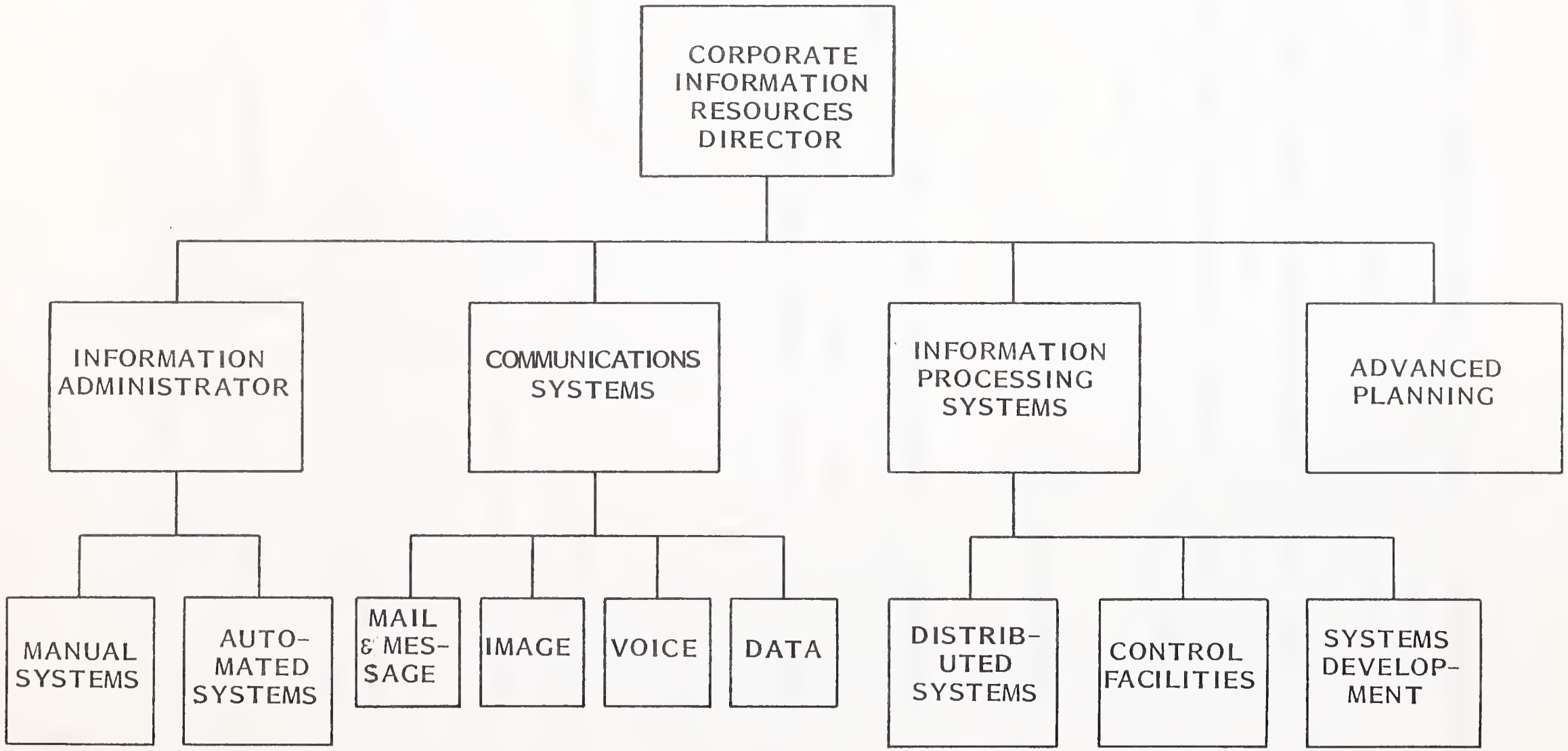
- An important tactical consideration is the enhancement of current data base administration functions to include manual systems. The information administration department would include responsibility for:

  - Preparing information directories and dictionaries.

  - Information storage and retrieval systems for electronic and paper media.

EXHIBIT II-1

INFORMATION RESOURCES ORGANIZATION



- Selection of the proper storage media.

- Coordination of indexing systems (both data base systems and conventional filing).

- Communications systems functions would include INPUT's long-standing recommendation that voice, data and message be combined under a central organization, along with:

  - Responsibility for analysis of all "mail," both electronic and paper.

  - Responsibility for all image transmission facilities, including video.

  - Selection of appropriate hardware and services for all communications.

- Information processing systems would be responsible for the hardware and software to support all computer systems connected to the networks.

  - This does not imply that the central function "owns" all hardware, but rather that control would be centralized over the selection of equipment and systems software.

  - This obviously includes all word processing systems, copiers and other office products that communicate on the network, and should include in addition any personal computers that could potentially connect to the network.

  - The normal systems development activities include control over the orderly distribution of appropriate systems development activities to end users.

- Advanced planning would be responsible for analysis and experimental implementation of systems to support the "office of the future" (which has been defined as systems that significantly change the way offices operate). While

the "office of the future" will be the subject for more detailed analysis in the Management Issue Report, topics of discussion will include:

- Use of executive terminals.
- Paperless offices.
- Working at home.
- Substitution of communications for transportation through teleconferencing.

- In order for the information resources function to operate effectively, it will be necessary to concentrate on systems that encourage the end user to assume responsibility for major systems development. It is therefore important for EDP management to recognize that the question is not so much one of integrating office automation into the EDP environment as it is of redefining the EDP function so that office automation can be accommodated into the broader concept of information resources.

III ANALYSIS OF OFFICE FUNCTIONS

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- Office workers are that group of people known as "white collar workers." They carry out their primary functions in offices - individually or in groups - rather than in factory production lines, farms, atop telephone poles, inside mines, etc.

- In 1978, a total of $826 billion was paid in direct wages and salaries to this group, which includes:

  - Managers and administrators.

  - Professionals and technical personnel.

  - Secretaries.

  - Clerks and typists.

- Exhibit III-1 shows the number of workers in each of these categories, plus their average and total wages and salaries paid in 1978.

  - Today, the number of workers probably reaches 50 million, with aggregate wages and salaries approaching one trillion dollars.

- Exhibit III-2 shows that secretarial, clerical and typing activities account for 26% of the total office costs. Most office automation products in place today

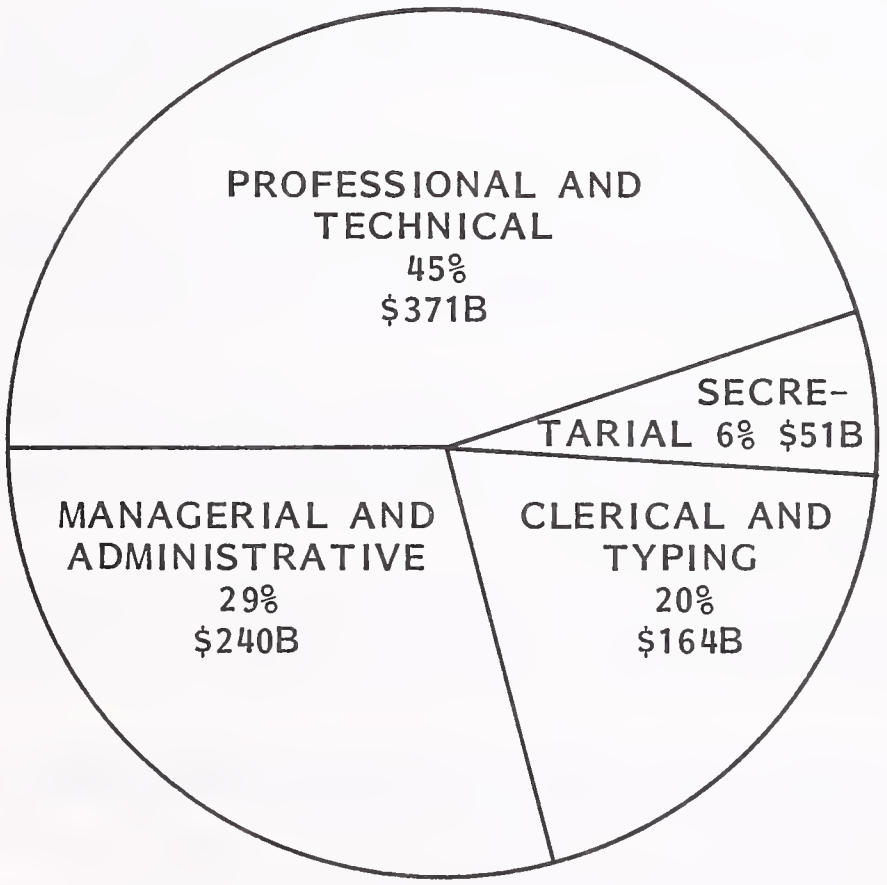
EXHIBIT III-1

NUMBER OF WHITE COLLAR WORKERS IN THE U.S., THEIR AVERAGE AND TOTAL ANNUAL WAGES AND SALARIES, 1978

CATEGORY OF WORKER	NUMBER OF WORKERS (MILLIONS)	AVERAGE ($ THOUSAND)	TOTAL ($ BILLION)
MANAGERIAL AND ADMINISTRATIVE	9.3	$25.8	$240B
PROFESSIONAL AND TECHNICAL	18.8	19.7	371
SECRETARIAL	3.5	14.6	51
CLERICAL AND TYPING	16.1	10.2	164
TOTAL	47.7	$17.3	$826

EXHIBIT III-2

DIRECT LABOR COSTS IN THE OFFICE,
1978



TOTAL (1978) = $826 BILLION

(e.g., word processors and copiers) are designed primarily to improve the productivity of these two groups.

A. WHAT OFFICE WORKERS DO

- If office automation is to be effective, it is necessary to know the cost of the various activities performed by the various office workers. The first step is to discover what these activities are.

- For the purposes of this report, INPUT has specified six activity groups in an effort to describe the work done by each category of worker:

  - Analytical work.

  - Face-to-face communication.

  - Using the telephone.

  - Origination of documents.

  - Handling documents.

- Analytical work includes planning, designing, calculating, preparing budgets, manipulating concepts and numbers, and other generally solitary work involving thinking, reflecting and comprehending. The use of calculators, computers and other instruments would be included.

- Face-to-face communication involves going to, coming from, and attending meetings, conferences and seminars, giving or attending presentations, talking to others directly in someone's office or in a hallway, and other generally verbal encounters. For want of a better category, teleconferencing would be included here.

- Using the telephone includes inside and outside calls, including waiting time, misdials, wrong numbers, etc.

- Origination of documents includes dictation, writing letters, drafts and reports, making sketches or drawings and tables of data.

- Handling of documents includes sorting, filing, retrieving and routing paper or other media containing information; processing incoming or outgoing mail; making machine copies; and reading material not used in analytical activities (e.g., memos on the new parking regulations, the office party and the blood bank).

- Exhibit III-3 shows the percentage of each worker's time spent in each of the various categories of activity.

  - Managers and administrators spend most of their time (79%) originating or responding to communications, face-to-face or on the phone.

  - Professionals and technical people spend 62% of their time doing analytical work and attending meetings.

  - Clerks and typists, as might be expected, spend most their time (60%) typing and handling documents.

  - Secretaries spend an equal amount of time in each activity.

B. THE COST OF OFFICE FUNCTIONS

- Personnel costs for the various activities are shown in Exhibit III-4, which reveals that the greatest focus of office automation products (copiers, word processors) is on the lowest cost-contributing elements of office activity. The biggest costs in the office relate to analytical work and face-to-face communications, where non-clerical personnel spend most of their time.

EXHIBIT III-3

PERCENT OF OFFICE LABOR ATTRIBUTABLE TO VARIOUS ACTIVITIES

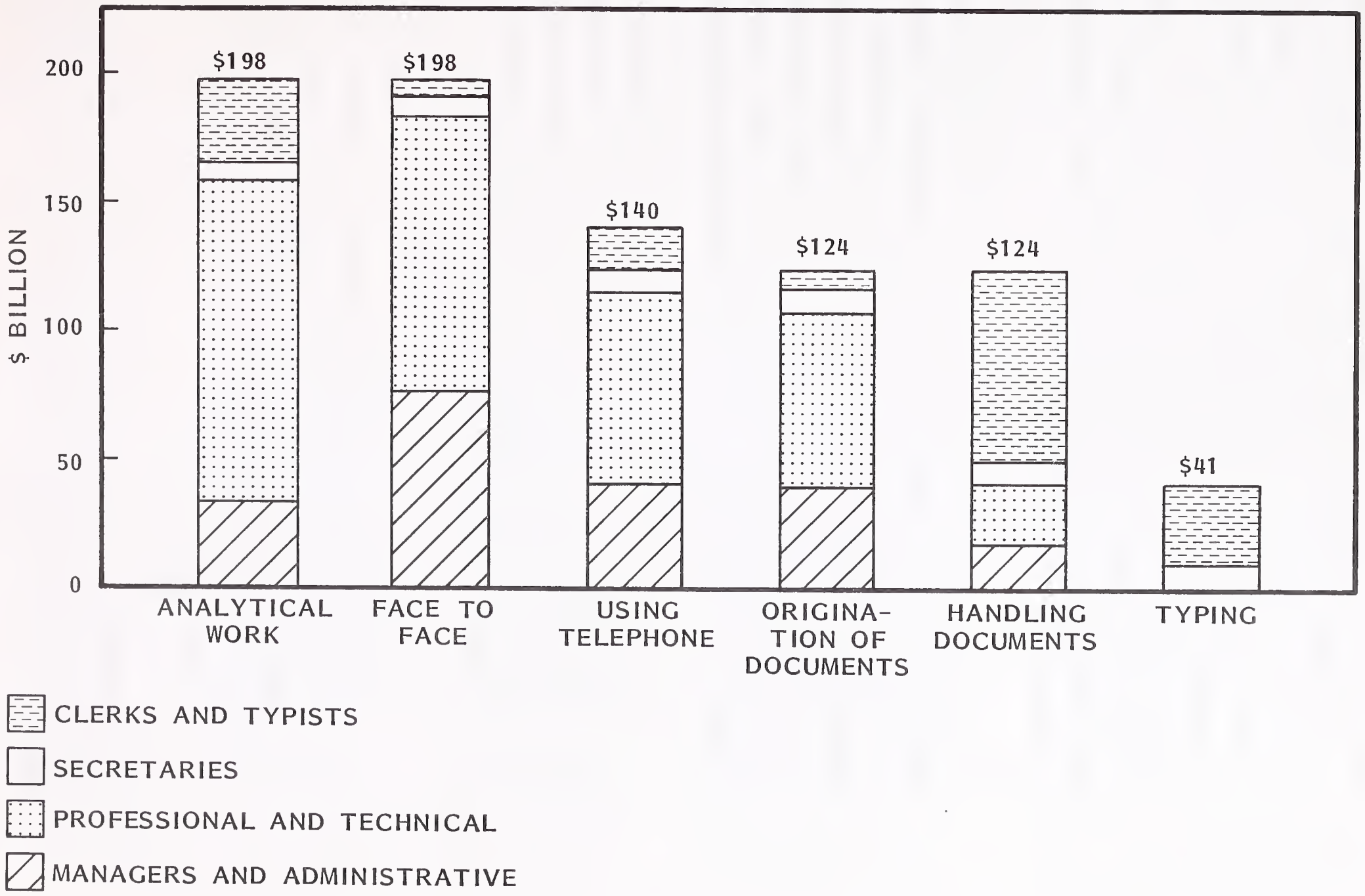
JOB FUNCTION	ORIGINATION OF DOCUMENTS (1)	HANDLING DOCUMENTS (2)	USING TELEPHONE	FACE TO FACE (3)	TYPING	ANALYTICAL WORK (4)	TOTAL
MANAGERS AND ADMINISTRATORS	7%	2%	7%	9%	0%	4%	29%
PROFESSIONALS AND TECHNICAL	6	4	7	13	0	15	45
CLERKS AND TYPISTS	1	8	2	1	4	4	20
SECRETARIES	1	1	1	1	1	1	6
TOTAL PERCENT	15%	15%	17%	24%	5%	24%	100%
EQUIVALENT IN $ BILLION	$124	$124	$140	$198	$41	$198	$826

(1) INCLUDES DICTATION, WRITING MEMOS, LETTERS AND REPORTS. EXCLUDES TYPING.
(2) INCLUDES FILING, COPYING, ROUTING, MAIL HANDLING. EXCLUDES TYPING.
(3) INCLUDES MEETINGS, PRESENTATIONS, SEMINARS, CONFERENCES.
(4) INCLUDES DESIGN, CALCULATION, TECHNICAL READING.

EXHIBIT III-4

COSTS OF VARIOUS OFFICE ACTIVITIES (BY LABOR CATEGORY)

TOTAL COST = $826B (1978)



- Analytical work (accounting for $198 billion of U.S. expenditures) is supported by calculators, computers and word processors with math packages and statistical capabilities. The implementation of in-house timesharing, distributed processing and small user computers is an effective means of improving the productivity of non-clerical workers in this kind of work. Professional and technical people tend to use these capabilities more than managerial and administrative people do. Delayed by managers' strong resisitance to using keyboards, "executive terminals" are just beginning to make an appearance at, for example, Citibank in New York.

- Face-to-face communication (representing $198 billion in U.S expenditures) is facilitated by "media presentations" at sales conferences, planning meetings and technical presentations. Nevertheless, the problems (and inefficiency) associated with getting all of the right people together in the same place at the same time continue to cause significant interruptions in the day's schedules of those who are summoned. (The total cost also includes a substantial portion of informal or unscheduled meetings of highly variable effectiveness.)

  - Electronic mail systems with electronic calendaring may help resolve the problem. A person wishing to call a meeting could examine - on his or her CRT - the calendars of all those who should be at the meeting, and make a trial schedule based on eveyone's prioritized calendars - subject to review and confirmation.

  - Teleconferencing is a potential alternative to face-to-face meetings that avoids both scheduling and transportation problems (and associated expenses). Bell System video telephones are a move in that direction, and the satellite services of SBS (Satellite Business Systems) and others will include single-frame, slow-scan and fast-scan TV for teleconferencing.

- Using telephones costs over $140 billion per year in the U.S., aside from the cost of the equipment and communications service. Given that less than one-third of all business calls are completed, there is considerable room for

improvement in this activity, which consumes 17% of all workers' time, and 24% (nearly 2 hours) of managers' time in an average day. This time includes misdials, failures to connect, note taking, interactions with secretaries, etc. It is extremely difficult to measure the cost associated with a manager, interrupted by a phone call, who has to restart a project after the work relating to the call is completed. The actual time spent placing calls, as well as the cost of those calls, is being reduced by using alternative (non-Bell) communications carriers and PABX and CBX equipment, both of which route calls automatically via the cheapest available link. "Store-and-forward" voice messages are coming.

- Origination of documents costs over $124 billion in labor alone. Oral origination (i.e., dictation) has improved little in many years. Handwritten origination has not improved at all. Few documents are originated in typed form, except by secretarial or clerical workers interfacing with outside clients. Most managers and professional people cannot or will not type. Budgets and other financial documents as well as graphics, while amenable to electronic creation, are traditionally done manually.

- Handling documents is a $124 billion labor area highly amenable to automation. Some companies are moving toward digitizing or microfilming all documents arriving from outside the company and preparing all internally originated documents for optical reading and input to data/word processing equipment.

  - AMOCO uses an IBM optical scanner to read specially imprinted sheets generated at gasoline stations for product and services charges. Instead of sending duplicates of each charge slip ("country club billing"), AMOCO prepares a page on which is recorded all the information from each transaction plus an ink-jet printed copy of each signature associated with each transaction. When foreign cards (e.g., American Express) are used, the system prints a facsimile of the charge slip, including the customer's signature, and sends it to the other company.

There is virtually no human intervention after the input sheet is scanned.

- Numerous mail systems are currently available for messages to be left, picked up, prioritized, etc. Automation of bulk mailing, in the computer room as well as the mail room, reduces clerical costs. The copier has contributed to an explosion in paper copies - which usually get mailed - amounting to a mixed blessing in the office.

- The document distributor (IBM 6670) is an effort to reduce the labor involved in routing and distributing internal mail by combining the copier process with selectable, preprogrammed distribution lists.

- Typing, while only 5% of office labor costs, is a significant $41 billion activity. The billion-dollar-a-year word processing market results from an effort to improve typing efficiency, and the procedures attendant with traditional typing, including proofreading, changing, updating and assembling documents. A doubling of the output of a typist - a feat that seems to be easily attainable - provides the means for cost justifying the acquisition of word processing equipment.

  - Other efforts are directed toward reorganizing typing resources and redefining secretarial roles. This will expand the benefits of word processing to management by allowing managers to off-load work to secretaries filling redefined job roles.

C. SERVICES IN SUPPORT OF OFFICE FUNCTIONS

- Many of the "office services" or "office support" functions are carried out by organizational units, which are offices in themselves:

- Mail room.
- Reproduction services.
- Graphics.
- Central typing/dictation pools.
- Data processing.

- Data processing is more an office function than not. It is therefore useful for DP management to understand the potential benefits of office automation for its own use.

- Through understanding how office automation can provide benefits in the EDP department, the EDP manager will increase in value to the entire company once planning for office automation becomes a company-wide activity.

- In fact, EDP managers must become as knowledgeable as possible in all facets of office automation, in order to participate to a maximum degree in the automation planning process of their companies. EDP managers offer a number of invaluable, and often unique, skills, including:

  - Knowledge of equipment and software vendors and products.
  - Knowledge of communications interfaces and protocols.
  - Experience in cost justification for users.
  - Experience in planning for expansion and growth.
  - Experience in managing and training people.

- Experience in installation of complex systems.
- Analytical orientation toward problem solving.
- Cost consciousness in system implementation.
- Experience in preparing budgets and long-range plans.
- Experience in preparing reports for management.

- By increasing their exposure to other office-type functional units in the company, and by learning about job requirements and personnel issues related to tasks not performed in the EDP department, EDP managers may find the key to unlocking the office automation puzzle.

IV CURRENT AND PROJECTED PRODUCTS AND SERVICES TO SUPPORT THE OFFICE

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A. COMMUNICATIONS PRODUCTS AND SERVICES

- Communications will be the hub around which office automation and its links to data processing will evolve. In order for DP managers to maintain control of the interface between data processing and word processing, and to adequately influence their company's move toward "integrated information systems" (a term adopted by Wang Laboratories for its newest systems), they will have to be very knowledgeable about what is happening in the world of communications products and services.

- While it may not be necessary for the DP manager to be intimate with all the regulatory details surrounding the communications industry, it is important to keep up with current products and services as well as those planned or expected in the next five years - particularly those related to digital communications of voice and video, in addition to data.

1. TELEPHONE COMPANY "DEREGULATIONS"

- The FCC has recently approved removing the barriers between telephone companies and computer services companies regarding data communications, effective March 1, 1982. Unless the decision is reversed as a result of legal action on the part of the Justice Department, AT&T and other telephone

companies will be able to sell unregulated services (everything but basic telephone services) and products through independent subsidiaries.

- Such a subsidiary, spawned by AT&T, could become the second largest data processing company in the world (after IBM), with enormous influence over what happens in the office.

- AT&T's Advanced Communications Service (ACS) will be a user-transparent communications line that will enable otherwise incompatible terminal devices (due to codes, protocols, speeds, etc.) to communicate with each other. The ACS network will provide the necessary code protocol conversions, plus speed marketing.

- The AT&T satellite communications will support digitized voice communications, electronic mail, video conferencing, facsimile and other high-speed text and data transmission applications, many of which will originate from and terminate in the office.

  - Communicating word processors, intelligent copier/printers and intelligent facsimile devices are already operating in the office environment.

  - Other networks, earthbound or satellite-based - such as Satellite Business Systems (IBM, Aetna, Comsat), Xten (Xerox), GTE/Telenet and TYMNET - will also support these activities. Xten is also oriented toward document distributors.

2. ELECTRONIC MAIL (EM)

- The definitions of electronic mail vary widely. The basic idea is to send and receive messages electronically instead of using paper or the telephone. Sophisticated systems store and forward, provide secure access, establish priorities, interface facsimile with data terminals, provide voice retrieval, and include numerous other features and options.

- Systems and services are available from hardware vendors (DEC, Datapoint, Wang and Computer Corporation of America), value added network services (GTE/Telenet and TYMNET), and computer services vendors (CompuServe).

  - Computer Corporation of America (CCA) offers COMET, a PDP-11 based system that can be used with any CRT or ASC II terminal. An X-25 interface is available for connection to packet switching the books. As a subscription service, it costs $60 per month per subscriber, plus terminal and common carrier charges. It provides message preparation, transmission, filing, retrieval and distribution control. It is also available for in-house set-up.

  - Datapoint has developed ARC (Attached Resource Computer) architecture, which allows a multitude of different boxes and applications to be run on a common architectural design. One of these applications is EMS (Electronic Message System), introduced in November 1979. EMS can be used standalone or as part of an integrated DP/WP system. It works in conjunction with Datapoint's Long Distance Control System (LDCS), which seeks the least expensive communication facility available to the user (e.g., SPCC, WATS, dial-up, etc.) for sending the message electronically.

  - Wang's Mailway, introduced this year, offers four functions, each costing $2,000, to link VS integrated information systems with OIS integrated information systems. The four functions are Post Office (network management), Mailbag (stores correspondence until receiver picks it up), Distribution (delivers correspondence to receiver's workstation), and Gateway (links to other mail systems, manual or electronic).

  - GTE/Telenet offers Telemail, priced below TWX, Telex and facsimile services. Basic charges for the service will be 22 cents a minute during normal business hours and 5 cents a minute nights and weekends. Introduced in July 1980, it will initially be in 110 U.S. cities, growing to

250 by year's end. The system, using Tandem minicomputers, will interconnect with Western Union to deliver messages directly to Telex and TWX machines and the Mailgram Service. The network will perform speed, code and network conversions. Telenet plans to develop interfaces for batch terminals, facsimile machines, intelligent copiers and micrographic equipment.

- TYMNET, which has been offering OnTyme electronic mail, just announced OnTyme II, which incorporates direct communications from ASC II terminals to facsimile terminals for hard copy output. The company is presently pilot testing TYMEGRAM, an equivalent of MAILGRAM (Western Union), in California with the Shell Oil Company. TYMEGRAMS are printed out on terminals located near a post office and complete their delivery through the mails. TYMEGRAMS cost 38 to 50 cents each, compared to $1.10 to $1.60 each for Mailgrams.

- CompuServe, through its Plexus Corporation subsidiary, offers Infoplex, which is a sophisticated digital electronic mail service not requiring a terminal. Via Execucall, a subscriber can use any telephone to store and retrieve messages. The system uses a toll-free WATS number, and costs about 75 cents per 1,000 characters.

- In addition, major companies such as General Electric have extensive internal electronic mail systems. GE's internal system has been so well received it is probable that it will be offered on a commercial basis through General Electric Information Services (GEIS).

- Advantages of electronic mail:

  - The receiver is not interrupted, and meetings are not disrupted, by routine telephone calls.

  - Sender and receiver need not be available at the same time. If a two-way voice-to-voice communication is necessary, it can be sent via EM.

A permanent record is automatically estabished, so duplicate copies of memos and notes of telephone conversations need not be kept.

- Paper consumption (copies) and distribution are reduced.

- Messages can be broadcast simultaneously to many receivers at many locations.

- Programs for distribution lists can be built into the system (e.g., all department heads) and distribution of the right information to the intended recipients is assured, as the system can also provide confirmation of receipt.

3. PBXs GO ELECTRONIC - AND SOPHISTICATED

- The heart of the electronic communications system of the "office of the future" will be the advanced PBX (Private Branch Exchange), PABX (Private Automated Branch Exchange), or CBX (Computerized Branch Exchange).

- The Bell System has fallen way behind in this area, as companies such as Rolm Telecommunications and Northern Telecom overtake the market. Rolm is the second largest PBX/CBX supplier after Western Electric, having shipped over 2,500 units since April 1975. This is still a small number compared to Bell's 110,000 installed PBX and Centrex base, but the move to independent suppliers is growing.

- The Rolm system is available for users with 24 to 4,000 telephone extensions. It allows users to access MCI Execunet and Southern Pacific Communications' SPRINT services simply by dialing "9" plus the long-distance number, as its hunt for the lowest cost communications service available at the time the call is being placed (route optimization). The system will allocate charges to users, and produce usage analysis reports.

- Inte Com, Inc. (Dallas), a subsidiary of Exxon Enterprises, has recently announced IBX (Integrated Business Exchange), which could have the capability of interconnecting products of Exxon's other office technology companies: Qyx (intelligent typewriters), QWIP (intelligent facsimile machines), Xonex (multifunction workstations), Vydec (communicating word processors), and Delphi (telephone answering/switching systems). IBX claims to be the first commercially available switching system to fully integrate voice and data communications. It will interface with SBS and Xten. Deliveries are scheduled for 1981.

4. LOCAL NETWORKING - WHO NEEDS SNA?

- Numerous companies are developing and/or offering local networking systems whose ultimate goal is to connect a variety of products from a variety of vendors together in a relatively small geographic environment, independent of codes, protocols and speeds. If successful, users will have no need to stick with single vendors to implement their automation projects.

- Datapoint offers Light Link, which uses modulated infra-red to transmit messages up to two miles.

- Valtec Corporation's Communications Fiberoptics Division (West Boylton, MA) links a host computer at Grumman Aerospace Corporation with high-resolution graphic terminals over a three-kilometer fiber optics link.

- Exxon Enterprises, a company to watch carefully in the high-technology office automation market, has a subsidiary, Optical Information Systems (Elinsford, NY) which manufactures semiconductor laser transmitters and receivers capable of transmitting six million bits per second over a single fiber. The transmitters themselves are capable of transmitting 275 million bits per second, which is far less than the multigigahertz capability of the laser itself.

- Wang's WISE (Wang Inter System Exchange) enables up to 96 workstations to access each other, or any other device in the network, up to one and one half

miles away. Data transfer is via coaxial cable, at speeds up to four megabits per second.

- Xerox's Ethernet, now being tested at the White House, is also a passive coaxial cable link, scheduled to be commercially available in 1980. It can string together any number of Xerox 860 Information Systems (DP and WP capabilty) and enables access to any other part of the system via Xten or any other common carrier.

  - Note that Xten plans to interconnect subscribers within a given city via microwave links for transmitting/receiving via a single satellite earth station, regardless of code, protocol or speed.

- A consortium of Xerox, DEC and Intel is currently developing the specifications for a low-cost local communications network based on Ethernet, which will be licensed to anyone who wants to build products for it. The Network 9 design will be nonproprietary.

- Interestingly, the world's longest fiber network is beginning with a 200 km underground installation between Regina and Yorktown in Canada. By 1984, it should be 3,200 km long, to bring cable TV and other communications services into 500 or more homes.

- Telesystems Network, Inc. (Chicago) is facilitating the mix-and-match approach to office automation by providing a Protocol Translator that enables almost any word processor or computer to communicate with almost any other. The accounting firm of Laventhrol and Horvath has used the product to convert from Vydec to Lexitron word processors. Each unit costs about $8,000, and rents for $450 per month, including maintenance. Existing units have a built-in modem of choice. Next year's models will have push-button selectable internal modums.

5. FACSIMILE

- Facsimile, seen by some as a sleeping giant, is taking a long time to wake up. A leader in this marketplace is QWIP, another Exxon Enterprises company. QWIP's Connection sends and receives written or graphic documents over ordinary telephone lines in two, three, four or six minutes. The Connection can receive a document for all compatible fax devices without operator involvement.

- Products will not change much in the next two years, although there is a definite trend toward digital systems for higher speed and accuracy, and greater resolution.

- In the 1983-1987 timeframe, there will be a series of transactional products that will have digital capability, will be able to serve as input devices and output printers for office automation systems, and will be compatible with the nearly quarter of a million analog facsimile systems in use in the U.S. today.

- Eventually, color fax may be practical, as the cost comes down. Today, most transmitted material is black and white (no grays), and users indicate they would not pay any premium for color.

- The main competition to facsimile is the communicating word processor. However, it is still cheaper to send a printed document by fax than to retype it for transmission by communicating word processor.

B. WORD PROCESSING

- Word processing is moving towards increased sophistication, communications capabilities, simpler command structures, greater local memory capacity and integration of word processing and data processing capabilities.

- Wang Laboratories is currently the largest supplier of word processing systems, shipping nearly 1,500 workstations per month. Wang's most advanced word processing products are the OIS (Office Information Systems) Series 125, 130, 140 and 145. These systems are the vehicle for word processing users to move into IIS (Integrated Information Systems) by adding a software package, OIS-BASIC. Wang's OIS/3270 Bisynchronous Protocol allows OIS stations to communicate with an IBM system emulating an IBM 3277 terminal.

- At Xerox, the 860 Information has just been announced. It handles both data and word processing. The data processing capability is provided via an optional software package providing a BASIC language interpreter. The 860 sells for $15,300, well within the means of many users to acquire without EDP or financial department approval.

- For those who look to IBM, there is little to be seen in the way of a pattern for the future. Word processing equipment is available from three divisions:

  - DPD encourages mainframe-based word processing with the 3730.

  - OPD, the group one would look to for leadership, offers the OS-6 and a word processing version of the System 32.

  - GSD has the most recent offering, the 5520 Administrative System, which is designed for integrating text processing and document distribution, but does not yet have data capabilities. It is assumed that DP could and would be added next year if the Xerox 860 and other DP/WP systems are successful, and if IBM can figure out how to get its three divisions into harmony in the office market (no slight task).

- CPT, a leading independent supplier of word processing systems (20,000 systems installed at 15,000 user sites since 1971) offers "Number Processing" capabilities, as well as CompuPak, which will allow BASIC, FORTRAN and COBOL programs from other suppliers to run on the CPT 8000 system.

C. COPIERS

- Ultimately, in the office of the future, convenience copies will be replaced by computer printers capable of generating text and graphics. Whenever a copy of a document, which is electronically stored, is required, the high-speed printer will produce an "original." Such devices are already available from IBM, Wang, Xerox and Canon. Datapoint expects to have one in two years.

- The IBM 6670 Information Distributor will print its first copy of an 8½ x 11 inch document in 6.5 seconds, with 1.7 seconds per "copy" after that. It uses a laser printhead to form characters on the photoconductor for transfer to paper.

  - Input to the systems can be via IBM mag cards, or via bisynchronous or SDLC communications.

  - Output, from mag cards or internal storage, can be transmitted in EBCDIC, ASC II or EBCDIC/WP. It can be transmitted to other 6670s, or 6640 ink-jet printers. It can communicate with IBM host computers, including 360, 370 and 5520.

  - The system will produce repetitive letters and automatically merge in special paragraphs and sequence addresses for distribution.

  - Six type styles are available with each machine.

  - The 6670 can be used as a convenience copier as well, producing 36 copies per minute (compared to 75 cpm on the IBM Copier III).

  - The 6670 sells for $75,000, with a bargain rental price of $1,500 per month, comparable to the Wang intelligent copier which sells for half as much. IBM wants to encourage distribution of the 6670 Information Distributor.

- Wang's intelligent image printer uses fiber optics and high resolution xerographic techniques (90,000 dots per square inch, printed) to print documents at a speed of 18 copies per minute.

  - Printing can be done in 10, 12 or 15 pitch, in any of three type fonts, two of which can be used within any one document.

  - First production units were to be shipped in the first quarter of 1980, at $32,000 (without a convenience copier).

  - All Wang's products are IBM compatible, via (BSC) 2780/3780 software.

- Xerox offers both the 1200 computer printing systems and the 9700 Electronic Printing System.

  - The 1200, introduced in 1973, produces 60 "copies" per minute, and is compatible with IBM 360 and 370 computers. It also operates off-line using standard magnetic tape formats.

  - The 9700, introduced at NCC in 1977, produces characters, shading, forms and logos, with a resolution of 300 dots per horizontal and vertical inch. It is compatible with IBM 360 and 370 mainframes, and prints 120 pages per minute.

- Canon's desktop laser printer is intended especially for computer graphics applications. It prints 240 dots per vertical inch, and up to 480 dots per horizontal inch, at a speed of 10 pages per minute. It is sold in the U.S. only through OEMs. OEM price, exclusive of character generators and interfaces, will be between $5,000 and $8,000, resulting in an expected end-user price of around $15,000.

- These computer-driven devices offer the possibility of an individual composing a memo or letter on a desktop CRT, having it sent automatically by electronic mail to receiver CRTs, and having hard copies printed, assembled and routed

to a pre-programmed mailing list of receivers who do not have CRTs (clients, suppliers, or internal users with limited needs for CRT terminals).

D. DATA PROCESSING SYSTEMS AND SERVICES

- In support of office automation, data processing hardware vendors are moving toward DP/WP integration, either in a multipurpose workstation, or in the communications link, or both. Again, IBM is not clear as to its intentions in this area, except to note that 3730s are being used for word processing in the 370 environment.

- Datapoint, with origins in distributed processing and communications, announced word processing capabilities within its ARC architecture in November 1979, the same time that it announced EMS (Electronic Message Service).

  - Datapoint is clearly committed to integration without obsolescence. All products, old and new, can be used on ARC, and applications are added more with new software than with new hardware. However, a new keyboard is required - that's the only hardware change for existing Datapoint 1500, 1800 and 3800 users. The software may be licensed for $750.

- Prime Computer has just announced its Office Automation System, which combines word processing, electronic mail, interactive timesharing, data processing and networking capabilities. New printers and terminals are available, including a letter-quality printer priced at $4,600.

- Wang Laboratories, noted for its word processing prowess, is also a major supplier of data processing equipment, the most advanced of which is the Virtual Memory VS Series. Being committed to leadership in the ITS (Integrated Information Systems) market, Wang offers its DP customers a way

into office automation by adding word processing software to the VS computer.

- The price of VS-based integrated systems ranges from about $80,000 to nearly $300,000.

- DEC (Digital Equipment Corporation), as mentioned earlier, plans to market its electronic mail system soon. The company believes that large corporate users will not get much into the integration of data and word processing because there are not that many applications that require switching from one to the other. For smaller companies, DP/WP integration means the ability to do many tasks with only one system.

- Apple Computer, the red-hot leader of the personal computer field, introduced Apple III at the 1980 National Computer Conference. Selling between $4,340 and $7,800, Apple III comes with special applications packages:

  - Information Analyst, which performs financial planning, forecasting, pricing, scheduling and budgeting.

  - Word Processing.

  - Visi Calc III, for forecasting and display.

  - Mail List Manager.

  - Apple Business BASIC.

  - This system can easily be purchased by relatively small user departments in a large corporation without any approval, and can complicate the EDP manager's life when the time comes to integrate the office into data processing networks.

- In respect to data processing services companies, we have already noted that CompuServ offers electronic mail through its Plexus subsidiary. In addition:

  - Bowne Timesharing offers word processing and photocomposition as remote computing services, on-line as well as legal document search and retrieval.

  - Value added networks (GTE/Telenet and TYMNET), traditionally movers and processors of data, are heavily committed to electronic mail services.

E. OTHER OFFICE PRODUCTS AND SERVICES

- Among the myriad other products available and promised for the office, two items that stand out are:

  - Voice recognition and synthesis.

  - Executive terminals.

1. VOICE RECOGNITION AND SYNTHESIS

- Voice recognition can revolutionize the office. Not only can the keyboard be bypassed, security of access be controlled and freedom of movement vis-a-vis the "terminal" be extended, but dictation, a phase of office work which has remained virtually unchanged since its inception, can enter into the automated system.

- Continuous speech recognition is probably 20 years away. IBM's Research Center in Yorktown Heights is probably the most advanced in this technology. It can recognize a vocabulary of 1,000 anticipated words (as in a legal environment, where certain words are expected, or common) using a 370/168

with perhaps 100 megabytes of storage. Recognition takes ten times the duration of the actual speech. Accuracies achieved range around 92%. The system has no current practical applications, other than as a research vehicle. Its goals are to determine whether or not continuous speech recognition is possible, rather than economical.

- Short of continuous speech recognition, there are other systems which can identify "connected speech" - particularly a series of digits. Nippon Electric markets such a device in the U.S., for about $75,000. Dialog Systems (Belmont, MA) - another Exxon Enterprises affiliate - has implemented a six-month test of a speaker-independent system which allows customers to talk directly to a bank's computer to transfer funds from their account to pay a bill. The Dialog system can understand 22 words.

- Machines can talk back, too. In it simplest form, Texas Instruments' children's "toy," Speak and Spell, is an example of electronic speech. On a more sophisticated level, IBM's Audio Typing Unit - announced by OPO in November 1979 - allows a keyboard operator to play back a phonetically spoken version of what has been typed or stored on magnetic media. Developed mainly to enable blind typists to proof their own work, the "talking typewriter" works with four of IBM's magnetic typewriters, and has an unlimited vocabulary. The device also signals end of ribbon, end of page and other control information required for perfect typing.

- The printed word can also be converted to audio by Kurtzweil Computer Products, Inc. (Cambridge, MA), recently acquired by Xerox. Originally intended as an aid for the blind and those with vocal or speech problems, the OCR-driven device can be bused as a multifont input device to an intelligent copier (using its digital output) for retrieval or demand.

- Putting the aforementioned devices together, one can conceive of an executive pushing a button on his phone, saying, "Send a copy of last month's financials to Joe Smith at Corporate Headquarters." The command is routed to the intelligent copier, which searches its files, prepares a standard

transmittal letter (to:, from:), retrieves the financial data, sends an electronic mail copy to Joe Smith, and calls the executive back when Mr. Smith picks up his mail. There is no paper, no executive typing, no middleman and no follow-up.

2. EXECUTIVE TERMINALS

- The value of an "executive terminal" rests in the fact that the bulk of office expense lies not with the typing function - where most "automation" is currently concentrated, but in management. Managers, much more than typists and secretaries, need to have their work streamlined to enable greater efficiency.

- Managerial efficiency is virtually unmeasurable. It would be impossible to cost justify executive terminals. They will be implemented by forward-thinking management organizations with confidence in their value - and where the managers are not threatened by the presence of a keyboard on their desks.

- A shining example of an executive terminal system is Citibank, New York's largest bank, which has 15 such terminals manufactured by a Citicorp subsidiary, Lexar Corp. (Los Angeles). The Lexar terminals include a keyboard, CRT, and Qume printer. The terminals can act as standalone local computers, or can access Citibank's central data base for information on budgets, general ledger and personnel. There is also the capability to access the New York Times Information bank. Calendaring, electronic mail and word processing are additional features of the system.

- According to Lexar, the need right now in the office automation field is to utilize the PABX for switching voice and data. Modems can be eliminated by plugging the CRT directly into the telephone. Lexar will be marketing a digital PABX by the end of 1980.

- Lexar has spun off the executive terminal group, now called Axxa Corp. (Woodland Hills, CA). Axxa is marketing a turnkey system, aimed at large

legal and financial companies and the Fortune 500. Axxa's System 90 is intended to fit into the office without disrupting existing manager-secretary relationships, by supporting two terminals, one for each of them. IBM 3270 communications is in development to enable executives of IBM-based companies to access their own central files.

- The field is of mixed opinions regarding managerial reluctance to use terminals. The popular mythology is that executives will not use them because:

  - They don't want to learn to type.

  - They don't want to give up their secretaries.

- According to CBS, where 1,600 terminals are in use, there is only a smattering of resistance. James Walsh, MIS vice president at CBS, has been quoted as saying that "very important people don't care anymore" about whether they type or not.

V CHALLENGES TO EDP MANAGEMENT

V CHALLENGES TO EDP MANAGEMENT

- Data processing management is currently under severe pressure from two directions:

  - There are increased expectations on the part of executive management - especially considering current economic uncertainty - and data processing functions will be expected to "produce more with less."

  - The end users of central data processing services are becoming increasingly frustrated with the perceived expense and poor quality of service, and dissatisfaction can be expected to increase during times when user budgets are decreasing.

- This vice-like pressure on traditional data processing organizations complicates the challenges presented to EDP management by the increased importance of office products and services which have been described.

- It is of the utmost importance for EDP management to understand and respond to these challenges, which will be described and analyzed by specific categories.

A. ORGANIZATIONAL

- Products and services to support office automation, by definition, cut across all organizational entities within an enterprise. The selection of products and services to support the office has traditionally been either centralized in "appropriate" central organizations or delegated to the operating establishments. However, there are as many organizational patterns as there are companies.

- Most office products and services have not been traditionally associated with the central EDP function. In fact, data processing has been considered just another service in most organizations and it still represents a modest (albeit visable) expense compared to overall office expenditures for products and services.

- There are currently complex decision-making patterns for the selection and purchase of most products and services to support the office. The centralized data processing function has not been - and is not generally considered - an appropriate organization to become involved in this process. Even as technology, in the form of microprocessors, penetrates more and more conventional office products, it is doubtful that data processing involvement will be welcomed.

B. VENDOR MARKETING

- There is practically an infinite set of problems associated with office work, and these problems have been addressed by an impressive array of vendors with various solutions to specific parts of office operations. Depending upon the solution, marketing has been directed to particular organizations (or individuals) within the establishment.

- Since there is no single right answer to the complex office problem set, today's technology is frequently being oversold against an "office-of-the-future" panorama created by both media and vendors. This sales strategy very specifically attempts to by-pass systems organizations which have become somewhat sensitive to simplistic answers to complex problems.

- However, some of the solutions can demonstrate very specific cost savings to particular problems such as: typing (word processing), telephone expense (PABX's), postage expense (electronic mail), filing (microfiche systems), etc. In addition, they can promise to reduce another (very unpopular) expense - data processing.

- The simple dollars and cents figures of potential savings are frequently very impressive and much more understandable than those presented by the central data processing facility for systems projects. The individual investment is small, and the decision making process is relatively rapid compared to DP's more prolonged investigations of feasibility, analysis and selection of computer systems.

- Even when a corporate decision has been made to "get EDP management involved" in the selection of office systems, vendors recognize that most EDP organizations are neither qualified nor interested in selecting office systems. (Even if they are, they probably do not have the time to do a thorough analysis.)

- The proper balance between total involvement and disinterest in office products and service acquisitions is an extremely complex challenge when viewed in terms of the resources available to the central EDP facility and the marketing strategies of various vendors.

C. SYSTEMS ANALYSIS - BACK TO BASICS

- Most current commercial data processing systems were subject to intense scrutiny prior to the time that computer systems were available. The basic processes of payroll, acccounts receivable/payable, inventory, personnel, etc. - and even most of the more complex operational activities such as manufacturing, scheduling (of all kinds) and maintenance - had been reasonably well explored. There was an underlying system, regardless of how crude, prior to the time that the "magic" of computer technology appeared.

- The relatively simple task was to analyze what was being done and apply the new technology. Many existing business systems currently running on the most advanced computer systems would still be recognizable to a tab card supervisor. Even where technology has been effectively utilized, the basic analysis had been done prior to implementation.

- The integration of office systems (which are not even understood, much less thoroughly analyzed) with the relatively rigid systems which go back several decades, has always been a point of exasperation for most EDP systems analysts. In fact, most of the conflict between end users and centralized data processing functions has been associated with the "lack of understanding" users perceive.

- Vendors of office products and services usually have substantially more knowledge of office systems and procedures than do systems analysts who have been concentrating on computer applications. This includes more detailed information concerning specific office functions.

- Since few organizations really understand a total information system, the specialized knowledge associated with particular office problems can result in immediate systems solutions to isolated parts of office automation.

- These partial solutions may result in immediate paybacks but require considerable systems effort to integrate them effectively into any future systems. The ultimate problems associated with such integration will probably fall upon the centralized data processing function regardless of who had responsibility for the original systems analysis.

- However, end users have become wary of computer systems analysis, which has frequently resulted in less than satisfactory results. Immediate, tangible results are very much desired and extended time spent in analysis is viewed as an unnecessary expense when a simple "solution" is readily available. Therefore, there is normally little time for study even if the resources are available for evaluation of alternative solutions.

- There is also a fundamental problem with most data processing systems: they have normally terminated at the point where information is made available to the end user. Office work is essentially the exchange of information - this presents an entirely new set of problems which are not well defined since there is little understanding of what office workers really do. However, it is probable that computer solutions will be neither appropriate nor accepted in most information exchange situations, and the mere distribution of data processing power into the office will fail.

  - Current data processing systems frequently contribute to office problems by making voluminous, unanalyzed data available. These data do not contribute to improved information flow - they tend to obscure meaningful information by overwhelming it with meaningless tabulations of specific data elements.

  - Current office products in support of office automation have tended to speed the production (word processing) and distribution (office copying) of paper. The present application of technology to such products has tended to improve the process but ignore the problem.

- "Advanced" office systems merely connect conventional products and dump the paper reports, forms and correspondence on a remote location more rapidly.

- EDP management has a responsibility to understand the true impact of conventional paper communications on the office environment. This requires the extension of both computer and communications technology into entirely new areas of office activity, and there are areas where systems analysis will be extremely difficult.

D. MERGING TECHNOLOGIES

- The Federal Communications Commission (FCC) has finally recognized the futility of attempting to draw a clear distinction between communications and data processing in its final ruling in the Second Computer Inquiry. (See "Data Communications for New On-Line Systems," INPUT May, 1980.) Not only does this ruling imply the need for both data processing and communications systems personnel to broaden their technological expertise, but it complicates the learning process by encouraging a wider range of new products and services.

- There are also rapidly shifting economic dividing lines between various storage medias, such as: paper (file cabinets), conventional EDP magnetic storage media, new storage systems (such as video disk) and communications network "storage and forward" (regardless of medium). The selection of proper storage media is not only complicated - it is becoming more important than the selection of processors in systems design. In fact, the selection of storage may dictate processor selection.

- Among processors themselves, the lines between micros, minis, small business, mid-range and large-scale systems are constantly being redefined. Over four years ago in the "Economics of Computer/Communications Networks and Their

Future Impact," INPUT projected that arrays of micros might compete against large-scale processors within 10 years. Whether such arrays will compete for heavy computation is still not clear; however, the potential of distributed micros to off-load large-scale systems is very real, and micros are going to be appear in offices in unimaginable numbers over the next decade.

- For data processing personnel who have achieved expertise (and job security) in mastering the intricacies of complex software systems (MVS/TSO/IMS, etc.), there is disturbing news: individual hardware devices and systems will eventually provide attractive alternatives to most current software functions. In fact, the mere economics of microprocessor-based office equipment may mean that many office workers may no longer require the development of conventional computer systems hosted from large-scale mainframes.

- Just as telephones impacted telegraph, electronic message services now threaten a certain amount of voice traffic as convenient, integrated systems develop on digital networks; and teleconferencing may impact voice, paper and travel. New combinations in communications systems are opening up practically unlimited possibilities for new information flow patterns.

- Rapidly changing economics as technologies merge (and tend to absorb each other) represent not only a significant challenge to stay abreast of various developments, but also the threat of early obsolescence of any new office or data processing system.

E. PROBLEMS OF INTEGRATION AND OBSOLESCENCE

- Problems of integration and obsolescence are the underlying causes for most of the disappointment and even dissatisfaction associated with the history of EDP.

- Computer systems have not been properly integrated with existing manual systems, which are the user interface. The end user doesn't like this.

- No sooner are applications systems installed and working than new technology in the form of a new hardware "generation" or a new software system demands the attention of the EDP systems function. Valuable resources must be diverted to conversion, and user demands are either delayed or ignored.

- These problems will only be compounded in the case of integrative office automation, and it is well to remember that much of the obsolescence in the past has been orchestrated to the vendor's advantage. There are many reasons to feel that the situation is not going to improve:

  - Multiple vendors and products will compound the integration.

  - The problems have increased enormously because of the merging technologies described above.

  - The rate of technological change is actually accelerating - especially in terms of applying technology in integrated computer/communications networks.

  - Not only can no single vendor (even IBM) control the technological changes taking place, no single vendor really understands what is happening. Vendors are not in a position to be of significant help even if they wanted to - which they do not. The impact of technological change is out of control from both the user and vendor point of view.

F. HUMAN FACTORS

- While technological change is inevitable (even if it is out of control), it is still being resisted, and this time it is not blue collar workers resisting automation, it is office workers at all levels, including professionals and executives.

- Some of this resistance is not even the result of a threat to security, it is merely a question of personal preference or status symbols from the past.

  - A high percentage of people still feel more comfortable with a piece of paper than they do with a CRT.

  - Personal secretaries are still prized, and will continue to be even after centralized facilities become just as effective.

  - Executives will resist conventional keyboard terminals as demeaning - even if they are skilled at typing.

  - Such resistance to technological change occurs even when the personnel involved perceive the potential advantages. They do everything they can to delay change because they feel uncomfortable.

- This resistance to change is not exclusively from those uncomfortable with current computer technology - data processing personnel have become among the most conservative of white collar workers as the industry has matured. This can be attributed both to past, unpleasant experiences with new systems (change) and fear of radical change in technology (personal security).

- As numerous alternatives are available in the implementation of office automation, there is also a natural tendency on the part of certain of those involved to make pre-emptive use of technology.

- "If we don't do something, those other guys will."

- "I'll show those programmers we can install a system."

- "Do something fast or they will think we don't know what we are doing."

- Human factors are more critical than ever before when considering the integration of office automation into the EDP environment.

G. MINIMIZING RISKS

- All of the above challenges to EDP management can best be summarized as minimizing risks. However, there are many different types of risks involved. The specific challenge is to balance these risks in the best interest of the enterprise, regardless of immediate pressures such as:

  - Limited systems resources.

  - Restricted budgets.

  - Impact on current projects.

  - Vendor pressures.

  - Management pressures.

  - User resistance (or pressure).

  - Technical complexity.

- Despite the risk of becoming involved in new areas when there is more than enough challenge in developing new systems of more conventional design, EDP

management has a responsibility to become involved in office automation because the EDP manager is in the best position to provide leadership in many important ways (as pointed out in Section III of this report). How data processing management views office automation and the degree of current and projected involvement is to be explored in the next section.

VI HOW EDP MANAGEMENT APPROACHES OFFICE AUTOMATION

VI HOW EDP MANAGEMENT APPROACHES OFFICE AUTOMATION

A. RESULTS OF TELEPHONE INTERVIEWS

- To EDP management, office automation means word processing, and even this limited example is happening too slowly.

- Throughout 30 user interviews, the theme is very nearly the same: the approach to office automation is slow and cautious. As can be seen from Exhibit VI-1, the median response is 2 on a scale of 1 to 5, suggesting a relatively low level of implementation.

- Exhibit VI-1 is actually an overstatement of the degree of office automation because to most of those interviewed, office automation is synonymous with word processing.

- Exhibit VI-2 shows what the respondents were thinking about when they rated the level of automation in their offices. Eighty percent offered word processing without any prompting. Only twenty percent or fewer considered anything else to be included in office automation.

- With prompting (i.e., interviewer asked for yes or no for each item on the list) several items came up to be included in one-third or slightly more than one-third of the respondents' concept of office automation. Word processing is still the major item by two to one or more.

EXHIBIT VI-1

EXTENT OF OFFICE AUTOMATION

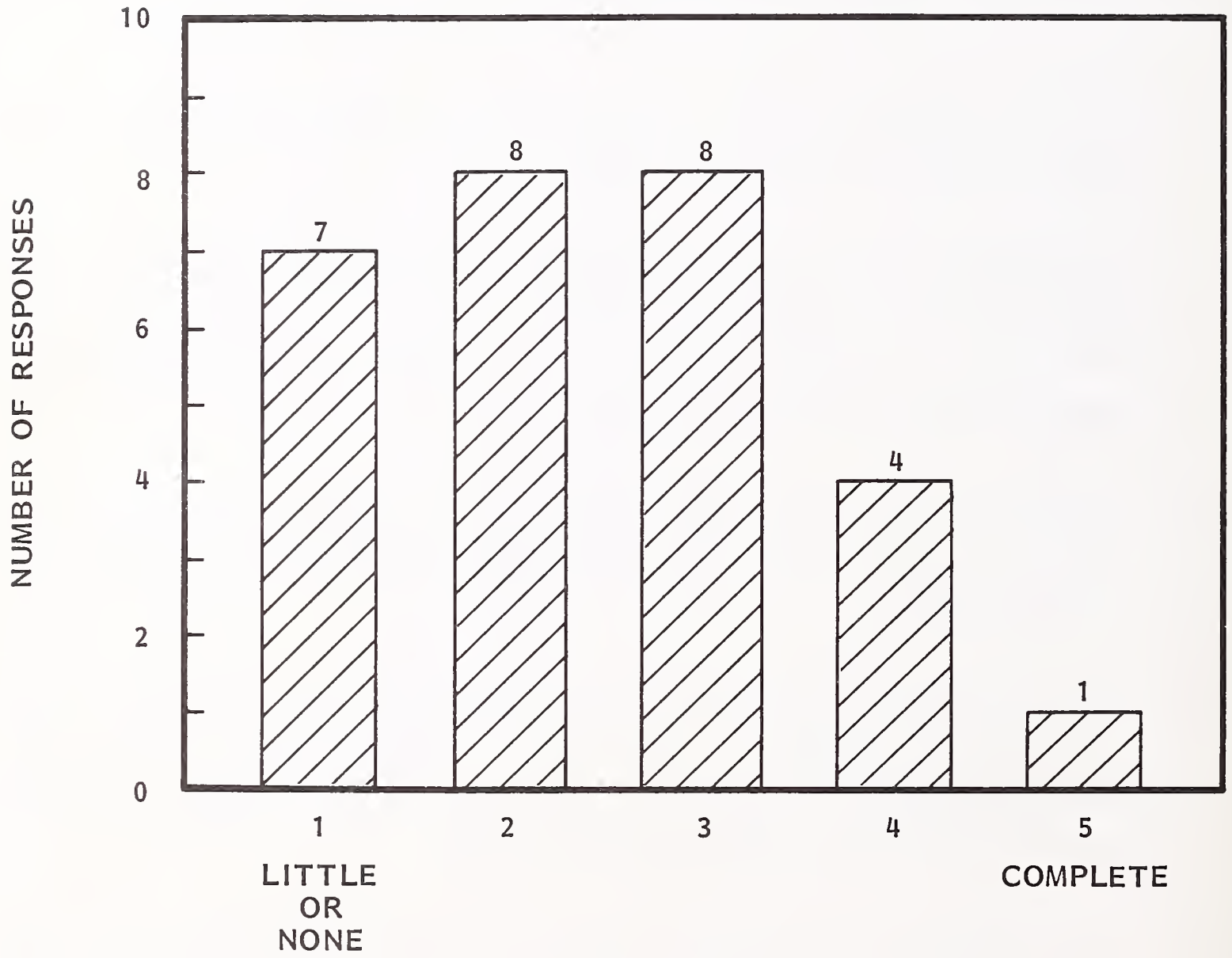


EXHIBIT VI-2

TYPES OF EQUIPMENT RESPONDENTS MENTIONED
WHEN ASKED TO THINK OF OFFICE AUTOMATION

ITEM	NUMBER OF SPONTANEOUS RESPONSES	NUMBER OF PROMPTED RESPONSES	TOTAL
WORD PROCESSING	24	1	25
DISTRIBUTED PROCESSING SYSTEMS (SUCH AS IBM 8100)	5	5	10
SMALL BUSINESS COMPUTERS	6	7	13
INTELLIGENT COPIERS	4	6	10
PABX	0	5	5
OTHER	15		15
- ON-LINE TERMINALS	5	-	5
- FACSIMILE	4	-	4
- MINIS (STAND-ALONE)	2	-	2
- MICROGRAPHICS	2	-	2
- COMMUNICATIONS	2	-	2

- Note that no respondent spontaneously included PABX equipment, and only one-third of those prompted included PABX equipment, under the aegis of office automation! Communications are rarely a DP function, and so EDP managers defer to communications managers for this.

- The remainder of this chapter will analyze the EDP manager's involvement in office automation. It should be remembered that this involvement is concerned primarily with word processing since that was the respondents' perception of office automation.

  - It is clear that more is on the way; i.e., plans are being made to consider other facts of automation in the future, as will be discussed further in Sections C and D of this chapter.

I. DEGREE OF INVOLVEMENT

- EDP managers' main responsibilities for office automation lie in hardware/software selection, and making recommendations to upper management.

- In Exhibit VI-3, respondent EDP managers ranked the following activities related to office automation for which they have responsibility:

  - Identifying/specifying hardware and software.

  - Making recommendations to upper management.

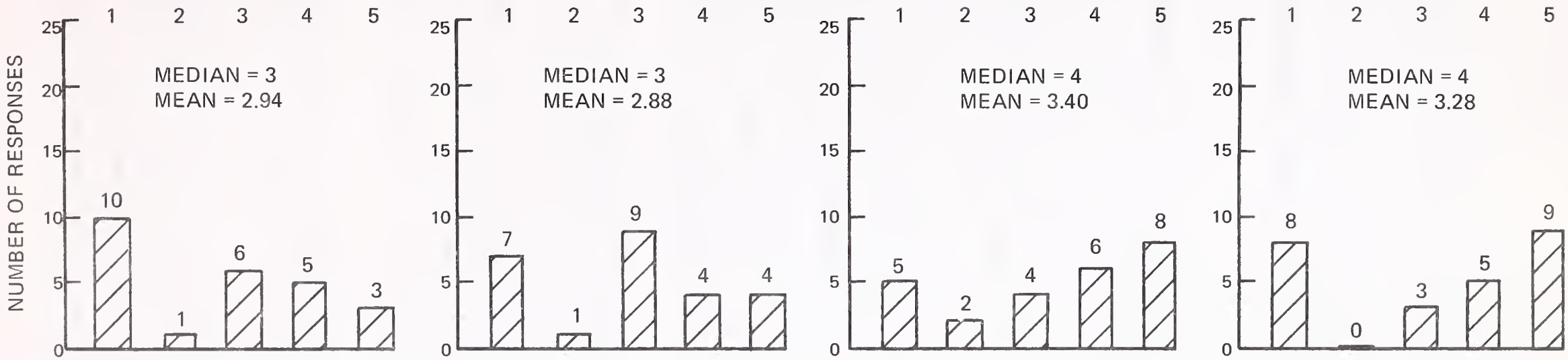
  - Selecting vendors.

  - Overall program management.

  - Identifying/specifying needs.

EXHIBIT VI-3

RELATIVE EDP RESPONSIBILITY FOR OFFICE AUTOMATION*



*NOTE: RATED ON A SCALE WHERE 1 IS MINOR AND 5 IS MAJOR

- Cost justifications.

- Authorization of purchases.

- In less than half the interviews (39%) was a data processing person found to be in charge of office automation.

  - In an equal number of interviews, no one specific individual had responsibility for office automation.

  - In the remaining 12%, a non-EDP person was in charge, either someone from the administrative side of the house, or someone senior to EDP management.

- Relationships between the EDP management and staff and those responsible for office automation varied widely, from "lousy," to "up in the air," to "good."

  - EDP managers were, of course, happiest with their relations with office automation people when EDP was in charge.

- All but one respondent EDP manager (who had total responsibility for office automation) believed there should be a committee to study the office automation problem. The committees would always include representatives of the EDP department, but the EDP managers often (40%) recommended someone else to be the chairperson; either a user, an administrative manager, a corporate manager or a recognized program manager for office automation.

- In part, EDP managers look to the vendors to provide good information on what it is possible to do, and what is available to do it. They find vendors to be lacking in this regard. Those who are long-time IBM users look to IBM for an overall perspective, and find IBM in great internal conflict, contributing further to their own confusion and hesitation. Most of the smaller vendors are seen to have narrow interests and a limited number of products, thus disqualifying them from providing the global view that is needed and sought.

- Disappointment with IBM's diversified approach is clearly verbalized:

  - "Even in IBM, all I see between those departments (GSD, DPD, OPD) is a lack of agreement. They are competing against one another. Right now, there is no company that can offer a totally integrated, end-to-end system."

  - "We continually get salesmen with products from different sections of IBM competing with one another. They are trying to resolve this, but on a branch level, not a corporate level, and that's why it's not working."

  - "Working with this in IBM makes it difficult - it's like working with three vendors. The products don't fit one another."

  - "We've dealt with IBM for many years. Had problems between OPD and DPD. We didn't select IBM this time."

  - "I don't think they (IBM) have a coordinated plan."

  - "I think they (IBM) are losing sales, because the customer wants a united front."

  - "(We don't have a plan) and IBM doesn't have one either."

2. PROBLEM AREAS

- User education and training, and user resistance to change, are seen as the major problems in implementing office automation.

- Although 22 items were identified when EDP managers were asked, "What do you see as the major problems having to do with increasing levels of automation in the office, as far as your EDP responsibilities are concerned?", only seven items were mentioned more than once, as shown in Exhibit VI-4.

EXHIBIT VI-4

PROBLEMS IMPLEMENTING OFFICE AUTOMATION
(EDP MANAGERS' PERSPECTIVE)

PROBLEM CITED	NUMBER OF MENTIONS
USER EDUCATION AND TRAINING	9
USER RESISTANCE TO CHANGE	6
COST JUSTIFICATION	4
NO PROBLEMS	4
NEW OPERATING METHODS AND PROCEDURES REQUIRED	2
FEAR OF LOSS OF JOBS	2

- The wide range of problems cited only once reflects the uncertainty in the minds of DP managers about unanswered questions, such as,

  - What does office automation mean in my company?

  - Will it be implemented in my company, and if so, how and when?

  - What will be my responsiblity when/if such a plan is developed?

- As far as technical implementation is concerned, EDP managers worry about the multitude of products already in service, and those being acquired without any planning or controls. They would like standard communications protocols and compatibility with the central computers to be minimum requirements on all newly acquired hardware.

- As for those systems (word processors) already in place, all that EDP managers can do right now is wait and see how their responsibilities develop, and if money will be available when necessary to convert existing systems to mainframe-compatible systems.

- Among the 30 interviews, few suggestions for successful implementation of office automation were mentioned more than once. A composite of the respondents' advice follows:

  - Develop a plan.

  - Educate/train the users, based on benefits to them.

  - Start small.

  - Test thoroughly.

  - Go back and evaluate actual benefits versus plan.

- Expand gradually, if plan is working.

- Maintain standardization.

- Have a central control group of EDP, administrative and user representatives.

- Solicit and maintain top management support.

3. CURRENT PLANS

- Respondent EDP managers would like to have a plan, even though they did not cite lack of planning as a problem in implementing office automation.

- Only 4% of the companies interviewed have such a plan documented, as shown in Exhibit VI-5.

- To further complicate the issue (not identified as a problem), 43% of those companies interviewed are proceeding with pilot and/or final implementations of some facet of office automation (usually word processing) in advance of completion of a plan. In 10% of the cases, there will "never" be a plan.

- Few plans currently cover more than word processing in selected segments of the company:

  - An insurance company in California is installing Four Phase Minicomputers in 19 district offices, to do claims processing. There is a small local data base with each mini. The systems are also used to write letters and do CRT text editing.

EXHIBIT VI-5

WHEN OFFICE AUTOMATION PLANS WILL BE DEVELOPED AND IMPLEMENTED

PLANNING STATUS	NUMBER OF RESPONSES
CURRENTLY HAVE DOCUMENTED PLAN	4
WILL DEVELOP SUCH A PLAN,	
1980-1982	16
AFTER 1982	1
NEVER	3
DON'T KNOW	10
WILL BEGIN TO IMPLEMENT THAT PLAN	
1980-1982	21
AFTER 1982	2
NEVER	1
DON'T KNOW	6
IMPLEMENTATION IN PROCESS	
WITH A PLAN	
WITHOUT A PLAN	13
THE PLAN CALLS FOR (WOULD CALL FOR)	
INTEGRATION OF DATA AND WORD PROCESSING	21

- A major food and grocery manufacturer, processor and distributor has had word processing "trial balloons" for 4 or 5 years. An office systems group formed two years ago is expanding the use of word processing and developing prototype DP/WP programs including the linking of word processors to photocomposition equipment or an intelligent copier.

- A division of a major automobile manufacturer is currently testing standalone word processing units at a central office and a remote site. As their telephone network expands, communications between the two will be implemented and tied into the central DP system.

- In several companies, it was made clear that any planning is closely coupled to the threatened conditions of the U.S. economy. A continuing recession could stop or delay any planning for, or implementation of, office automation.

- Sorely lacking from most planning is the human factors element. Two companies made strong pitches for making the ultimate end user (secretaries, in the case of word processing) an active participant in the planning.

  - One company had a committee of several secretaries from different departments make the final choice of word processing hardware, based on their own needs and preferences.

  - One company has a "job enrichment" program in which people who will be involved in the automation process are assisted in examining their activities in light of the new system, rewriting their job descriptions, and looking for and solving problems as they arise in the analysis.

4. VIEW OF THE FUTURE

- While lack of a comprehesive plan is apparent, many companies do not even perceive a need for office automation. This is partly because it is not well understood, and also because the cost benefits have not been convincingly

demonstrated. Some express the idea that office automation products are solutions in search of problems.

- The future will expectedly bring evidence of the benefits of office automation, some tested scenarios for implementation, and more mature products to do the job.

a. Electronic Mail is a Mixed Bag

- One application commonly associated with word processing is electronic mail, or electronic messaging. Communicating word processors are arranged to be able to exchange information with others in the network; completely edited documents can then be sent from one to another, or from one to many.

- Exhibit VI-6 shows that among those interviewed, more than half (53%) are either studying and planning for electronic mail, or in some phase of testing or implementing it.

- The 20% who are doing nothing see electronic mail as a phase that will not be within the scope of their planning for, perhaps, two to five years.

- The 17% who have decided against it mainly find it too expensive or apparently unnecessary within their particular operating frameworks.

b. Personal Computers Will Be in the Office

- Just over two-thirds of the respondents feel that personal computers will penetrate the office environment. Only four report that personal computers are currently being used (to their knowledge), but 17 more expect that they will be used in the future.

- One major company EDP manager reports that programmers are now taking terminals home to do software development.

EXHIBIT VI-6

STATUS OF ELECTRONIC MAIL,
AS PERCEIVED BY EDP MANAGERS

STATUS	NUMBER OF RESPONSES	PERCENT OF TOTAL
FULL-SCALE IMPLEMENTATION	0	0%
PARTIAL IMPLEMENTATION	3	10
PILOT TESTING	4	13
STUDYING/PLANNING	10	33
DOING NOTHING	6	20
DECIDED AGAINST IT	5	17
OTHER	2	7
TOTAL	30	100%

- Those who would venture a guess indicated it would take anywhere from one to five years for the penetration to achieve significance.

- Among the one-third who believe personal computers will not penetrate the office environment, some of the reasons given were:

  - "Users won't want to learn a new programming language."

  - "Not for 10-12 years. They're too 'Stand-alonish.'"

  - "We would lose standardization."

  - "Too many programming problems."

c. Integration of Data and Word Processing Will Happen

- Whether their companies had long-range plans or not, most respondents (86%) expect there will be an integration of data and word processing whenever office automation is finally implemented, as shown in Exhibit VI-7.

- As might be expected, there is virtually no DP/WP integration now. Only five of the 30 companies interviewed ventured to say that some minor amount of DP/WP integration exists in their companies today. These included:

  - An insurance company doing word processing with an IBM 3730 terminal.

  - A manufacturer integrating distributed processing (IBM or Datapoint) with WP and message switching.

EXHIBIT VI-7

RESPONDENTS PLANNING TO INTEGRATE
DATA AND WORD PROCESSING

RESPONSE	NUMBER OF RESPONSES	PERCENT OF TOTAL
YES	26	86%
NO	2	7
DON'T KNOW	2	7
TOTAL	30	100%

- A manufacturer with pilot shared logic word processing going into a corporate office for testing.

- A manufacturer piloting electronic mail with Telenet and TYMNET.

B. RESULTS OBTAINED FROM 1980 USER PANEL

- This year's User Panel consists of over 900 respondents who filled out a rather complex mailed questionnaire on their EDP plans and budgets. Among the questions asked were several pertaining to office automation and EDP involvement in communications.

- The specific categories of products and services for which data were collected are listed in Exhibit VI-8. The current and planned uses of these products and services are plotted in Exhibit VI-9. The bottom line represents the percent of respondents currently using the product or service, while the top line represents those planning to use such products or services by 1985. Thus the shaded area represents planned usage.

- The following conclusions and observations are based on the results depicted in Exhibit VI-9.

  - While electronic mail is currently being used by only 7% of the respondents, its usage will increase over 400% in the next five years, when 30% of the respondents indicate they will have such services available.

  - The current use of word processing systems tends to confirm the results of the telephone interviews. Word processing currently being used by over 50% of the companies surveyed, will be used by nearly 80% by 1985. It is little wonder that word processing is synonomous with office

EXHIBIT VI-8

OFFICE AUTOMATION AND COMMUNICATIONS
PRODUCTS AND SERVICES

OFFICE PRODUCTS AND SERVICES

1 - ELECTRONIC MAIL
2 - WORD PROCESSING
3 - IMAGE PROCESSING
4 - TELECOPIER - FACSIMILE
5 - CRT/GRAPHICS

DATA COMMUNICATIONS

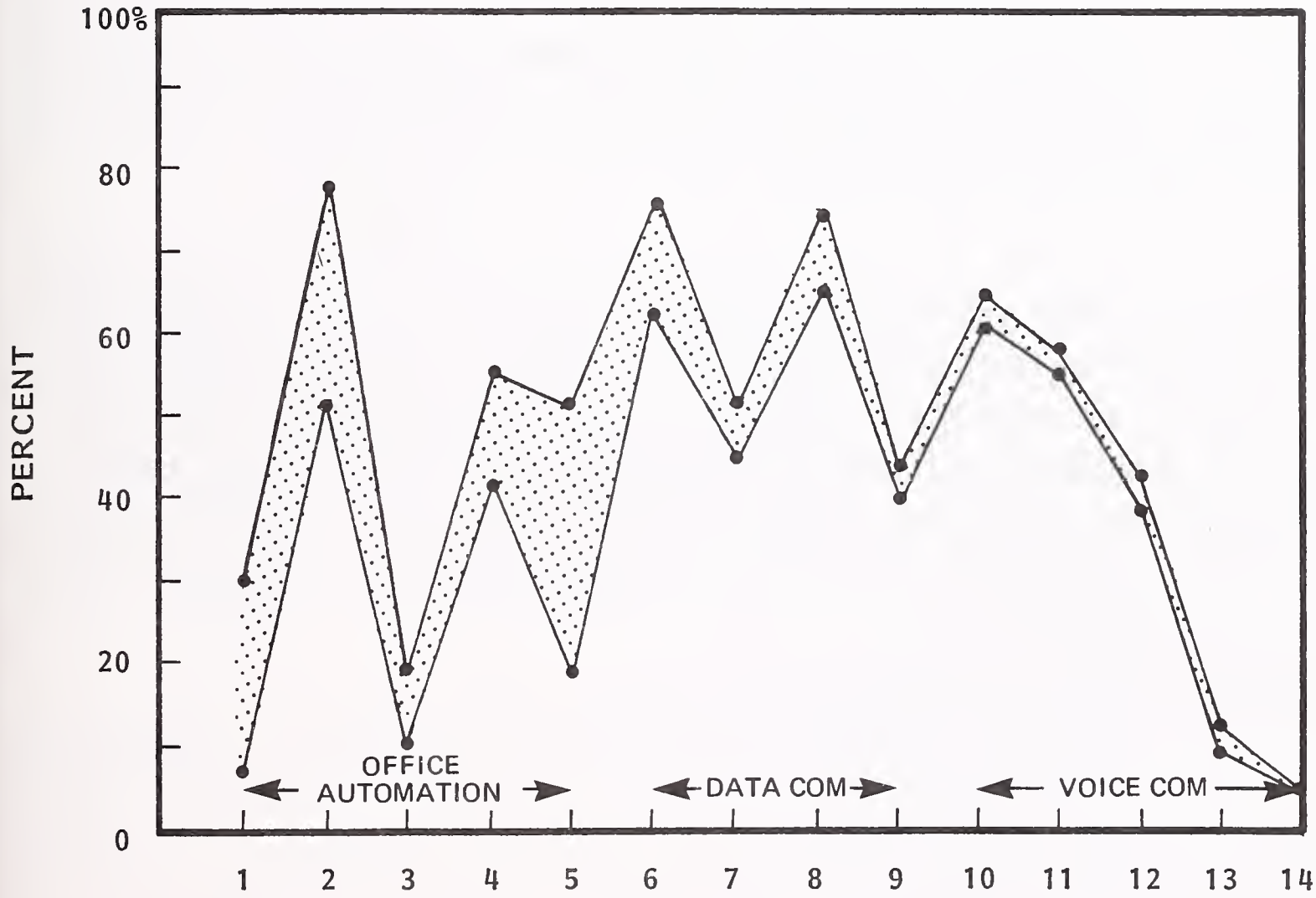
6 - DIAL-UP
7 - WATS
8 - DEDICATED
9 - TELEX/TWX

LONG-DISTANCE VOICE

10 - DIAL-UP
11 - WATS
12 - DEDICATED
13 - SPECIALIZED CARRIERS (MCI, SPC)
14 - OTHER

EXHIBIT VI-9

PERCENT OF USER PANEL CURRENTLY
USING, OR PLANNING TO USE, PRODUCTS AND SERVICES



NO ANSWER:	17%	7%	22%	15%	18%	13%	24%	12%	28%	19%	21%	28%	46%	62%

MEAN PERCENT OF NONRESPONSE: 24%

TOTAL CASES: 912

automation - it is a currently available, obvious consideration in the planning of a high percentage of companies.

- Image processing (in the form of either micrographics or more complex systems) is not currently in widespread use, but usage is projected to nearly double by 1985. INPUT feels that image processing is extremely important to the "office of the future" (as opposed to office automation), and the first 1980 Vendor Watch Report was devoted to this subject. Its current low usage (and low percentage of planned usage) indicates that little planning is being based on advanced concepts. This is one reason the 1980 Management Issue Report will attempt to provide an integrated frame of reference to address the "office of the future."

- Some of the more exciting products currently available to support office automation are various telecopiers, or "information distributors," such as the IBM 6670. The relatively high percentage of current usage (over 40%) in this category is probably facsimile, and the low percentage of planned usage tends to confirm this. It seems apparent that few companies are seriously planning to use even currently available, advanced office products in implementing their perception of office automation.

- The use of CRT graphics in the office environment is projected to increase substantially over the next five years. This is probably due to the sales strategies of vendors who sell to data processing executives; and, in truth, the increased usage of display terminals can result in a new office environment. However, the projected percentage of usage (over 45% by 1985) does not reflect actual impact, since the number of terminals per office employee may still be small. In other words, the classic distributed data processing approach to office automation is relatively selective in the systems it addresses and does not normally have a substantial impact on the total office environment.

- Outside the office automation category, the current and planned use of products and services tends to stabilize. The only ones showing even a modest increase in usage are: dial-up data communications and dedicated data circuits - the old standbys of the data processing function.

- It does not appear that much change is planned in current communications usage - either data or voice. This is unfortunate, since communications (in all forms) represent the essence of office work and expense.

- There is both challenge and opportunity associated with the relative stagnation of the communications area as viewed by EDP management. It represents a major systems function that is not being adequately addressed.

- Exhibit VI-9 also lists the percentage of survey respondents who did not answer questions concerning specific categories (the percentages charted are for those who did answer). Not responding to a question is viewed as the most negative possible response since it indicates either ignorance or apathy concerning the subject. The "no answer" percentages tend to confirm the analysis of data of those responding.

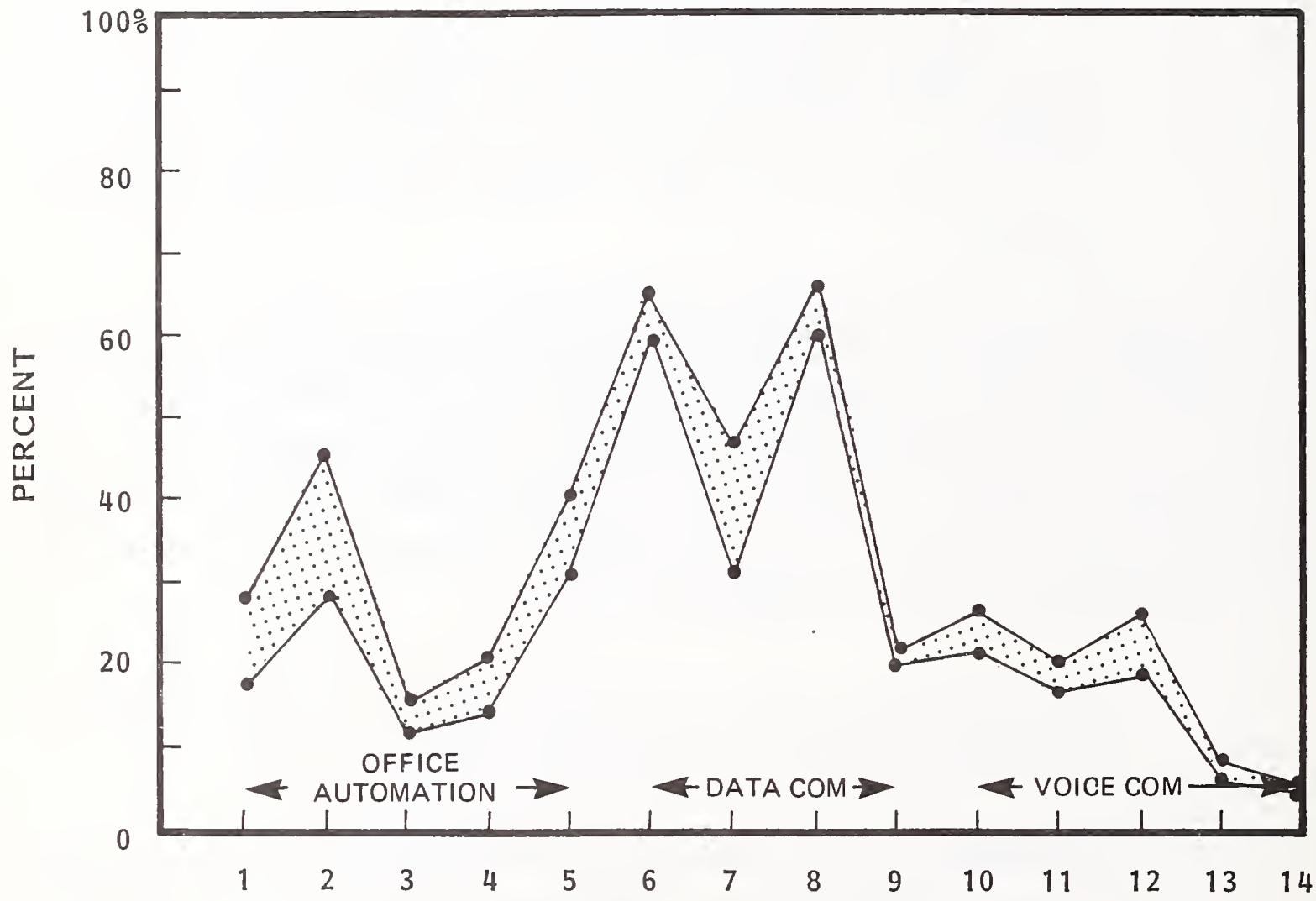
  - Only 7% failed to answer the word processing question, indicating a high degree of either knowledge, involvement or interest.

  - Responses in the voice communications categories were extremely poor - 46% "no answer" for specialized carriers and 61% "other" (a catch-all for advanced planning such as satellite communications).

- The User Panel was also asked to provide information concerning their current and planned responsibility for the office automation and communication categories listed in Exhibit VI-8. The results are plotted (in a manner similar to the usage statistics) in Exhibit VI-10.

EXHIBIT VI-10

CURRENT EDP RESPONSIBILITIES AND PLANS



NO ANSWER: 39% 28% 49% 44% 37% 26% 43% 26% 49% 45% 48% 50% 65% 73%

MEAN PERCENT OF NONRESPONSE: 45%

TOTAL CASES: 912

- Most importantly, a substantially higher percentage of respondents failed to answer the questions concerning responsibility for the specific categories. The mean percentage of nonresponse to usage questions was 24%, while the mean percentage of nonresponse to responsibility questions was 45%. This is interpreted to mean the following:

  . Those not answering probably do not have, or do not plan to have, responsibility for the categories under consideration.

  . Therefore, the percentage figures in Exhibit VI-10 are relatively less than those in Exhibit VI-9 on usage. For example, while both 1985 usage and responsibility for category #1 on Electronic Mail indicate approximately 30%, over twice as many failed to respond to the question on responsibility. This indicates that there is significantly less assurance concerning current and planned responsibility than there is concerning usage.

  . This should be borne in mind when analyzing the results in Exhibit VI-10.

- It appears that most EDP managers feel they have responsibility for the implementation of electronic mail, whether or not it has been implemented. In addition (despite the caveat concerning nonresponses), it also appears that most feel that if electronic mail is implemented, they will be responsible.

- The same is not true with currently installed word processing systems, where less than 60% of the EDP managers indicate that they have responsibility for installed systems (482 companies had word processing installed and only 270 EDP managers indicated they had responsibility).

- In addition, despite an aggressive campaign to become responsible for word processing - as indicated by the spread between current and projected responsibility - EDP management will still have responsibility

for less than 60% in 1985 (709 companies with planned implementation, with 420 under EDP control).

- Thus even in the primary category of office automation recognized by EDP management, they do not appear to have solid plans to become more involved than at present.

- There is also very little EDP responsibility for telecopier or facsimile installation or plans - probably because this is viewed as a communication function. Out of 385 installations, only 127 of the responding EDP managers (approximately 33%) have responsibility.

- On the other hand, the installation of CRT/graphics is considered to be essentially under EDP control. There are currently 284 EDP managers who feel that they have responsibility for CRT systems in the office, while only 165 have systems installed.

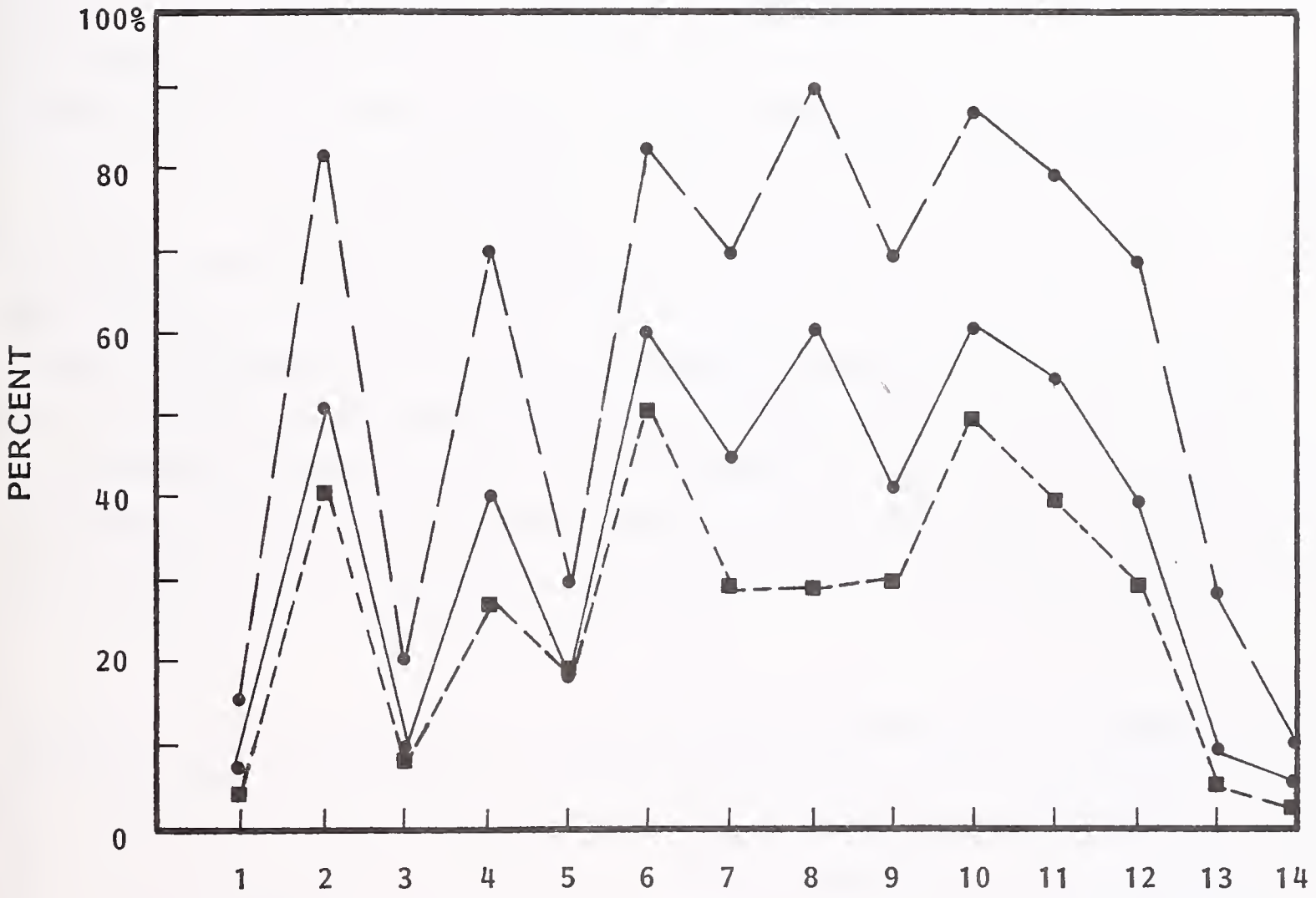
- The data communications categories (with the exception of Telex/TWX) also appear to be essentially under EDP control. However, this may be misleading since it is doubtful that technical personnel responsible for interfacing with vendors are necessarily under direct EDP management control. However, there is a clear indication that EDP management feels responsible.

- The lack of EDP responsibility for voice communications, while not surprising, is significant in terms of the "office of the future": Not only is there little current involvement, but little planned for the next five years.

- An analysis of the relative importance of establishment size in the usage of office automation and communications products and services is contained in Exhibit VI-11. As expected, larger establishments are more heavily involved than smaller ones.

EXHIBIT VI-11

CURRENT OFFICE AUTOMATION USAGE, BY SIZE



- There were industry fluctuations - most of which were anticipated - but nothing to destroy the essential patterns that have been established. (Detailed industry analysis will be contained in the 1980 Annual Report.)

C. CONFUSION STILL REIGNS

- The varied vendor marketing approaches outlined in Chapter V have not only represented a challenge to EDP management, but have created considerable confusion over the course technology will actually take. In no case has this confusion been more evident than in the interorganizational rivalry demonstrated by IBM in the office automation market place.

- The multiple approaches taken by the Data Processing Division (DPD), the General Systems Division (GSD) and the Office Products Division (OPD) of IBM not only confused but angered many traditional IBM EDP customers. Conflicting solutions and sales strategies have been causing problems for users over the past several years. The level of concern finally caused many DP managers to feel they were dealing with multiple vendors within IBM, and this eventually prompted them to consider true multiple vendors in their approach to office automation.

- Defections and potential defections from the fold usually get any vendor's attention, and IBM is far from an exception to that rule. Thus, during the course of this study, IBM announced its "office systems directions." This was done: "In order to meet the increasing number of customer requests for guidance in the office systems area . . . " The full text of IBM's Information Bulletin for Customers is repeated here both for the information it contains and for what it does not say:

  - "It has been IBM's practice to develop a variety of solutions to meet the broad spectrum of user application requirements. The System/370 Distributed Office Support System (DISOSS), the System/370-8100 Dis-

tributed Office System, the 5520 Administrative system, the Displaywriter System and the 6670 Information Distributor are recent examples of products optimized to meet differing office systems text requirements.

"IBM recognizes that many users will require communication capabilities to integrate these products into their information handling systems. Communications support must be available so that text documents that require filing or transmission can be sent to or retrieved by authorized individuals throughout an enterprise.

"It is IBM's intent to provide support, over time, for this document interchange capability across these office systems offerings. More specific information as to this intent is available from your IBM marketing representative."

- The occasion for this bulletin was the announcement on June 17, 1980, of new devices and software to support the IBM 8100 Information System in a distributed processing office environment. While it is beyond the scope of this study to analyze the announcement in detail, such support was predicted by INPUT shortly after the announcement of the 8100 (see INPUT's Vendor Watch Report on the 8100 dated April 1979.)

- Thus, the joint bulletin from DPD, GSD and OPD states that various products are designed to optimize differing office systems text requirements. The trick is to integrate these systems throughout the enterprise, and IBM will provide such support "over time." If customers need a warm feeling concerning this intent, they should contact their IBM marketing representative.

- While it may be possible - based on past coordination problems - to speculate on which IBM marketing representative should be contacted, there is good advice implied in the quoted bulletin. That advice is to look to communications to solve the problems associated with the integration of data processing and office systems, and the information handling problems of the enterprise.

In fact, communications technology becomes so important to both office automation and the "office of the future" that it is not advisable to leave its planning to any vendor (or group of vendors) or to any organization outside the EDP area.

- EDP management cannot expect a clear direction to office automation to come from the multiple approaches currently being taken - confusion still reigns, and the only way to bring order to the chaos is to have a clear understanding of the problems.

VII DEVELOPING A STRATEGY TO ACHIEVE INTEGRATION

VII DEVELOPING A STRATEGY TO ACHIEVE INTEGRATION

A. UNDERSTANDING THE PROBLEM

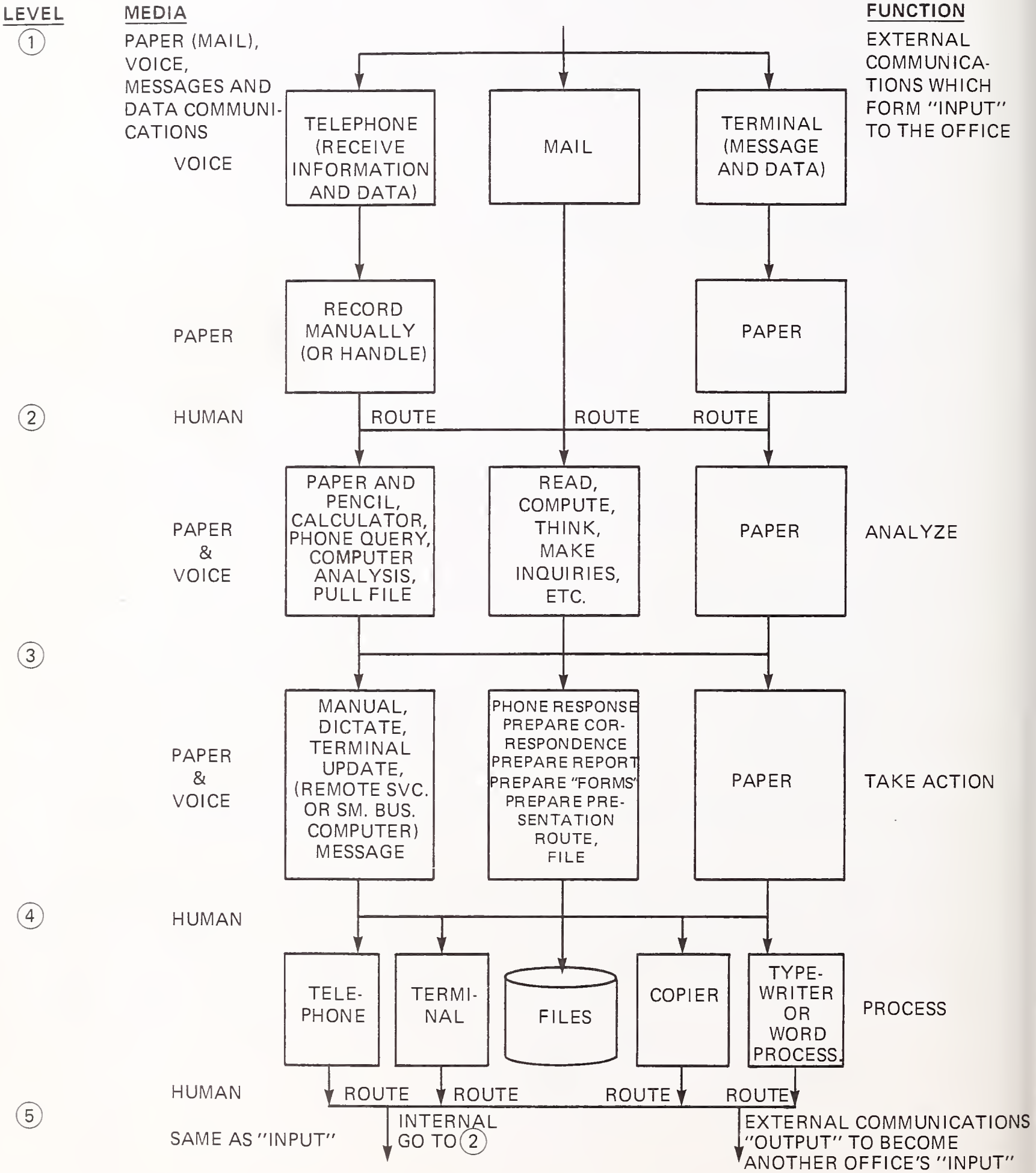
- Thus far, this entire report has attempted to define in general terms an extremely complex problem. During the course of research to support this project, it was concluded that there were really two problems - one-short term and one long-term. Therefore office automation and "office of the future" were defined in the introduction in order to separate out a more manageable portion of the overall problem.

- This simplification still leaves EDP management with all of the challenges outlined in Chapter V of this report - an array still imposing enough to defy simple solution. More importantly, there are infinite variations across individual offices even within the same organization. There will be no "cook book" solution to managing the integration of office automation into the EDP environment. Each individual organization must further define (and hopefully simplify) the problem to be more representative of its specific environment.

- INPUT has concluded that the general office productivity problem becomes more understandable when viewed as a communications rather than a data processing problem. These communications can be either voice or paper in any combination, but they consume the overwhelming portion of an office worker's time, as shown in Exhibits III-3 and III-4. The operation of a single office may be viewed as illustrated in Exhibit VII-1.

EXHIBIT VII-1

INTRA-OFFICE COMMUNICATIONS AND WORKFLOW



- Incoming communications are received from external sources at Level 1. These communications may be either voice or paper. They provide the "input" into the office systems regardless of whether it is a manual system or automated.

- For incoming voice and electronic messages from computer and/or communications networks, information or data are normally recorded on paper before they progress to Level 2, where they are analyzed.

- The analysis at Level 2 can vary tremendously in terms of systems, procedures and effort employed. Essentially, this is the process of deciding what to do, and it is the least defined in terms of both what happens and how rapidly and/or effectively it takes place.

  . It may require substantial analysis just to decide that nothing should be done.

  . "Passing the buck" by routing to someone else may take very little time for an individual, but Level 2 can then become a highly interactive process.

  . Another popular ploy to either defer or avoid analysis is to call a meeting (sometimes legitimately, but frequently unnecessarily).

- However, regardless of the quality of analysis, eventually Level 3 is reached and some action is taken, even if that action is to cut the communications line by throwing the information in the waste basket (an action which may or may not be appropriate). A less drastic action would be to store the information in a file (paper or electronic) where it can be retrieved and forwarded for someone else's use.

- Most frequently, the result of initial analysis results in another communication - either internal or external - which in turn will require analysis. This communication may be highly selective, or, thanks

primarily to the office copier, it may be broadcast to dozens or even hundreds of other people for analysis.

- Level 3 flows into the process portion of the office system, which produces additional communications and routes them to other individuals within the organization, stores them for future use, or transmits them to another office (organization) to serve as Level 1 input.

- It is important to notice that this generalized office system is interactive regardless of the degree of automation. Communications systems are designed to receive a response even if it happens to be a check in payment of a long-overdue invoice. Computer communication systems and office systems merely have the potential for improving response time.

- The contribution of conventional data processing systems in the office is generally quite small (if not insignificant) when overall office systems are viewed in terms of communications. More importantly, current data processing thinking frequently does not lend itself to approaching office automation in an expeditious fashion.

- Critical to this difficulty has been a preoccupation with the technical aspects of handling, processing and storing data rather than being concerned with information. While much of this technical emphasis has been necessary, there has been a tendency for end users to become disenchanted with complex, expensive, general-purpose systems that do not really facilitate the flow of office communications (information), as depicted in Exhibit VII-1.

B. SELECTING A TACTICAL APPROACH

- INPUT's definition of office automation does not include the drastic revision of the way offices currently operate, but rather emphasizes the application of

current products and services in improving the operation of existing systems. However, past experience has shown that even a small portion of office operations can turn into lengthy systems projects using conventional EDP approaches. For example, even relatively routine accounting applications can prove difficult when the accountants and clerical personnel are put "on-line" with interactive terminals.

- One of the primary problems has arisen from the distributed data processing approach to the automation of specific office applications areas. Under network architectures requiring interfacing with large central hosts, systems must be implemented using complex systems software which does not lend itself to simple development and implementation. There is no indication that this situation will improve materially in the near future.

- Since the challenges to EDP management are immediate, it is necessary to take tactical steps to assure than an effective strategy can be developed. It has been INPUT's recommendation for some time that the design of computer/communications networks should consider not only computer and data communications but voice and message as well, and that these should be under one central management control.

- Time has passed and this still has not been done in many companies (as indicated by our current research). The problems have only become more pressing, and now it has become clear that mail and information flow (in the form of paper) are of equal importance. It is strongly urged that the responsibility for all such flow be centralized and viewed as part of one overall office system.

- This does not imply that all terminal equipment or even computers associated with the process phase in Exhibit VII-1 must necessarily be "owned" by the centralized function. It does require that a central organization have responsibility for the total communications flow and have technical responsibility for product and service evaluation.

- A key implementation consideration in this approach is the extension of the data base function (or concept) to include the analysis and documentation of office information flow patterns, including Level 1 "Input" and Level 5 "Output." This includes not only data dictionaries and directories but time-dependent events that create new information flows or change data elements.

  - Information flow includes creation, routing, handling and transmission of business correspondence, reports and documents. A time-dependent flow could involve such diverse things as the purging of a paper file and the distribution of the company newsletter.

  - The term data element is used in the normal data processing sense, and time-dependent flow of data is merely the normal updating of files, or transaction streams flowing over networks.

- Both of the organizational entities above - centralized computer/communication and combined data/information flow administration - involve a lot of detailed, unpleasant and frequently thankless work that has not been welcomed in the EDP environment. However, it is necessary if office automation is to be managed.

- Essentially, emphasis would be placed on understanding and controlling communications flow and providing the hardware, software and services to assure this is done effectively. Major computer communications systems will still require centralized planning, analysis, development and maintenance; but substantial systems work in Levels 2, 3 and 4 could be done by the operating organizations responsible for those functions.

- In other words, management concentration would not be on processing at the distributed nodes (although technical advise is implied), but on the communications (information flow) between nodes. Just as the IBM Information Bulletin stated, the key to integration of diverse office and data processing systems lies in communications. Any organization concerned about effective management of this integration must give top priority to the broadest possible aspect of communications and information.

C. SYSTEMS ANALYSIS REQUIREMENTS

- In many companies, the EDP department exhibits a singular lack of interest in what happens to the output of computer systems, or how that output is used. The responsibility ends when reports and documents are produced (hopefully on time) and delivered to the end user.

  - DP documents form an important source of input into the office environment, as shown in Exhibit VII-1. However, it is really only the beginning of the office system and a relatively trivial portion in terms of expense. Exhibit VII-2 puts the relative expenditures of computer and communications services into proper perspective compared to office personnel costs.

  - In addition, data processing products and services to support the office represent only 22% of the total expenditures, as shown in Exhibit VII-3.

  - The manual handling and analysis of EDP reports and documents is much more expensive and important than the computer subsystems that produce them. It behooves EDP management to understand how computer system output is used, how it relates to the total office system, and how it can be improved.

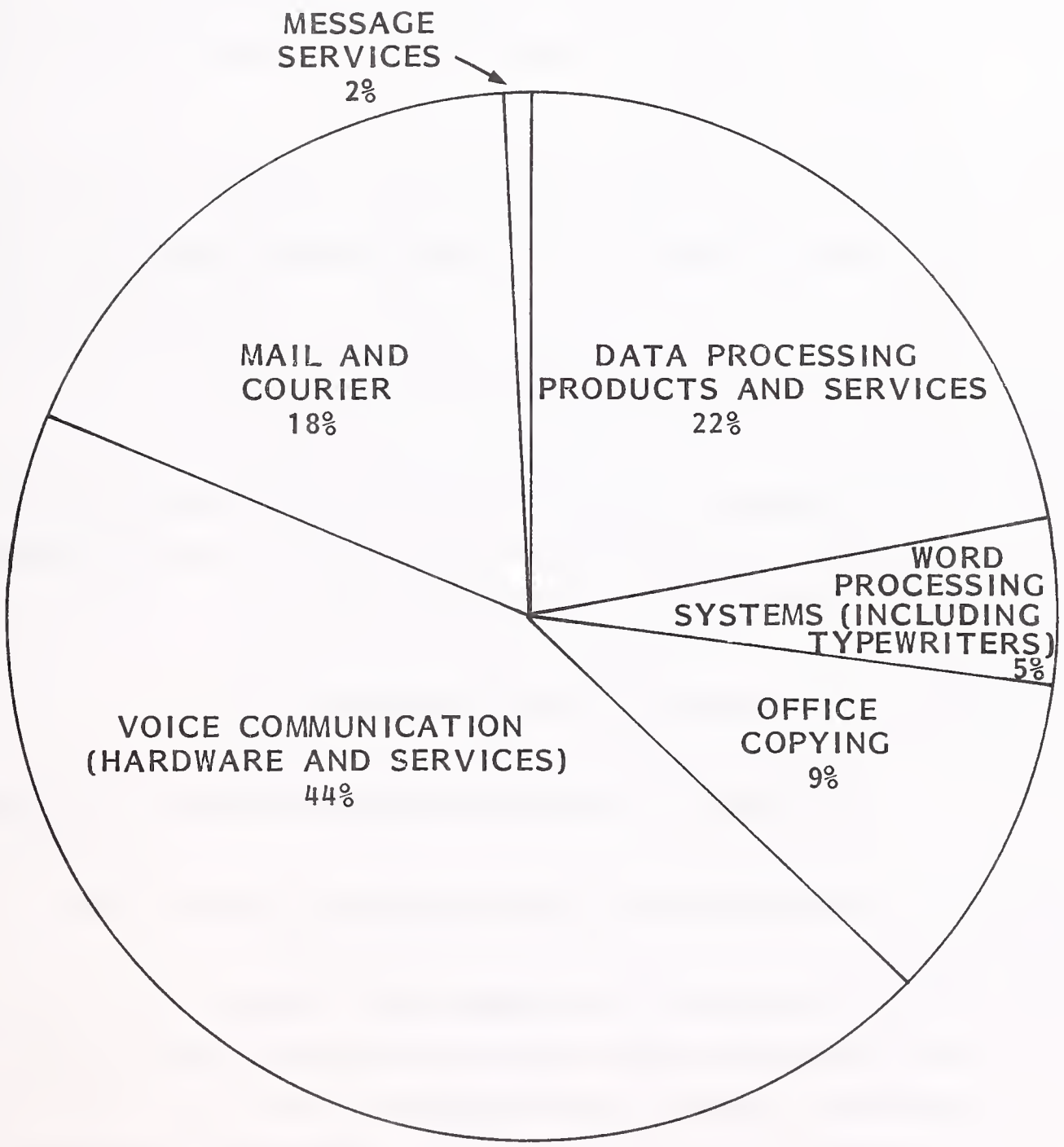
- This requires that the data processing function become more aware of the manual systems, which still represent the greatest portion of office expense. Considering the availability of resources and the magnitude of the analysis required, it will be necessary to leave detailed analysis to the end user in most cases. However, by concentrating on information flow rather than detailed procedures, the systems function can make a substantial contribution towards integration of emerging office systems. Even more important, the knowledge gained is essential preparation for the "office of the future."

EXHIBIT VII-2

RELATIVE EXPENDITURES FOR PRODUCTS AND SERVICES
AND FOR SALARIES AND WAGES, 1978

EXHIBIT VII-3

BREAKDOWN OF OFFICE PRODUCT
AND SERVICE EXPENDITURES



- The research for this report again confirmed that when EDP management thinks of office automation, they think of word processing. Even if word processing were effectively integrated into the EDP environment, the resulting systems would represent only 27% of office expenditures for products and services. However, word processing is important - because it is undergoing significant technological change right now.

  - EDP management should analyze the potential of advanced word processing systems to complement and supplement conventional DP processing and output.

  - In addition, nowhere is the immediate problem of integration more important. Advanced word processing systems represent a significant growth area among office expenditures, and noncompatible word processing and data processing terminals and systems will place them in ever increasing competition for financial resources.

  - EDP management must understand the technology, systems potential and cost trade-offs of providing word and text processing capability in three separate environments:

    . Decentralized, standalone systems.

    . Distributed, interconnected systems (without host involvement).

    . Distributed systems connected through a central host.

  - INPUT recommends immediate systems involvement in the selection and planning of word processing systems that may be used as multifunctional equipment (and therefore assume certain data processing functions), as well as those that are devoted to conventional office functions. The immediate potential of such systems for reducing paper handling within the office is substantial, and the possibility of address-

ing the problems associated with mail and courier services is also important.

- There is a secondary consideration associated with word processing systems that is not being analyzed thoroughly at the present time. The question of whether to centralize or decentralize word processing capability within an office is a microcosm for the problems concerning centralized, decentralized and distributed data processing. Several observations can be made about this:

  . A centralized word processing center will experience all of the actual and perceived problems of service and scheduling that centralized DP services have been plagued with for so many years.

  . Systems that can be more effectively centralized (at least from a cost point of view) will become rapidly obsolete as offices are "wired" for distribution of terminal equipment of all kinds.

  . During the office automation phase of systems development, it will be difficult to change classic patterns of secretarial assignment, regardless of cost effectiveness. The missing ingredient to real change will come with the "office of the future," which requires executive terminals.

  . EDP management has had more experience with the problems of centralization and decentralization than any other organizational entity. It is imperative that this experience (no matter how unpleasant) be brought to bear on the organizational aspects of word processing systems if the problems of the past are to be avoided.

  . This involvement on the part of EDP management assumes that they will not recreate the same "solutions" that did not work in

the past. This includes the absorption of all word processing systems into a highly centralized EDP environment.

- When the IBM 8100 was announced, INPUT's Vendor Watch report presented an integrated office system in the form of a future distributed processing model, as shown in Exhibit VII-4. Regardless of whether the IBM equipment depicted is the best solution, the model has the following characteristics:

  . The 3750 voice and data communication control (currently available only in Europe) can serve as the controller for input and output of the office (Levels 1 and 5 shown in Exhibit VII-1), and with the 8100 it can handle all communications within the office.

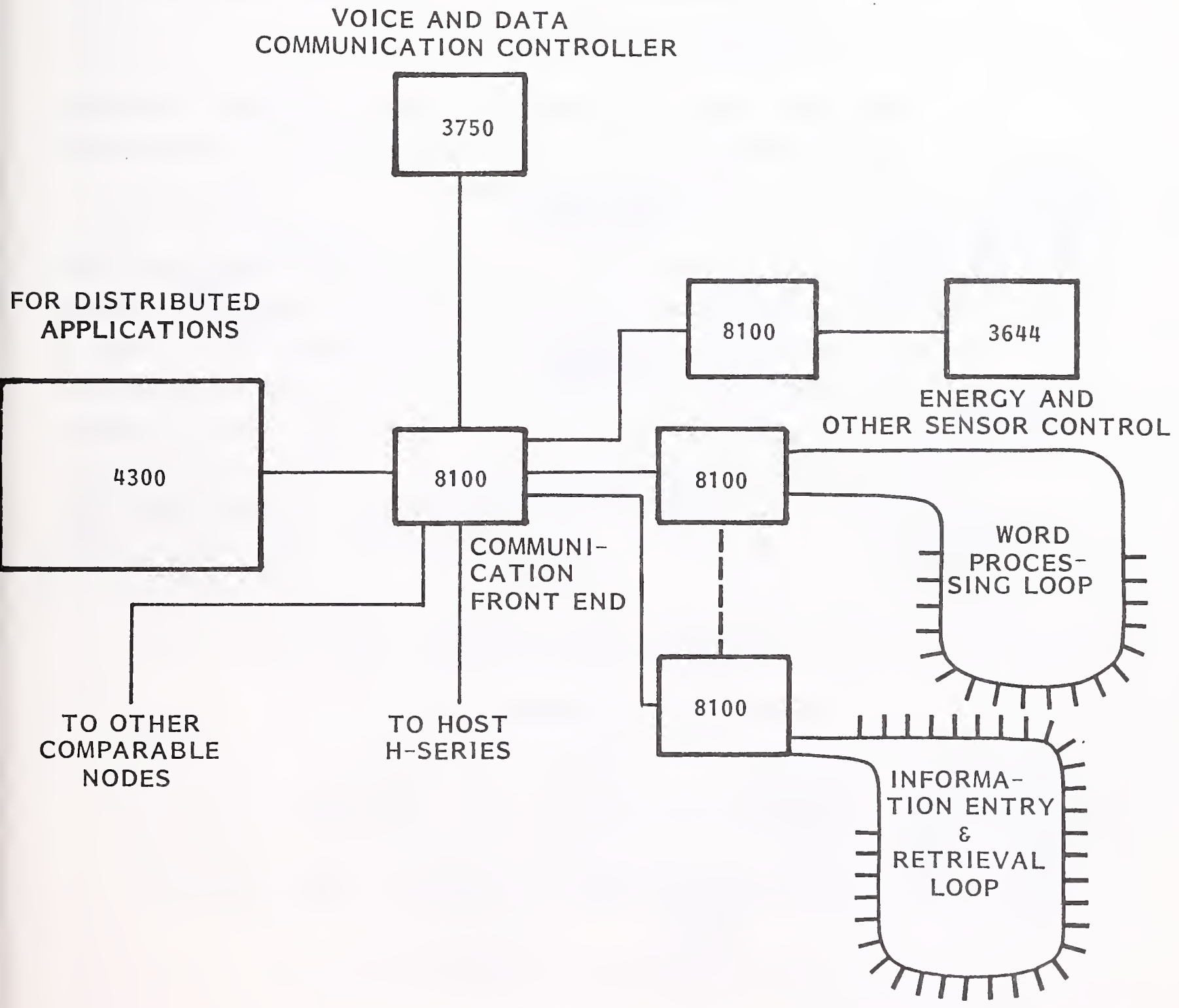
  . An 8100 with the 3644 automatic data unit can control energy consumption, run elevators, provide building security, fire control, etc. (The IBM Series 1 or any other minicomputer could clearly do as well or better, but the purpose of the diagram was to depict how the IBM data processing division could satisfy all of the office requirements.)

  . 8100 loops for word processing and information flow (data base) can be installed as required and can also communicate with each other if that is desired. At the time the diagram was prepared the 8100 did not support word processing, but the prediction came true. It was also predicted that the loops would support all current and future office products such as "printers, CRTs, intelligent copiers, etc." INPUT still feels this will be the case.

  . The 8100 was also shown as a communications front end although other alternatives are certainly available.

EXHIBIT VII-4

A FUTURE DISTRIBUTED PROCESSING MODEL



  - . The important thing, of course, is that the diagram depicts the integration of office automation and data processing, and clearly indicates the need for central planning and control. The limiting factor pointed out at the time of publication was software.

  - . It is recommended that the 8100 Vendor Watch Report be reviewed.

- Once again, the key to effectively managing integration is to understand and control the flow of information and not be overly concerned with the processing aspects of the system.

- A good case can be made that the office copier has had more impact on the office environment than any technological development since the telephone. It can also be stated that a technological development has never been so readily accepted as an unmixed blessing nor so poorly understood in terms of its impact. Its application, use and true cost have not been either analyzed or managed, but the time has come when copiers must become a concern of EDP management. The IBM 6670 "Information Distributor" will be used as an example.

  - The 6670 has the following capabilities, as shown in Exhibit VII-5:

    - . It can serve as a convenience copier.

    - . It can communicate with word processing systems.

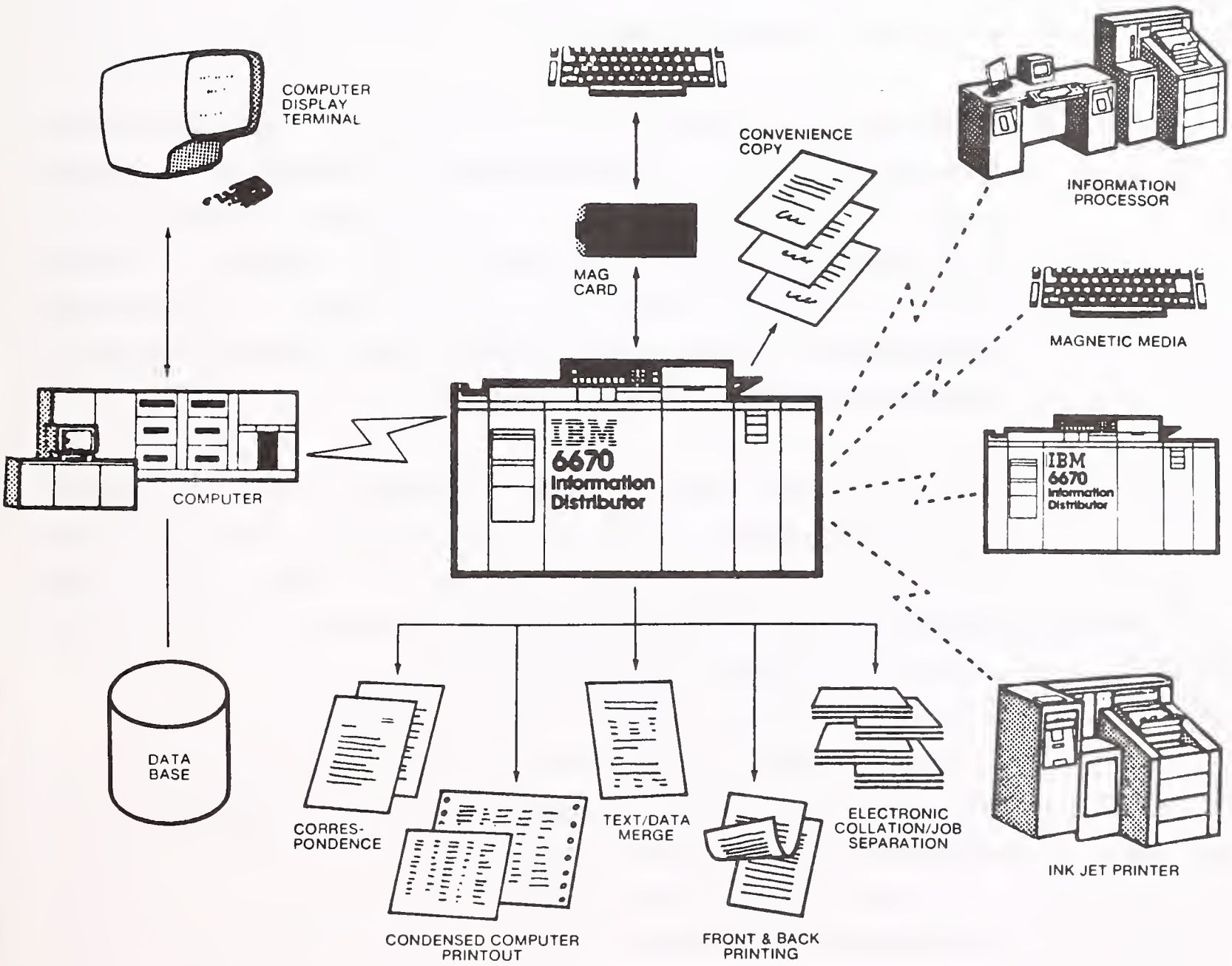
    - . It can communicate with large and small IBM mainframes.

    - . It can communicate with other IBM 6670s.

    - . It can communicate with standalone word processing systems through magnetic cards.

EXHIBIT VII-5

IBM 6670 INFORMATION DISTRIBUTOR



COURTESY OF IBM

- The print capabilities are also impressive:

  - Correspondence in multiple font.

  - Condensed computer output.

  - Text/data merge for both correspondence and business forms.

  - Print qualities suitable both for office and for off-set printing.

  - Ink jet printing for flexibility and remote output.

- Because of the central role in information distribution of such a system, it must be of concern to anyone analyzing the flow of office information. Due to its obvious interaction with computer systems (as well as its expense), the 6670 is a natural for EDP analysis and control. However, INPUT believes that this loose coupling of data processing documents and correspondence requires that additional attention be given to the role of even simple copiers.

- The office copier has effectively destroyed concepts of document control that are essential not only to privacy and security but also to orderly and controlled information flow. Increasing concerns about privacy and security have focused on data processing systems with little regard for more obvious problems.

- It has long been INPUT's position that data processing systems have permitted privacy and security to be more carefully monitored and have not posed a problem in their own right. As office automation permits more and more information subject to privacy and security restrictions to be stored electronically, the central control and responsibility will probably rest in the EDP department. With improved office copiers, the problems associated with duplication (access) to such information must be understood and controlled.

- The concern for unrestricted duplication also extends to analysis of the use of computer output. New systems approaches are required if information flow is to become orderly and controlled. To understand the problem, it is only necessary to consider the following simple example:

  . An essential computer report is distributed from the central DP function to five locations (individuals or organizations).

  . Over a period of time, sub rosa distribution is made by duplicating five additional copies (it could as easily be hundreds).

  . The information contained in the report is used as the foundation for interaction among the enterprise's management.

  . A mistake is discovered in a recent copy of the report.

  . Normal distribution is notified, but the informal distribution procedure does not accommodate the exception.

  . Business continues and decisions are made based on two sets of information.

- This simplified example is indicative of the problems associated with the use of conventional data processing output when it can be distributed without effective controls. Office automation is facilitating the potential for conflicting information to be distributed.

- EDP management should be more aware of considerations of privacy, security and document control because the problems have been forced upon the EDP departments. As office copiers become more sophisticated and multifunctional, these problems will be compounded in the office environment - some EDP knowledge and discipline is required if such systems are ever to be effectively integrated.

- There is also an element of cost analysis that must be applied to copiers as they gain "intelligence" and capability. Since they are so "easy to use" and clearly cost effective in their current application, there is the danger of assuming they will be cost effective when imbedded in more complex computer/communications systems. This is probably not true; consequently, a basis for valid cost comparisons must be established.

- Thus far, the automation of the production of paper correspondence and documents has been discussed. The cost of paper handling within an office has been discussed previously, but the cost of conventional handling of paper between offices has only been highlighted by the fact that mail and courier services represent 18% of office product and service expenditures, as shown in Exhibit VII-3.

  - Current data processing systems generally ignore the importance of a relatively simple interface with the primary paper communications system - the U.S. Postal Service. The significance of the oversight in the information flow is clearly demonstrated by problems associated with increasing the length of the ZIP code.

  - It is imperative, when considering electronic mail, that similar problems be avoided - this is the responsibility of data processing management. There are several potential difficulties in this connection.

    . The U.S. Postal Service does not understand the ramifications of electronic mail, and this confuses the issue.

    . The maintenance of "address lists" for intracompany distribution is not being considered in most companies.

    . It is probable that linking up word processing systems, intelligent copiers and facsimile equipment will only compound problems of delivery and result in competing systems.

- Electronic mail through today's centralized data processing systems are just another competitor for internal electronic mail business.

- External services for interfacing with external organizations are limited in their use, and systems interfaces are far from clear.

- INPUT recommends that EDP management give immediate attention to the problem of "addressing" all internal organizational entities, functional areas and individual employees. This internal structure may vary from company to company, but flexibility should be maintained at the external interface level in order to accommodate electronic communications with other organizations and to use the new electronic mail services that are anticipated.

- The central maintenance of such addressing facilities is essential to the analysis of information flow in order to be prepared for the "office of the future." It is recommended that all communications directories - mail, voice and message - be consolidated into a single directory (and a single problem) because this concept provides a convenient tool for the integration of conventional communication services with accesss to computer/communications networks.

- Such a centralized directory has many immediate advantages in addition to providing for future integration of office systems, DP systems and communications.

  - It can be integrated with data and information dictionaries and used to control both access and distribution of reports and correspondence.

  - It can serve as an on-line telephone book and address directory, and can provide access to current organizational charts (in addition to providing the necessary input to the printed versions).

  - . Simple preparation of labels and maintenance of mailing lists would also provide a desirable central function that is currently subject to considerable duplication and even inaccuracy in most organizations.

  - . Such a system, even though originally developed for internal use, could be easily extended for external purposes and should be designed with that in mind.

- Finally, and perhaps most important, establishing and maintaining central dictionaries and directories provides a relatively simple and effective way for EDP management to become involved in areas that are currently ignored. Merely tracking activities against the directories can lead to valuable insights into information flow.

- INPUT research has disclosed that DP management is especially reluctant to become involved in voice and message systems, which represent 46% of the total expenditures for computer/communications products and services to support white collar workers, as shown in Exhibit VII-3. In the overall framework of analyzing information flow rather than concentrating on process, this is a clearly serious oversight.

  - The telephone, like the office copier, is easy to use and conspicuously cost effective. However, the cost of telelphone service does not reflect the true cost of the information exchanged. The time of the two (or more) individuals involved in conversation is far more valuable than the cost of the service, and the actual amount of telephone time spent on interactive business conversation can be quite small for the following reasons:

    - . Failure to connect with the intended party.

    - . A significant percentage of personal calls on business time.

  - Business calls that only report information and do not require interactive conversation (and therefore are easily replaced with message service).

  - Casual conversation associated with legitimate business calls.

  - It is probable, considering all of the above, that only 10% of personnel time devoted to telephone use is actually spent in interactive business conversation. Telephoning is not necessarily cost effective.

- Understanding how voice and message services are used is extremely important regardless of their cost effectiveness. Even though new telephone systems provide functional alternatives to data processing, and other office systems are currently becoming available, the telephone remains the "executive terminal." As such, it must be understood if it is to be replaced or integrated into tomorrow's information systems.

- Fortunately, the new technology allows for not only more effective use of voice communications but also a convenient means of understanding how much time is being spent on the telephone and for what purpose. EDP management must become familiar with computerized telephone systems, encourage their use where appropriate, and at least start to integrate them loosely with data processing systems.

  - Relatively simple statistics made readily available on a timely basis can do much to improve the understanding of both the billable expense and the value of the time spent on the phone. Even simple programs to compute the value of each individual telephone call (in terms of both time spent and success in making the connection) would probably focus appropriate attention on the subject.

- Voice store and forward - even in the form of answering devices - can achieve substantial savings by having messages stored that may replace an interactive return call, avoiding interruptions without human (secretarial) intervention and permitting the calls to be batched for return.

- As more answering devices are installed, and as store and forward services become more generally available from carriers, the reluctance on the part of some people to "talk to a machine" will be rapidly overcome. Prior to the time when voice recognition becomes widely available, voice store and forward can be an inexpensive means of data entry to (or output from) many EDP systems. All that is required is a little imagination.

- There is one other area that must be mentioned briefly: the potential impact of personal computers on current EDP systems design and office automation. The lesson of the pocket calculator, in terms of its rapid development, should not be forgotten. However, the personal computer has two things that will make its impact on the office much more striking: storage and communications capabilities.

  - In addition, it may have a significant psychological impact in getting some administrative, professional and executive personnel to use it as an executive terminal. A normal terminal is too much like a typewriter. The moment it becomes a personal computer, attitudes may change, due to its implication of a certain skill level and its initially restricted availability.

  - Personal computers will also prompt the distribution of personal data bases: calendars, address and telephone directories, and certain confidential files that might not be entrusted to the central DP facility or unsecured file cabinets.

- It is INPUT's opinion that personal computers may force a rapid change in the plans and strategies of all major vendors of both computer and office systems. This subject will be covered in more detail in the Management Issue Report. It is mentioned here because DP management must start thinking about the possible role of such systems in the office.

- One simple question that should be answered fairly promptly is whether individuals can bring in their own personal computers and use them as terminals. While this would seem to be analogous to personal calculators, the answer is not at all clear. The potential ability to extract copies of information in processable form could have severe consequences. In addition, personal computers embedded in any type of office process (either privately owned or provided through the end users' budget) can present all of the integration problems symptomatic of word processing systems. Personal computers should receive attention and direction from EDP management.

D. TOP-DOWN VERSUS BOTTOM-UP

- There is a general tendency in the data processing industry to apply both technology and systems approaches beyond their applicability. Most past data processing systems lend themselves to structure programming and specifically to top-down design. There are indications that such an approach may not be appropriate for office automation, and this is clearly indicated by the competitive marketing efforts within IBM.

- That there is probably no single correct approach. Depending upon the specific system, the rigors of a classic EDP approach may be not only desirable but necessary. On the other hand, there are probably numerous specific office systems that would never be implemented if they required detailed analysis and implementation through a centralized DP function.

- The essential role of the central information services group should be to provide the communications framework necessary for various systems that may be developed from the "bottom up" to communicate with each other and with those developed using top-down design. The selection of a proper design strategy is extremely difficult and must be emphasized in analyzing all of the systems mentioned in the preceding section.

E. NEW PRODUCTS AND SERVICES

- Since the problem of integration is essentially one of communications, it is imperative that potential technological developments be anticipated. For example, INPUT's Vendor Watch Report on Image Processing explained in some detail the effective integration of data processing and new technology in an office environment. Image processing technology will be extremely important in both office automation and the office of the future, and it must be recognized early.

- Such technological developments are important and, if requirements can be stated, some will become available quite rapidly. A good example is current packet-switching technology. The requirements for larger packet sizes to support the "office of the future" will be available once broad-band communications are fully available - satellite, local microwave and fiber optics - within office buildings.

- With the government deregulation previously described, it is anticipated that many new services will be announced. Few individual companies will be able to afford developing their own networks (global or local) once such services become available. Early implementation of advanced functions related to the "office of the future" should be avoided during the tactical phases associated with office automation.

- There is another possibility concerning the implementation of advanced networks, which should be considered in lieu of in-house development or services provided by common carriers. The concept involves a pooling of technical talent in a central research and development organization and the eventual sharing of network facilities among companies with common requirements.

F. VENDOR CONTROL

- Vendors' strategic plans extend beyond currently announced products through the next generation of hardware. Thus, in the computer industry, change and obsolescence are part of the vendors' planning. Even those users who have been through numerous conversions of hardware and/or software have difficulty identifying technological exposures when making purchase decisions.

- Current vendor marketing strategies of selling at multiple points within companies creates a situation which practically assures ill-advised equipment selection. Even data processing organizations have difficulty keeping abreast of technological developments and anticipating change. End users should not be expected to perform such evaluations or to understand that what may be a new piece of hardware to them is, in fact, at the end of its life cycle.

- Vendors favor multiple sales points within companies because they know there will be overlapping and redundant solutions sold for the same basic office system. One of the first things to do is to establish control over vendors' approaches to end users. This may be done in the following manner:

  - Operating management must be made to understand the substantial technical and financial exposure in selecting and installing various systems without regard for a centralized and coordinated plan.

- Reasonable internal procedures must be developed and published so that all vendors know what the proper approaches are for various types of equipment and service.

- Vendors must be made to adhere to those procedures.

- Realizing that the above is more easily stated than accomplished, there are certain things that can be done to facilitate controls over vendor marketing.

  - One obvious thing is to be able to demonstrate that the vendor has more to lose than to gain from multiple sales points. Where the central DP organization has control over substantial amounts of hardware (or service) from the vendors' attempts to sell word processing systems, it is possible to exercise such control by merely being firm and escalating the issue within the vendor's organization.

  - Where no such leverage exists, the actual exercise of clearly defined selection procedures on a consistent basis will usually discourage uncoordinated sales calls.

  - It is important in selecting office systems to have end user involvement even if the central DP organization has veto power over equipment or service selection. This is true because of the probability of direct user responsibility for the development of many office systems. Such involvement should be perceived as a learning experience by both the DP department and the end user, and it can work to their mutual benefit.

  - Some of the procedures for controlling vendor marketing can be quite simple, such as requiring vendors to file contact reports centrally whenever they visit a user. Enforcement need only include the receipt of contact reports as part of the evaluation and selection procedures.

- Under any circumstances, if the integration of office automation is to be managed into the EDP environment, one of the first areas to be addressed is vendor control.

G. ORGANIZATIONAL CONSIDERATIONS

- Practically any organizational structure can be effective provided all of the personnel involved understand and work towards a common goal. Unfortunately, in many cases, the area of office automation represents the antithesis of this situation.

  - The problems of office automation are not understood by those involved in implementation.

  - There is contention among various parts of many organizations concerning the implementation of their perception of office automation.

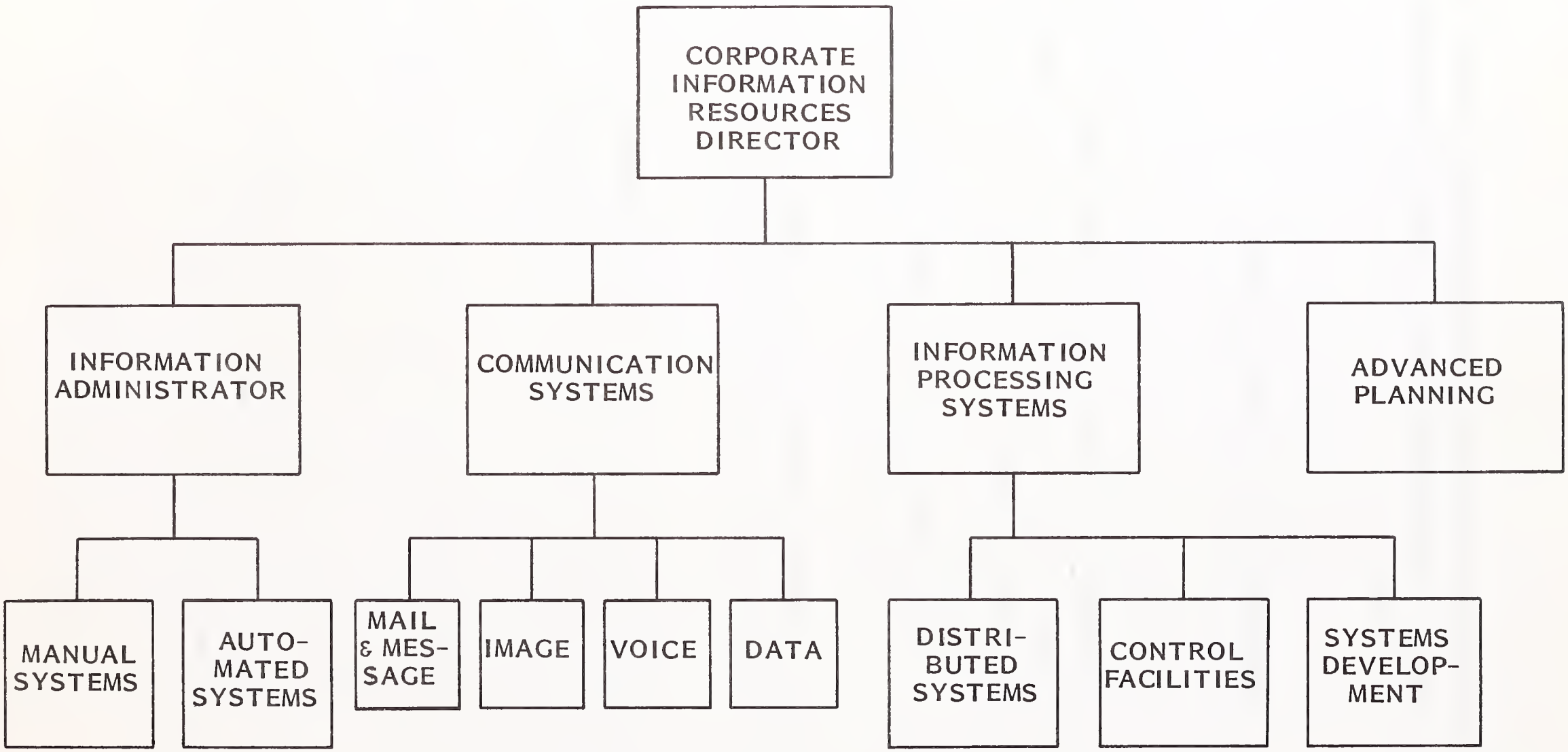
- It is INPUT's opinion that, while matrix-type organizations work in many project environments, they will not work effectively where there is inadequate understanding of objectives or conflicting interests. This is especially true when implementation will be over an extended period of time.

- Therefore it appears necessary to have a classic, hierarchical organizational structure that will have responsibilities for planning and implementing the integration of office automation into the EDP environment. This in itself causes problems because it may appear to be a power play on the part of the current data processing organization. However, viewed in the context of this chapter, a logical argument can be made for an organizational structure comparable to that depicted in Exhibit VII-6.

  - A single corporate information resource director would be responsible for all information flow, storage and retrieval.

EXHIBIT VII-6

INFORMATION RESOURCES ORGANIZATION



- The information administration function would assume responsibility for the information base, including current manual systems (primarily paper filing systems).

- Communications systems would be responsible for current data communications, voice, image transmission (including video) and mail/message services.

- Information processing systems would be responsible for central computer facilities and distributed nodes communicating with the information network provided by communications systems. (This responsibility obviously encompasses office systems.)

- Advanced planning would be responsible for computer/communications systems to support the "office of the future."

- The specific lines and boxes in Exhibit VII-6 are relatively unimportant, but the centralization of functions is critical.

- This centralization should be accompanied by the decentralization of many current system development activities to end users as rapidly as technology permits.

- This proposed organization points out quite clearly that the role of data processing management must change. Depending upon the situation in particular companies, this could result in either a substantial increase or a substantial decrease in responsibility. However, the trend toward rapid integration of computer, communications and office systems appears irreversible, and necessary organizational realignments should be considered now.