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OPPORTUNITIES FOR SERVICES COMPANIES

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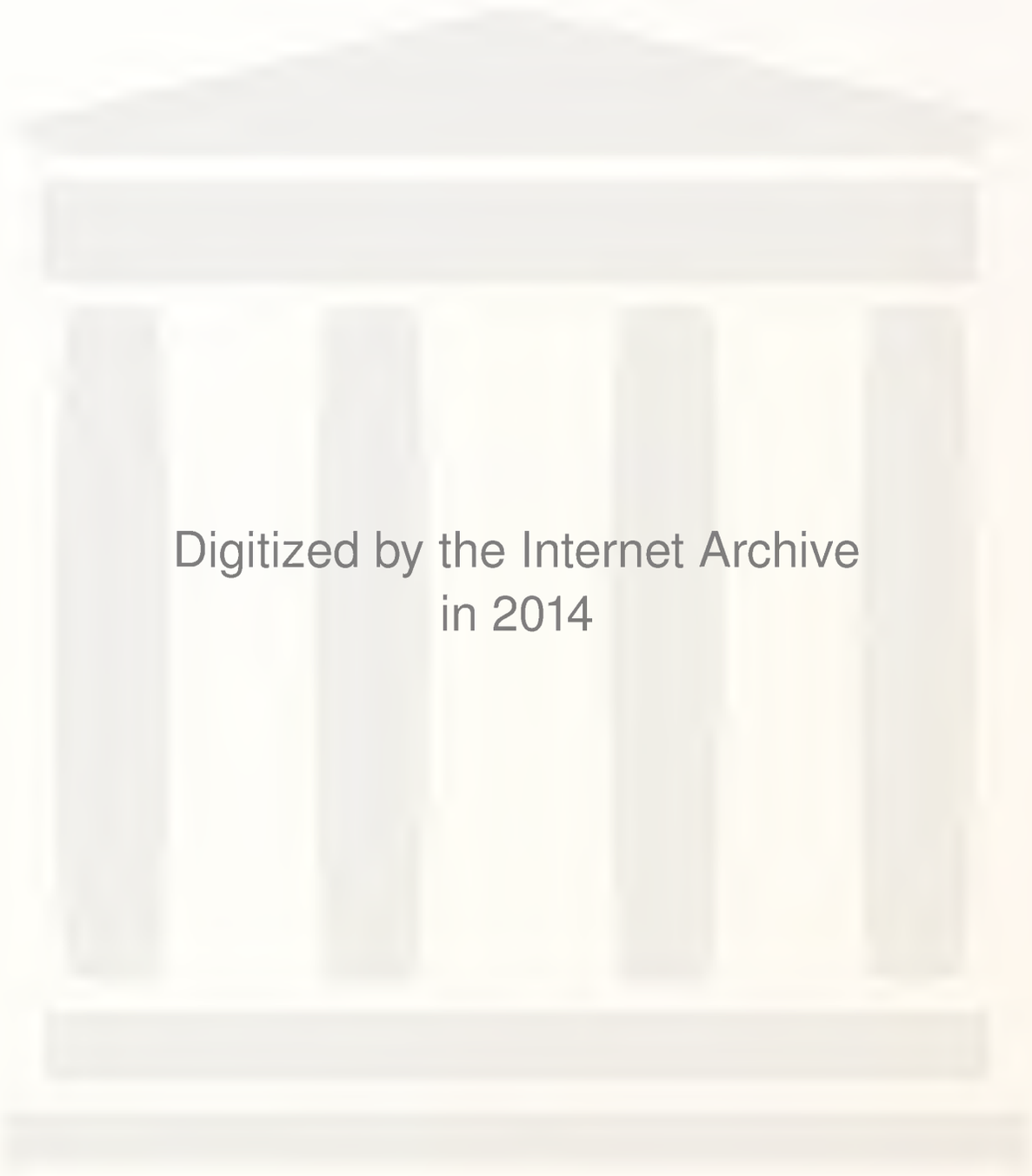
OFFICE OF THE FUTURE: OPPORTUNITIES FOR SERVICE COMPANIES

IMPACT REPORT #16

DECEMBER 1979



OFFICE OF THE FUTURE:
OPPORTUNITIES FOR SERVICES COMPANIES

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1 INTRODUCTION

I INTRODUCTION

- This report is published by INPUT as a part of its ongoing Market Analysis Service. The report researches market opportunities in the office of the future.

- The office of the future concept embraces every business associated technology, including computers, office automation and telecommunications.

- The study was undertaken because of high client interest.

- The initial research was conducted by interviewing both vendors and users.

- The vendors were divided into two categories: hardware suppliers and computer services companies.

- The vendor questionnaire was designed to provide data for evaluating those programs and products vendors are planning to offer the office of the future market.

- Users were selected from the banking, insurance, and manufacturing industries because these industries are highly automated.

- The user questionnaire was designed to provide data for evaluating user attitudes, experience and requirements with reference to the office of the future.

- Before the research began, the proposed questionnaires were reviewed by interested INPUT clients. Their suggestions were incorporated in the final questionnaires.

- Interviews were conducted in August through September, 1979.

- Office automation is studied from the standpoint of existing technology. No attempt is made to forecast radically new technologies, such as extremely low cost electronic storage media, which could exert profound influences on office automation.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

A. UNIQUE CHARACTERISTICS OF THE OFFICE AUTOMATION MARKET

- A discussion of computer services markets in the office of the future must start with a description of the status of, and driving forces behind, the office of the future.

- The office of the future objectives are to:

  - Increase managerial effectiveness.

  - Increase white collar worker productivity.

  - Reduce office costs.

  - Reduce the volume of paper handled and stored.

- A totally integrated system for the rapid electronic flow of information is required to realize those objectives. The technology applied to processing information will be applied to communicating information.

  - Computers, office automation, and communications are combined to form the integrated system.

- Flexible transmission networks to interconnect the subsystems are vital to this integration.

- The office is one business area where automation has not speeded up the flow of information and reduced the number of manual tasks, with the possible exception of typing.

  - Data processing has actually increased the volume of paper which must be read, handled and stored. Reading, paper handling and storage are usually manual operations.

  - For purposes of this study, the office is defined as the place where management and administrative personnel interact with the other groups that form a corporation.

- Unlike the computer and communications industries, the office automation industry is fragmented - no single vendor offers a totally automated office.

- Some vendors are now offering a combination of functions with a communications capability.

- An increasing number of word processing, digital PABX and other subsystems are being installed or actively considered.

  - This seems to indicate that the office of the future concept is gaining widespread acceptance. This is not true.

  - These installations are mostly task oriented with little systems integration.

  - What is lacking at most installations is the vital, all-digital telecommunications interconnection necessary to integrate all the subsystems into a completely interactive system.

- Existing technology can be used to establish an integrated system, so technology is not an impediment. The impediment is people: management and clerical personnel.

  - Managers do not see how the integrated system will increase their effectiveness. They often do not understand the technology and are far from eager to learn it.

  - Clerical workers do not understand the technology and are afraid of it. They believe that at best they will have to learn new skills and at worst their jobs will be eliminated.

- Management's effectiveness could be improved with an automated office.

  - They will have instant access and selective control of the information they need to form a basis for making decisions.

  - They will be able to selectively and simultaneously transmit their decisions without delay.

  - Management spends 80% of its time communicating. An integrated system will expedite these communications.

- Clerical workers will have to learn new skills, but these skills give them upward mobility.

  - New career paths will open up for them.

  - Experience has shown that few, if any, jobs have been eliminated by office automation. Fully integrated offices could change this in the future.

- There is a direct relationship between the captial equipment investment per employee and productivity per employee.

- The capital equipment investment for the average secretary is $3,000.

- The capital equipment investment for the average production worker is $25,000.

- In 1978, $762.5 billion was spent to support 45 million white collar workers. Ninety-one percent of this money went to salaries and wages.

  - Personnel costs for white collar workers are increasing 22% annually.

  - Increasing productivity can reduce these costs.

B. MARKET SIZE AND GROWTH RATE

- This study is primarily concerned with the opportunities computer services companies have to sell services for the office of the future. These services will often include hardware.

- Exhibit II-1 provides the market forecasts through 1984. The high growth rate for computer output microfilm (COM), information retrieval, and data base services reflects tremendous potential in these areas for office automation. Data processing related revenues are not included in these market forecasts. For example, the data processing related revenues for COM approximated $90 million in 1979.

- Definitions for the categories in Exhibit II-1 are:

EXHIBIT II-1

MARKET FORECAST FOR INFORMATION PROCESSING SERVICES IN THE OFFICE OF THE FUTURE

OFFICE AUTOMATION SYSTEM	1978 MARKET ($ MILLION)	1979 MARKET ESTIMATE ($ MILLION)	1984 MARKET POTENTIAL ($ MILLION)	1979-1984 AVERAGE ANNUAL GROWTH RATE (PERCENT)
ELECTRONIC MAIL*	$ 20	$ 26	$ 105	32%
INFORMATION RETRIEVAL	2	4	45	63
DATA BASE SERVICES	1	2	28	68
COM SERVICES	2	3	50	72
OTHER**	NEGLIGIBLE	2	54	94
TOTAL	$ 25	$ 37	$ 282	50%

THE ABOVE FIGURES INCLUDE ONLY THOSE APPLICATIONS WHICH APPLY TO THE OFFICE FUNCTIONS. TRADITIONAL EDP APPLICATIONS WHICH APPLY TO OPERATIONS, FINANCE, ETC., ARE EXCLUDED.

* DOES NOT INCLUDE WESTERN UNION'S "MAILGRAM" (ESTIMATED AT $51 MILLION IN 1978), AND FACSIMILE.

** INCLUDES MAIL LIST MANAGEMENT, OCR SERVICES, SOURCE DOCUMENT MICROFILMING, CORRESPONDENCE, CONTROL, WORD PROCESSING AND PHOTOCOMPOSITION/PHOTOTYPESETTING.

- Electronic Mail Services are interactive systems for the electronic transfer of documents and messages. These systems are user oriented and can be tailored to user needs by software. Included are the dial-up services and in-house systems offered by computer services vendors and private network vendors. Excluded are mailgrams, facsimile systems and Telex/TWX services.

- Information Retrieval allows direct terminal access to information, such as correspondence and document files stored elsewhere. Office personnel use the terminal to retrieve information which is directly related to office functions.

- Data Base Services are the maintenance and storage of dedicated application or special purpose information which can be electronically retrieved by office personnel.

- COM Services are the microfilming of documents and records directly from computer output for archival storage and audit trail. Traditional data processing COM and financial records microfilming is specifically excluded.

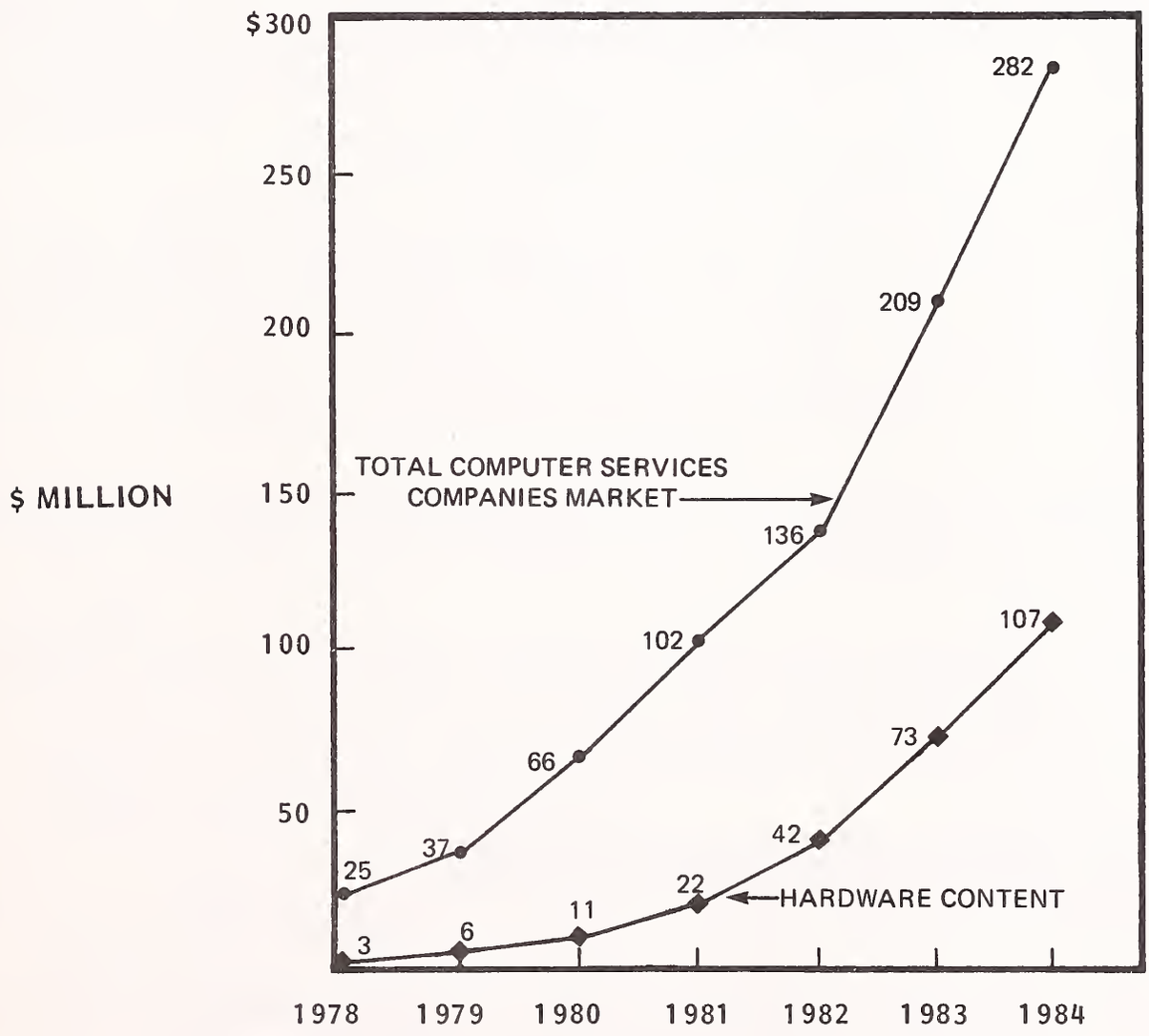
- Other services include distribution/mail list management, OCR services, source document microfilming, correspondence control, word processing, and photocomposition/phototypesetting. These services are defined in Section III-A.

- Exhibit II-2 projects the growth of the hardware portion of the total computer services companies' market.

  - The increasing hardware content reflects the definite office user preference, as determined in user interviews, for in-house installations over outside services.

EXHIBIT II-2

ESTIMATED HARDWARE CONTENT IN COMPUTER SERVICES OFFERINGS TO THE OFFICE OF THE FUTURE



- Computer services companies are responding to this trend by increasing their hardware offerings and serving as systems integrators.

- As defined in this study, the market for office automation systems includes word processors, computer based message systems, facsimile, optical character recognition services, computer output microfilming services, and other major office systems and services. In considering the total market, hardware vendors must be included as well as computer services companies.

  - The market will approach $1.5 billion for 1979 and is expected to exceed $7.6 billion in 1984, reflecting an average annual growth rate of 39% in current 1978 dollars adjusted with a 7% inflation factor. These figures do not include PABX or copier sales.

  - Key growth areas are public and private computer based message systems, communicating word processors and teleconferencing.

  - Facsimile will experience a slower growth rate.

  - Standalone, non-display, word processors appear to be a diminishing market.

- The growth rate for office automation systems is out pacing the growth rate for the economy.

C. USER ATTITUDES AND BUYING POINTS

- Users favor in-house installations for office automation functions except where equipment costs are high and/or usage is low.

  - Computer services companies are favored for computer output microfilming, optical character recognition and photocomposition services.

- Computer services companies are also well positioned to offer the services of systems such as the IBM 6670 Information Distributor.

- Cost effectiveness is the primary consideration when choosing between in-house installations and computer services companies.

- The largest companies are most aware of the advantages of office automation. They are making the greatest effort to electronically integrate office functions.

- Banks and financial institutions with branch facilities are prime market targets.

  - They already have on-line operations to a computer and have several office functions automated.

  - They are looking for more data base and information retrieval capabilities.

- Small banks are increasingly relying on automation to remain competitive. They are a good target for computer services companies and small systems vendors.

- There is a direct correlation between on-line data processing and office automation. Companies with an on-line processing network represent good markets for office automation functions.

- From the user's viewpoint, the major driving forces toward the office of the future are:

  - Increasing managerial effectiveness.

  - Reducing cost of performing office functions.

- Increasing white collar productivity.

- Several user respondents said traditional cost justification methods do not apply to the office of the future. While this may be true in isolated instances, the real problem is a lack of relevant cost justification data necessary for a complete analysis.

- It is difficult to measure white collar productivity.

- The traditional planning, decision and purchasing points which form the buying cycle are changing to include office automation functions.

  - Planning committees are expanding to include telecommunications and advanced office systems managers.

  - DP managers are moving closer to the executive suite. They are normally a part of the Management Planning Committee, which includes top management people and an administrative manager.

- Exhibit II-3 shows which office automation functions survey user respondents have installed or are considering.

- Exhibit II-4 illustrates the status of merging data and word processing functions by user respondent companies. The merger is occurring most rapidly in companies where an internal data processing network exists.

D. VENDOR ATTITUDES

- All vendors believe they have a role to play in the office of the future. However, no single vendor interviewed believes he can supply everything users need.

EXHIBIT II-3

CURRENT OFFICE AUTOMATION FUNCTIONS INSTALLED
OR UNDER CONSIDERATION BY ALL USER RESPONDENTS

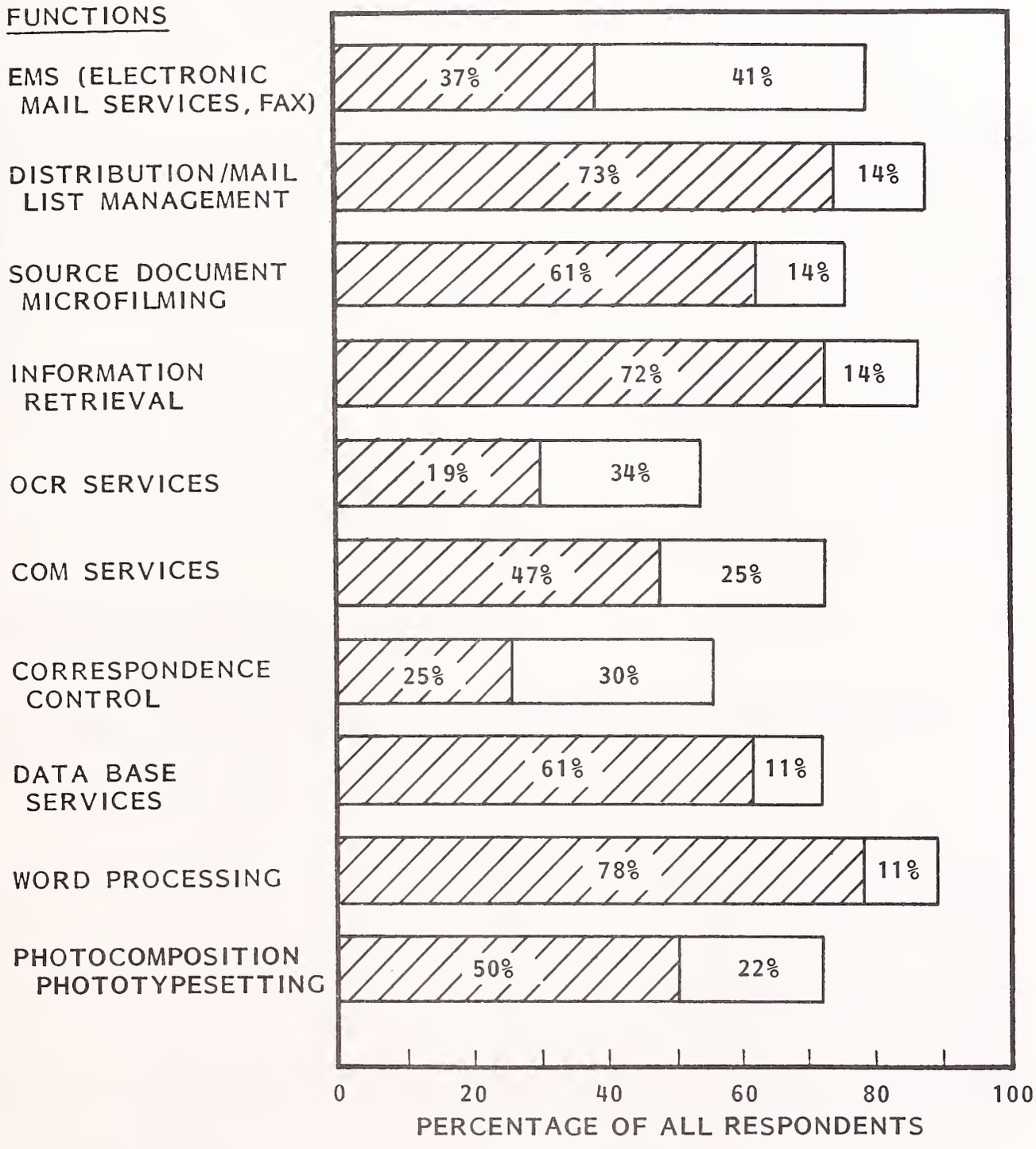


EXHIBIT II-4

STATUS OF MERGING DATA AND WORD PROCESSING
IN USER RESPONDENT COMPANIES

MERGING FUNCTIONS	ALL USER RESPONDENTS (PERCENT)
YES, THEY ARE MERGING	45%
NO, THEY ARE NOT MERGING	33
NOT REALLY SURE	8
DON'T HAVE WORD PROCESSING	14
WHEN THE MERGER IS PLANNED	**ALL USER RESPONDENTS INDICATING MERGER (PERCENT)**
RIGHT NOW	25%
LESS THAN ONE YEAR	13
ONE TO TWO YEARS	37
TWO TO FIVE YEARS	25

- Sixty-seven percent of the vendor respondents believe extensions of their present lines will meet the initial product and service requirements for the office of the future.

- All vendors believe implementing the office of the future is a step-by-step process. They believe they will have products and services available for that step when users are ready to make it.

- Vendors view their primary function in meeting a customer's needs to be in improving information handling by integrating automated functions. The objectives are to:

  - Increase managerial effectiveness.

  - Increase business efficiency.

  - Increase worker productivity.

- Exhibit II-5 shows the vendors' attitudes toward offering various types of hardware; the most prevalent offering is a word processor/data processor combination.

- With regard to applications, vendor interviews revealed a casual relationship between increases in electronic mail service, word processing, and correspondence controls.

  - These three naturally augment each other and lend themselves to integration.

  - Anticipated increases in information retrieval and data base services reflect vendor responses to user requests for greater, more flexible information retrieval capabilities. The two functions complement each other.

EXHIBIT II-5

OFFICE AUTOMATION HARDWARE OFFERINGS BY ALL VENDOR RESPONDENTS

OFFICE AUTOMATION HARDWARE	CURRENTLY OFFERED (PERCENT)	MAY OFFER (PERCENT)	DO NOT PLAN TO OFFER (PERCENT)
SMALL BUSINESS COMPUTERS	57%	14%	29%
WORD PROCESSORS	64	7	29
WORD PROCESSOR/DATA PROCESSOR COMBINATION	72	21	7
I/O TERMINALS	72	7	21
FACSIMILE EQUIPMENT	29	21	50
COPIERS	14	14	72
PRINTERS	65	14	21
INTEGRATED PERIPHERALS SYSTEMS (MFS, PABX)	29	29	42

- Details on applications are presented in Chapter IV.

E. CHANGING ECONOMICS

- According to government statistics, fewer people will be entering the labor force during the balance of this century.
  - The labor pool annual growth rate will decline each year until approximately 1995.
  - Fewer people will be available for office staffing.
  - Labor will become more expensive because of its scarcity.
- The ratio of electronics technology costs to physical labor costs is becoming more favorable to electronics every year. The cost of technology (all inclusive) is falling 22 to 30% annually while labor rates are climbing 8 to 10% annually.
- The volume of paperwork is increasing 12% annually. An annual increase of only 8% in labor costs brings the total annual increase of handling paper to 20%.
  - Eighty percent of business correspondence could be handled by electronic mail services.
  - The savings in paper and labor costs might justify the cost of source document and computer output microfilming without reference to the savings from reduced storage space requirements.
  - The cost of electronic and magnetic storage will soon decrease to the point where these media are cheaper than paper for many applications.

- Telecommunications facilities are expected to have an average annual growth rate of 12% through 1990, while the cost per message continues to decline. The 1979 cost of $1.25 per message for computer based message systems will decline to 50 cents per message by 1982.

- Computer services companies will be able to use high speed transmission networks to advantage in applications, such as electronic mail and teleconferencing.

F. IMPACT OF TECHNOLOGY

- Very large scale integration (VLSI) and fiber optics are basic technologies which are favorably impacting the computer, office automation, and telecommunications industries. These benefits are certain to be passed on to the office of the future.

  - VLSI is directly beneficial to distributed data processing, word processing and digital telecommunications.

  - Fiber optical technology is directly beneficial to digital telecommunications and wideband digital data transmission systems.

- The increasing availability of digital communications systems will benefit the office of the future.

  - The telephone network is becoming digital, at least in metropolitan areas.

- Satellite based systems, dedicated to business communications, will be plentiful by 1985.

- Rooftop earth stations will largely eliminate the expense of back-haul routes.

- Several technical innovations will assure the reliability and efficiency of these routes.

- Cable television transmission facilities are another possibility for data transmission.

  - The number of cable installations is growing rapidly, particularly in heavily populated areas.

  - There are wideband facilities capable of handling high speed data, although modems are required for best operation.

  - CATV provides a convenient route to reach consumers for some office related functions, such as electronic mail. CATV could have tremendous impact in the funds transfer area as well, particularly between small retailers, banks and consumers.

G. TECHNICAL RECOMMENDATIONS

- The technical recommendations, directly applicable to the office of the future, deal with the blending of technology and human factors.

  - The equipment must be fitted to the office environment. The environment will not change to fit the equipment.

  - New multifunction terminals must be far easier to use than today's single function terminals.

- Executive work stations should not require any technical skill to operate. Information should be instantly available at the touch of a key.

- Equipment operation should not interfere with thought processes or concentration.

- Instructions and documentation should be plain and simple.

- Office applications software is a major need that must be met.

- Customer support services should be emphasized.

- Human factors are the ultimate key to the success or failure in applying the office of the future concept.

- The cost of providing initial instruction and continued training to many new automated office users will be a major driving force toward changing the training delivery mode.

  - Travel costs will be prohibitively high which will necessitate local on-site user training.

  - Instructor costs and availability will force the use of a different training approach.

  - Simple start-up instructions and operation instructions could also be a part of this system.

- Computer Assisted Instruction (CAI) is a very reasonable and workable alternative for training new automated office users.

  - CAI can be implemented on the office automation hardware.

- Microprocessor based systems are also an economically justifiable approach to training.

H. MARKETING RECOMMENDATIONS

- Emphasis should be on increasing managerial effectiveness, cost control and improved employee productivity.

  - Management reluctance must be overcome by making them aware of non-economic benefits, such as increased accuracy and currency of information.

  - Educational seminars are good tools for overcoming reluctance; however, managers will not attend seminars with participants other than their peers.

  - Office automation projects should be cost justified, even if the justification must use imperfect data.

  - User thinking must be directed towards information flow instead of task-oriented unrelated functions.

- Reducing the amount of paperwork is a good point to emphasize because it saves money.

- The largest Fortune 500 companies are a primary target. They are more automated and more aware of available technologies. They are also more aware of potential cost savings.

- Banks and financial institutions with branch facilities are target markets. Their operations are tied to an on-line computer. They are particulary interested in increased information retrieval and data base applications.

- Small banks are interested in automating to stay competitive with larger banks.

- There is a direct correlation between on-line data processing capabilities and office automation. Companies with on-line data processing usually have considerable automated office capabilities and are interested in more.

- A potential market for services vendors is providing data base information and access to a variety of public and private data bases.

- Electronic mail service is an excellent market for computer services vendors because vendors have intercity connections in place.

- Services vendors have an opportunity to increase revenues by offering hardware.

  - They are in an excellent position to serve as systems integrators or turnkey system suppliers.

  - They have the skills to integrate word and data processing using networks where appropriate.

  - They must exercise care, however, to consider support and maintenance costs which are often inherent in hardware offerings.

- Computer services vendors should realize that integrating office automation functions is an excellent opportunity. Computer services vendors can develop necessary interface between hardware devices, supply networks, and develop a completely automated office on a turnkey basis for their clients.

- Computer services companies are better prepared to solve the office automation integration problem than hardware vendors. Services companies have the software expertise, network, and in many cases, turnkey systems experience vital to dealing with this situation.

III MARKET SIZE, SEGMENTATION, AND GROWTH RATES

III MARKET SIZE, SEGMENTATION, AND GROWTH RATES

A. MARKET SEGMENT DEFINITIONS AND EXAMPLES OF OFFERINGS

- The office automation functions discussed in this report are aimed at reducing the volume of paper handled and stored by U.S. business establishments. As the costs of electronic and magnetic storage decline, and as the price of paper increases, it will be more cost effective to use electronic or magnetic stroage than paper. This will have a major impact on what office automation functions are performed.

- Many of the functions are also aimed at increasing the speed of information transfer by using electronics or optical technology.

1. ELECTRONIC MAIL SERVICES

- Electronic Mail Services (EMS) means document and message transfer by electronic transmission over voice grade telephone circuits.

- There are four types of electronic mail systems available today:

  - Facsimile: A system for transmitting words and images. Pictures are scanned and converted to signal waves which are transmitted to a remote point where they are reconverted to produce a duplicate of the original. There are nearly 180,000 units installed today.

. Examples of new facsimile devices are:

- Xerox Telecopier 485 (less than one minute per page transmission).

- Qwip 1200, and Qwip 2 (two minute per page transmission).

- Graphic Sciences Inc. (GSI) - range of low end to high end facsimile units.

- Panafax MV 1200.

- Public or Private Teletypewriter networks: A terminal to terminal form of communications. The TELEX/TWX network is a public network available through Western Union. There are about 130,000 TELEX/TWX terminals installed today. Private teletypewriter networks are used by many large companies. There are over 100,000 terminals attached to these private networks available through telephone operating companies and Western Union.

- Communicating Word Processors: A basic word processor with added transmission capabilities. Many communicating word processors have multiple work stations using shared logic and handle a document base in conjunction with communications. There are approximately 15,000 communicating word processors installed today.

. Examples of communications word processors are:

- Wang's Office Information System (OIS) 145, which has an array of telecommunications options.

- Datapoint's "ARC" distributed processing network which can be tied into its phone management system, "Infoswitch." Word processing software is available.

- Computer Based Message Systems: Interactive message systems which are completely user-oriented. The software packages can be tailored to the users' specifications. There are about 15,000 CBMS terminals installed today.

  . Examples of systems available from timesharing computer companies are:

    - Tymnet's "On Tyme" public service Electronic Message Service. The average cost per short message is $0.30 - $0.40, a full page is $1.25. This service is available in 100 cities where Tymnet nodes are located.

    - Corporate Time Sharing Service's Global Electronic Mail (GEM) timesharing service via Telenet's public packet network.

  . An example of a CBMS network for private, intra-company use is: Computer Corporation of America's COMET system. This message service is offered as a dial-up service at $1.50 per message, including terminals and average usage. The COMET software can also be purchased for in-house installation at about $40,000.

  . Distribution/Mail List Management (D/MLM) services are performed by an application software package. The function manages the automatic updating for repetitive printing and mailing of documents.

- D/MLM can be implemented on in-house computers or word processors.

- D/MLM is also available from many remote computing and batch computing service bureaus. Occidental Computer System Inc.'s "Super Mailer" is an example. It is a mailing list processing and management system.

- Another type of message system in common use is available from companies that offer computer processing services. Messages are sent between users of the services on a network.

  - There are thousands of terminals that have been used for this purpose at one time or another.

  - Few of these terminals are dedicated to message systems, but can function in that capacity when desired.

2. SOURCE DOCUMENT MICROFILMING AND COM

- Source document microfilming and computer output microfilming are separate services, but they use essentially the same equipment. Accordingly, they are combined for this definition section of the report. This area is not a new opportunity, but it has potential because of the tangible savings it offers over conventional paper use.

- Source document microfilming is an automated function which microfilms incoming paper messages and internal documents for permanent record storage and audit trail. COM does the same thing with computer output information.

- Source Document Microfilm and COM equipment is available from:

  - Kodak - Komstar Microimage Processor.

  - 3M - System 700S.

  - Datagraphix COM.

- Prices range from $75,000 to $150,000.

- Micrographic services are available from computer services vendors such as:

  - Computer Micrographics Inc., a nationwide network of micrographics service centers.

  - U.S. Datacorp, the largest service company in the COM field. U.S. Datacorp also supplies turnkey COM systems.

  - Zytron, a subsidiary of National CSS, Inc., is a rapidly growing COM services company.

3. INFORMATION RETRIEVAL SYSTEMS

- Information Retrieval allows direct, terminal access to specific data or information elsewhere, such as correspondence and document files or data bases. Information storage and retrieval software package systems are available for a variety of applications. They are supplied by a large number of software and service bureau companies, such as Informatics, Mathematica, National CSS and Tymshare.

4. OPTICAL CHARACTER RECOGNITION SERVICE

- Optical Character Recognition (OCR) service is the optical transcription and/or translation of pre-printed bar codes or type fonts. OCR is used for high speed data collection and data entry to central computers, intelligent terminals, and word processors.

  - Recognition Equipment Inc., is the largest supplier, providing high speed document readers to the U.S. Postal Service, large banks, insurance companies, and other large companies.

- Scan-Optics Inc., Scan-Data, and Optical Business Machines offer high speed page and/or document readers to many companies in banking, retailing, and manufacturing.

- Several OCR manufacturers are interfacing OCR readers to word processing equipment. Included are CompuScan, Hendrix Electronics, and the Context Division of Burroughs.

5. CORRESPONDENCE CONTROL SYSTEMS

- Correspondence Control systems are software packages providing indexing for future retrieval to provide action files, reminders, automated tickler files, and scheduling or "calendaring." Examples of correspondence control are:

  - Credit and loan tracking systems offered by services companies to banks and lending institutions.

  - An insurance company with correspondence control integrated into their DP Policy Management System.

  - A manufacturing respondent will be implementing a correspondence control capability in-house using records storage via the word processors.

  - A large remote computing services company has configured a comprehensive correspondence control and data base package for a financial institution who was already a client.

6. DATA BASE SERVICES

- Data base services involves the maintenance and storage of dedicated application or special purpose data base information; e.g., an economic data base, or a parts inventory data base. Examples of data base services are:

- Bank customer records, credit reporting, and appraisals. These services are obtained from outside computer services vendors.

- An insurance company example is a respondent with a consolidated data base file for insurance policy holders and a file for current payments. These are available on an in-house central computer.

- A manufacturer uses an outside data base service for medical and chemical statistical information.

- Data bank services are available from a number of private companies, government agencies, and non-profit organizations. Examples are Lockheed's DIALOG data bank of over 80 data bases, and Interactive Data Corporation and Chase Econometrics in business and finance.

- Data Base Management Systems software is available from many vendors for implementation on in-house computers. An example from Cullinane Corporation is Multiple Computer Support which allows a user to configure a shared data base between two or more IBM and/or compatible CPUs. Features include dynamic scheduling and automatic recovery.

7. WORD PROCESSORS

- Word processing is the text preparation, formatting, and error-free retyping of final copy from stored (removable) media. There are now nearly 200,000 word processors installed. Today word processors fall into four generic types.

  - Non-display standalone electronic typewriters with removable storage media. Ninety-five percent have no ability to communicate and account for 80% of the installed base. Examples are:

    . IBM Mag Card typewriters.

. Redactron's early models.

- Display standalone units, some with communications capability. Examples are:

  . Lexitron, early models.

  . IBM System 6.

  . Xerox 850.

  . Wang Laboratory's WPS5.

- Shared logic, minicomputer-based systems with multiple work stations and normally, CRT displays. The minicomputer handles communications and maintains a document base. Examples are:

  . Philips Electronics Ltd. - Micom-2001.

  . NBI, Inc. - Paperwork Processor.

  . AM Jacquard Systems - AMtext 100.

- Hybrid information processor systems used for both word and data processing. Examples are:

  . Basic Four - Dataword. A small business computer with a word processing software package.

  . Wang Laboratory - Office Information Systems (OIS) 125, 130, 140, 145.

  . CPT Corporation - CPT 8000 and Wordpak.

- IBM - OS6.
- 3M - System 84.
- Four-Phase Systems Inc.
- Datapoint Corporation.

- All shared logic, hybrid word processors, and an increasing number of display standalone processors have communications capabilities. These are known as communicating word processors (CWP). They can be interfaced to, and communicate with, a variety of other equipment used for office automation functions or business communications. Examples of communicating word processors' interface capabilities are:

  - CWP interfacing to a central computer.
  - CWP interfacing to facsimile equipment.
  - CWP interfacing to OCR equipment.
  - CWP interfacing to COM equipment.
  - CWP interfacing to central dictation systems.
  - CWP interfacing to image printers.
  - CWP interfacing to photocomposition and phototypesetting equipment.
  - CWP interfacing to remote computing services.

- The following are examples of CWP's performing other automated business functions:

- CWP performing electronic mail services.

- CWP performing distribution/mail list management.

- CWP performing information retrieval functions.

- CWP performing correspondence control.

- CWP performing data base services.

- Word processing and text editing services are available through a number of remote computing services companies: Tymshare and Bowne Information Systems are examples.

- Word processing services companies are relatively new. However, a few already have a national network of service centers available.

  - These word processing companies offer numerous document processing and handling services using advanced office automation equipment.

  - Software application packages are often available for data base management, personalized correspondence, and other services such as photocomposition.

  - Examples of word processing services companies are: Keyboard Communications, Inc., and the Cyberway Division of Bowne Information Systems.

8. PHOTOCOMPOSITION AND PHOTOTYPESETTING

- Photocomposition and phototypesetting automation is a computer based preparation, composing and formatting of material for camera-ready copy printing. Computer based photocomposers and phototypesetters are available from several manufacturers including:

- AM International: Varitypers' Comp-Set and Comp/Edit.

- Compugraphics: Edit Writer 7500; MDT350 area composition system.

- IBM Electronic/Selectric Composer.

- Commercial printing and publishing companies offering these services are available in all but the smallest towns and communities. Generally, they are local businesses whose territory coverage can offer one-day pick up and delivery.

  - An example of an area Service Bureau is ADAPT, Inc., Automated Documents and Photo-Typesetting. There services include word processing to phototypesetting and phototypesetting from computer tapes.

  - An example of a nationwide printing and publishing company is Arcata Graphics, with numerous local service centers offering computer-assisted photocomposition, typesetting and a range of printing techniques.

- There are other aspects of office automation that are important, but have not been specifically addressed in this report. Some of these include:

  - PABX and its effect on automating voice communications (such as the recent Rolm product announcement).

  - Image processing in the office.

  - Intra-office work flow as a major opportunity for office automation.

- Furthermore, the role of office automation, CATV and their relationship with the consumer market is not addressed in this report.

B. MARKET SEGMENT FORECAST

1. OFFICE AUTOMATION SYSTEMS

- In 1978, U.S. business, government and education spent $762.5 billion to support 45 million white collar workers. Seven hundred billion dollars (91%) went to salaries and wages.

  - The cost of clerical salaries is increasing 8% annually.

  - The overall personnel costs for white collar workers is increasing 22% annually.

- White collar productivity has increased less than 5% over the past ten years. Factory worker productivity has increased 90% over the past ten years.

  - The captial equipment investment for the average secretary is $3,000.

  - The captial equipment investment for the average production worker is $25,000.

  - The ratio is greater than 8:1 in favor of the factory worker.

- There is a direct relationship between captial equipment investment per employee and employee productivity.

- In 1978, U.S. business, government and education spent $62.5 billion for computers, communications, office products and services to support the office and business operations of 45 million white collar workers.

- Studies show that over 33% of total office costs, excluding salaries and wages, are spent in the preparation, duplication, handling and storage of paper. Paperwork volume is increasing at 12% annually.

- Telephone and face to face communications account for over 45% of total office costs, excluding salaries.

  - Top management spends 80% of its time communicating.

  - Middle management spends 60% of its time communicating.

  - Secretarial staff spends 15% of its time communicating.

  - Clerical staff spends 11% of its time communicating.

- Merchanization in the office has been around for many years. During the last 10 to 15 years a number of office functions have been automated. However, office automation functions are fragmented and operate independently of each other.

- The evolution of data processing has been going on for 30 years. In the last 10 years dramatic technological advancement has been brought about by Very Large Scale Integration (VLSI) and microprocessors.

- This same technology is creating dramatic changes in the telecommunications industry. Digital networks for data and voice transmission are being installed at a rapid rate.

- This technology should now be applied to office automation as a whole. The merging of several functions is occurring but, it will be years before the integration of equipment and functions becomes widespread.

- This integration is the objective of the office of the future concept. Since the technology is already available, the time required to integrate automated office functions should not be as long as the time required for the integration of data processing and communications. However, office automation integration is dependent on the progress of the other two.

- Exhibit III-1 shows the current and projected markets for major office automation systems. The dollar value and growth rates of these markets should provide ample incentive for vendors to make the efforts and take the risks necessary for active market participation.

- Computer services companies are in a unique position to gain advantages in these markets, if they make certain changes and additions to their operations.

- The implementation of the office of the future is already in motion and accelerating. It will gain momentum in the early 1980s and continue to accelerate throughout the decade.

- Some users have formulated long range plans for completely integrated systems to speed up the flow of all types of information, including data, words and images, to wherever they are needed. Other companies will soon follow these leaders.

- Those vendors, who are ready to supply the hardware and services necessary to fulfill these plans at the time the users want them, will receive maximum benefits in this marketplace. To arrive at this position, vendors will have to invest substantial sums of money and the time of their most innovative technologists. The immediate stakes are high, but the long term gains will be worth the effort.

2. TELECONFERENCING

- The mounting costs and inconvenience of travel combined with the current emphasis on energy conservation have revived interest in teleconferencing. Since it is not a paper-oriented business function, teleconferencing is not considered an office automation system as defined for this report.

  - However, teleconferencing will play an important role in the office of the future.

EXHIBIT III-1

MARKET FOR OFFICE AUTOMATION SYSTEMS-
TOTAL HARDWARE AND SERVICES

OFFICE AUTOMATION SYSTEM	1978 MARKET ($ MILLION)	1979 MARKET ESTIMATE ($ MILLION)	1984 MARKET POTENTIAL ($ MILLION)	1979-1984 AVERAGE ANNUAL GROWTH RATE (PERCENT)
WORD PROCESSORS	$ 865	$ 1,177	$ 6,030	39%
COMPUTER BASED MESSAGE SYSTEMS (PUBLIC & PRIVATE)	27	64	835	68
FACSIMILE	150	186	505	22
OCR SERVICES	5	15	157	60
COM SERVICES	5	11	98	55
TOTAL	$ 1,052	$ 1,453	$ 7,625	39%

NOTE: THE MARKET FOR SERVICES ALONE IS PRESENTED ON EXHIBIT II-1

- Estimates are that 40% of business travel could be eliminated by teleconferencing.

- Teleconferencing is a good market for computer services vendors with communications networks. Computer services account for 89% of the $37 million total 1979 teleconferencing market.

  - The market is expected to increase to $231 million by 1984, with services accounting for 85% of the total.

  - Any sharp escalation of the energy crisis could dramatically increase the total teleconferencing market.

C. INDUSTRY EMPHASIS

- Exhibit III-2 shows office automation services installed or under consideration by all user respondents.

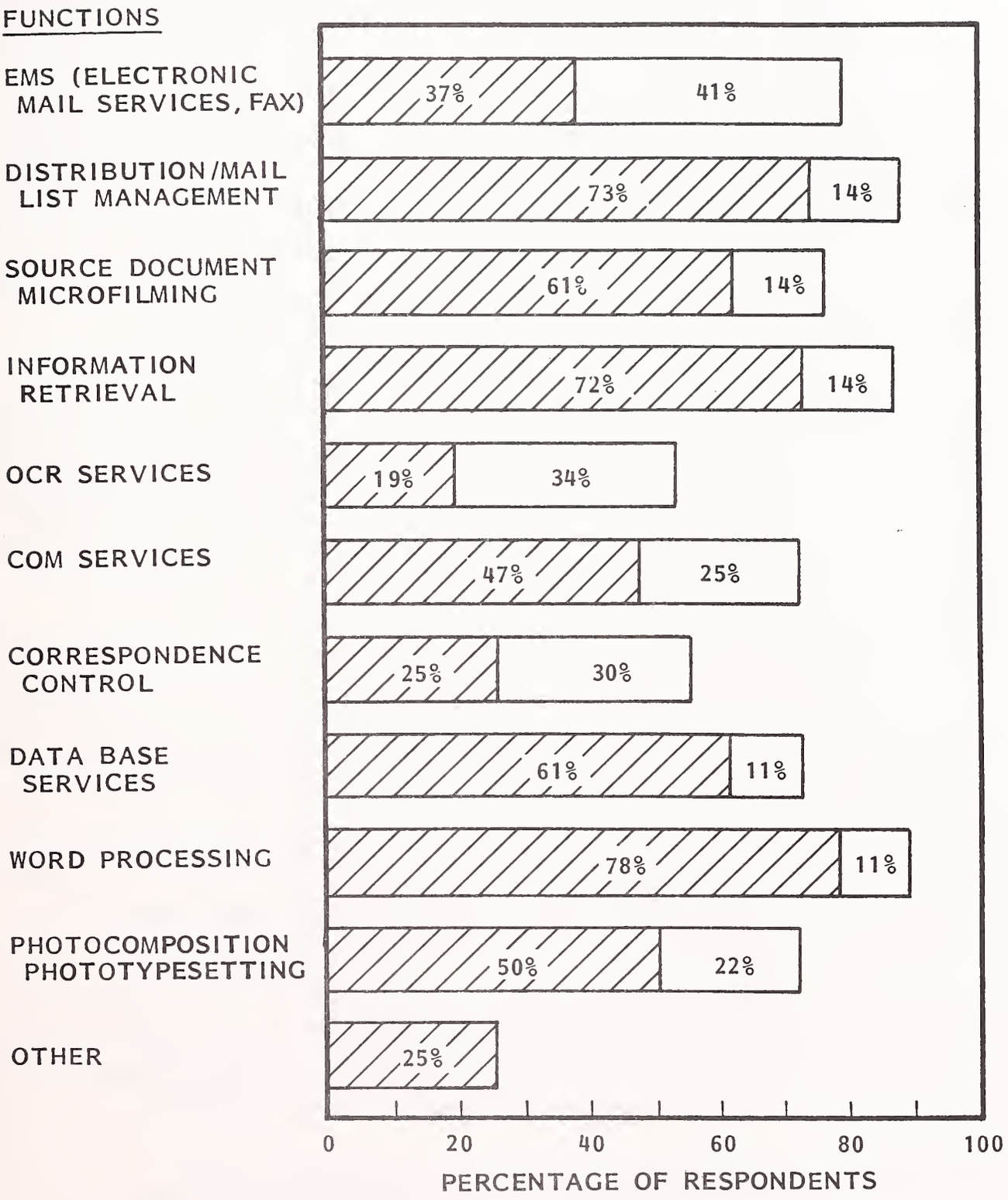
- Electronic Mail Services: TWX, Telex, and facsimile account for practically all of the installed electronic mail systems. However, there is a strong user desire for faster message service.

  - Computer based message systems are receiving a great deal of attention. Terminal installations are expected to grow at an average annual rate of 80% a year through 1984, with substantially higher rates in the earlier years.

  - Newer, faster facsimile devices are receiving a favorable market reaction. Average annual growth rate is expected to be in the 20-25% range through 1984. The growth rate will begin to decline by 1985.

EXHIBIT III-2

OFFICE AUTOMATION FUNCTIONS INSTALLED OR UNDER CONSIDERATION - ALL RESPONDENTS



- Distribution/Mail list management is second only to word processing in the number of installations. D/ML management is frequently implemented on the word processing system or central computer. This is a software application and the trend is to implement it in-house, instead of through an outside service.

- Source Document Microfilming Service: Banking and insurance firms are heavier users of source document microfilming than are manufacturers.

  - The users' desire to reduce the volume of paper storage is increasing their interest in using source document microfilming for record retention.

  - The records retained are largely transaction documents. However, as the drive toward reducing paperhandling and archival storage gains momentum, source document microfilming will be applied to other areas. As a result, the market will see a 12-15% average annual growth rate through 1984.

- Information Retrieval ranks third among the office automation services currently in use. User interest remains fairly strong in this area. This interest will increase as more information is being stored in digital form and on film. The market should show a substantial growth in the 1982-1984 time frame.

- OCR services have the least number of installations. Several respondents find the service interesting but too expensive for office applications.

  - Prices are coming down. A 40% reduction in full page scanners is expected by 1981. Market growth for office automation applications, which is expected to average 60% annually through 1984, will achieve a maximum growth in 1982-1984.

  - By way of contrast, the traditional OCR market is expected to have an average annual growth rate of 16% through 1984.

- COM Services: Forty-seven percent of the respondents use COM Services. Nineteen percent of the users record the computer output on magnetic tape and send it to a service company for processing onto microfilm. Frequently, this service is a large part of the respondents' EDP budget.

  - Just as in the case of source document microfilming, COM has been traditionally used for archival records. It too is beginning to find increasing use in other areas, particularly office applications. As a result, a 55% average annual growth rate in these areas is anticipated through 1984.

  - By way of contrast the entire market growth rate is projected at 14% over the same time period.

  - Essentially, the same equipment is used for source document microfilming and computer output microfilming.

- Correspondence Control has a small number of installations. However, it is receiving considerable attention and users indicate it is one of the faster growing areas.

- Data Base Services: Sixty-one percent of the users have on-site data base service capabilities. Users say this capability is under utilized at present but its use is growing rapidly. The under utilization is a result of a lack of application software and on-line terminals. These deficiencies can be translated into terms of time and money. Their correction will account for a substantial portion of the 30-35% overall annual growth rate through 1984.

- Word Processing has the greatest number of installations of any office automation function. Seventy-eight percent of all users have installations and another 11% are considering it.

  - Many users are upgrading their present installations to shared resource systems with communications capabilities.

- Many have plans for adding functions such as electronic mail. Providing a direct interface to a phototypesetter is becoming increasingly popular.

- The market is expected to have a 39% growth rate annually through 1984.

- Photocomposition/Phototypesetting: Fifty percent of the users have photocomposition and phototypesetting installations. Another 22% are considering such an installation. A variety and high volume of printing needs are required to justify the cost of these installations. Barring substantial cost reductions, the average annual growth rate is projected at 10-15% through 1984.

- Exhibits III-3 through III-5 show the use of office automation services by the banking, insurance and manufacturing industries respectively. The following statements summarize their differences and similarities in the use of office automation.

- Electronic Mail Services - Manufacturing has more installations and greater interest in electronic mail systems (90%) than banking (70%) or insurance (58%).

- Distribution/Mail List Management - All three industries have a high interest in distribution/mail list management functions: Insurance (91%), manufacturing (86%), and banking (80%).

- Source Document Microfilming - Banking and insurance have far greater requirements than manufacturing for source document storage. This fact is reflected in the exhibits.

  - Eighty percent of the banking respondents are using source document microfilming and an additional ten percent are interested.

EXHIBIT III-3

OFFICE AUTOMATION FUNCTIONS INSTALLED OR
UNDER CONSIDERATION - BANKING AND FINANCE INDUSTRY

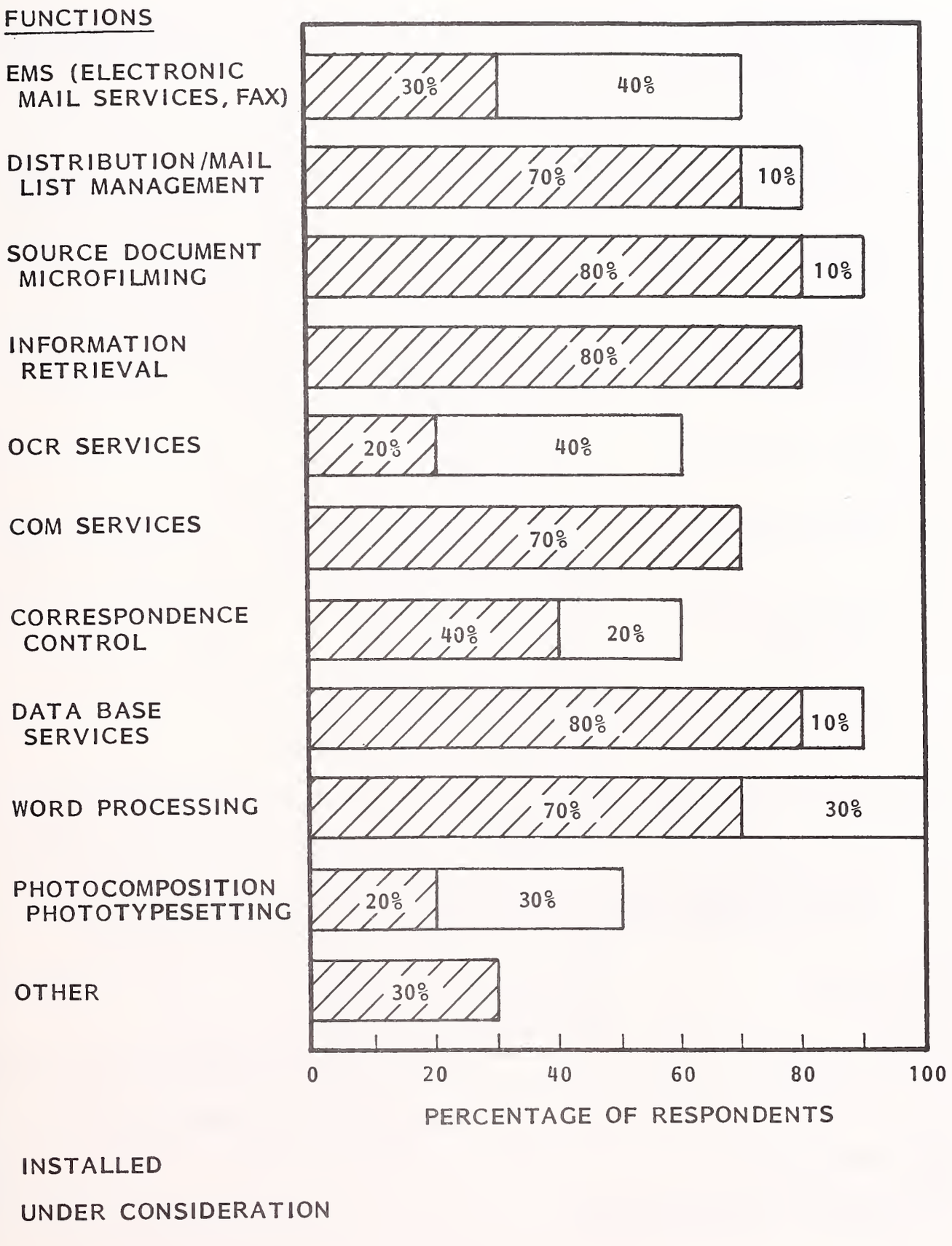


EXHIBIT III-4

OFFICE AUTOMATION FUNCTIONS INSTALLED OR UNDER CONSIDERATION - INSURANCE INDUSTRY

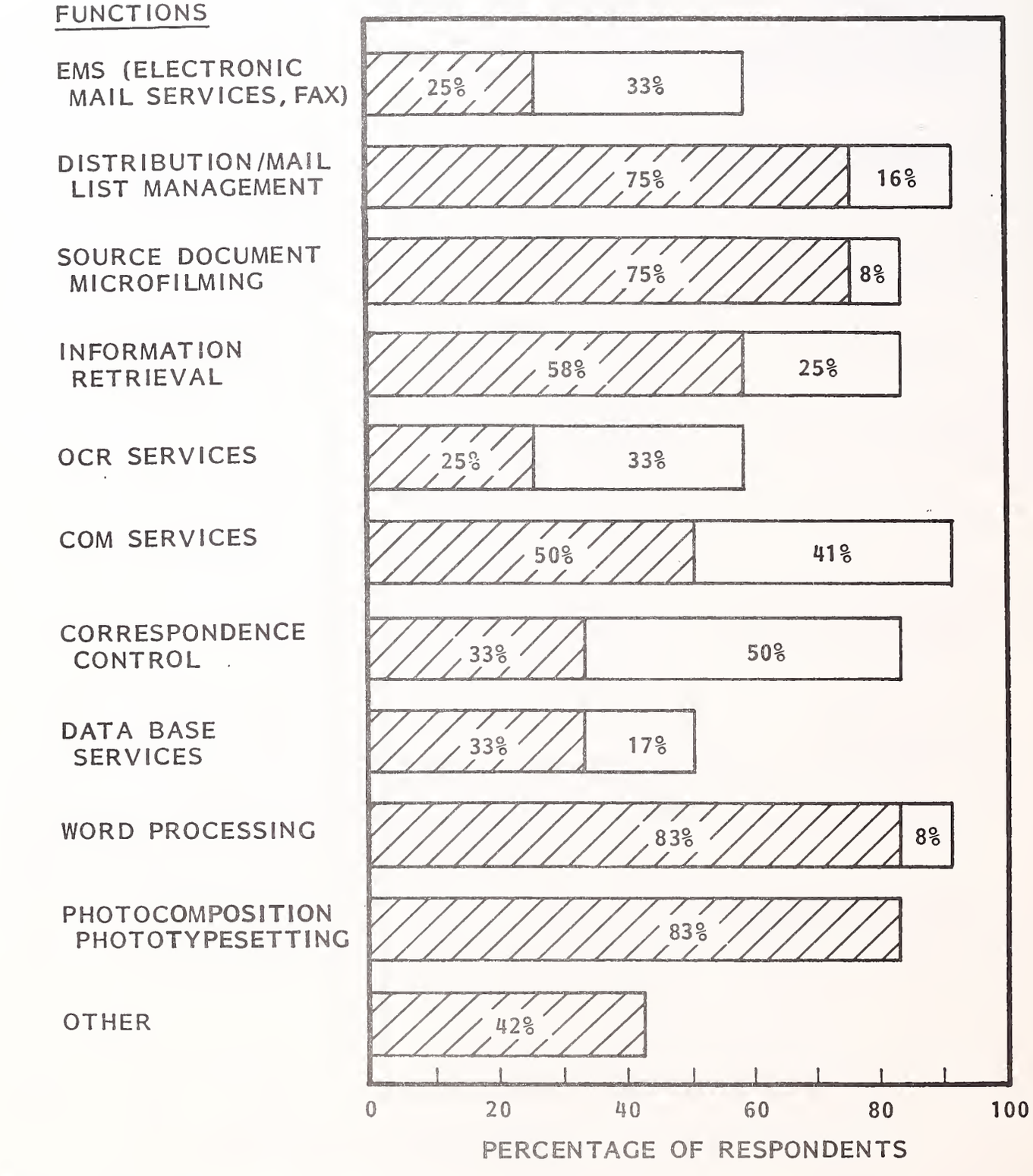
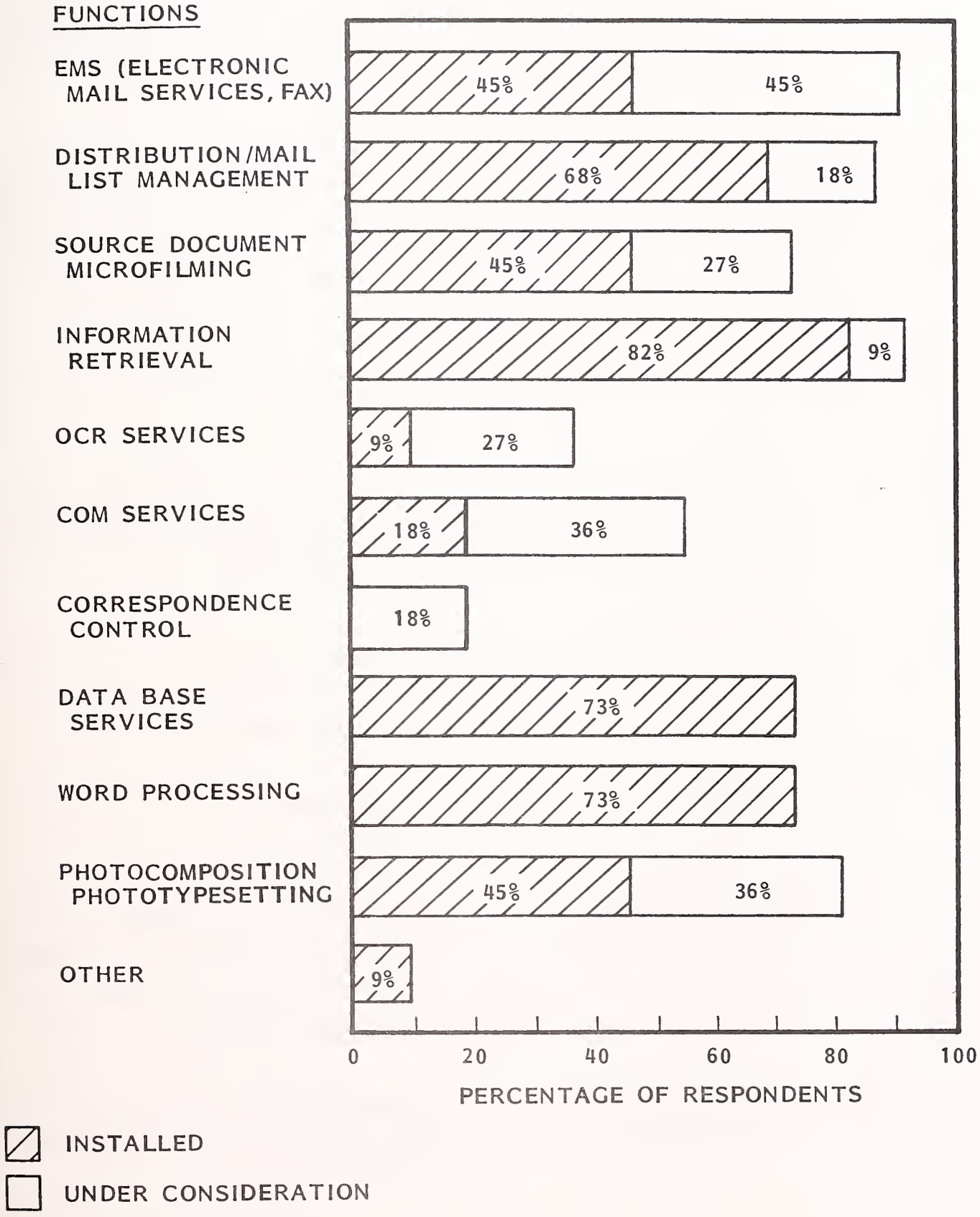


EXHIBIT III-5

OFFICE AUTOMATION FUNCTIONS INSTALLED OR
UNDER CONSIDERATION - MANUFACTURING INDUSTRY



- Seventy-five percent of the insurance respondents are microfilming source documents and an additional eight percent are interested.

- In contrast to the banking and insurance industries, only 45% of the manufacturing respondents are using source document microfilming, although an additional 27% indicate an interest.

- OCR Services - All three industries show a substantially greater interest in OCR services than their current installations indicate. The percentages for banking and insurance are higher than those for manufacturing. Banking and insurance are interested in high-speed scanning of checks and transaction documents, because they process a large volume of these items every day.

- COM Services - Seventy percent of the banking respondents are using COM services.

  - Fifty percent of the insurance companies are using COM and an additional 41% are considering it. Apparently the insurance industry has a greater interest than banking in COM services.

  - The number of manufacturing respondents who show an interest in COM is twice as great as those who have it installed. However, their requirements are not as great as the banking and insurance sectors.

  - Insurance respondents, with an installed base greater than 2.5 times that of manufacturing, also shows a higher percentage of interest.

  - Banking respondents have the highest installation percentage, but there is apparently no interest in future installations. This may be the result of the fact that banks use COM for a single application, check recording.

  - The 30% of the banks that are not currently using COM are small and cannot afford the service. If other applications, beneficial to banking

are developed and if the cost of the service continues to decline, this market could open up for COM services.

- Correspondence Control - Forty percent of the banking respondents are using correspondence control and another 20% are considering it. The principal application is in loan tracking, including action reminders.

  - Thirty-three percent of the insurance respondents are using correspondence control and another 50% are considering it. They use it for premium tracking with action reminders, and as an integral part of their EDP services, for policy management.

  - Not one of the manufacturing repsondents has an automated correspondence control system. However, 18% are considering it.

- Data Base Services - Banking and manufacturing respondents each have a higher percentage of data base services than do insurance respondents. This correlates with the information retrieval figures. The two techniques are mutually supportive.

  - The 27% of the manufacturing respondents who do not have data base services are not interested in it. This is the result of a lack of knowledge. The responses show they believe data base services have something to do with EDP. They are not aware the services are used as an information source for research and marketing.

- Word Processing - Seventy percent of the banking respondents have automated word processing, and the remaining 30% are considering it.

  - Eighty-three percent of the insurance respondents have word processing and another 8% are considering it.

  - Seventy-three percent of the manufacturing respondents have word processing. Many of these users are expanding and augmenting their

present systems. However, no respondent among the 27% who does not have word processing is considering it. This apparent contradiction is explained by the fact that almost all of the 27% have a stable or single product line. They are operating in a well defined market and have a long established customer base. They do not have the same need for word processing as manufacturers with diverse product lines and highly competitive markets.

- Photocomposition and Phototypesetting - Eighty-three percent of the insurance respondents have phototypesetting or photocomposition services installed. None of the remaining 17% are considering these services. These are companies with specialized products tailored to specific markets. For example: decreasing life and disability insurance covering the term of a loan and sold through banks and lending institutions.

  - Forty-five percent of the manufacturing respondents have phototypesetting and/or photocomposition services. An additional 36% are considering it.

  - Twenty percent of the banking respondents have phototypesetting and/or photocomposition services. Another 30% are considering. Apparently, banks' need for these services is not as great as those of insurance and manufacturing. Banks have lower requirements for product brochures, promotional literature, and similar documents.

IV VENDOR ATTITUDES

IV VENDOR ATTITUDES

- The information presented in this section is based on data which INPUT collected in a series of personal, telephone, and mail interviews. The companies selected for interviews included both system hardware and services vendors. The ratio of hardware to services vendors is 1.5 to 1. The interview program is shown in Appendix A.

- All vendors believe they will have an important role in establishing the office of the future.

- The merging of word and data processing is an evolutionary step towards the integrated information processing system. Almost all system hardware vendors expressed this belief which is reflected in their present and future product plans.

- Several vendors also consider multifunction work stations as an evolutionary step towards the integrated information processing system.

- Many vendors view distributed information processing as the principal route leading to the final goal of a totally integrated system.

A. VENDOR PRODUCT OFFERINGS

- The office of the future concept includes such a wide diversity of products and services that no single vendor provides them all. However, many respondents are offering systems which integrate several office of the future functions. A few others plan to introduce similar systems in the very near future. Most of these systems are designed to provide interface and communications capabilities which will allow the integration of other functions at a later date.

- Exhibit IV-1 shows the percentage of all vendors currently offering each of the ten office automation functions considered in this report. The exhibit also shows the percentage of total vendor respondents who are planning or considering each function as a future offering.

  - Ninety-three percent of all vendors offer or plan to offer electronic mail services including CBMS, TWX, TELEX, and facsimile.

  - Eighty-six percent offer or plan to offer word processing.

  - Eighty-six percent offer or plan to offer information retrieval.

- OCR, COM, and data base services show the greatest planned or contemplated future growth on a percentage basis.

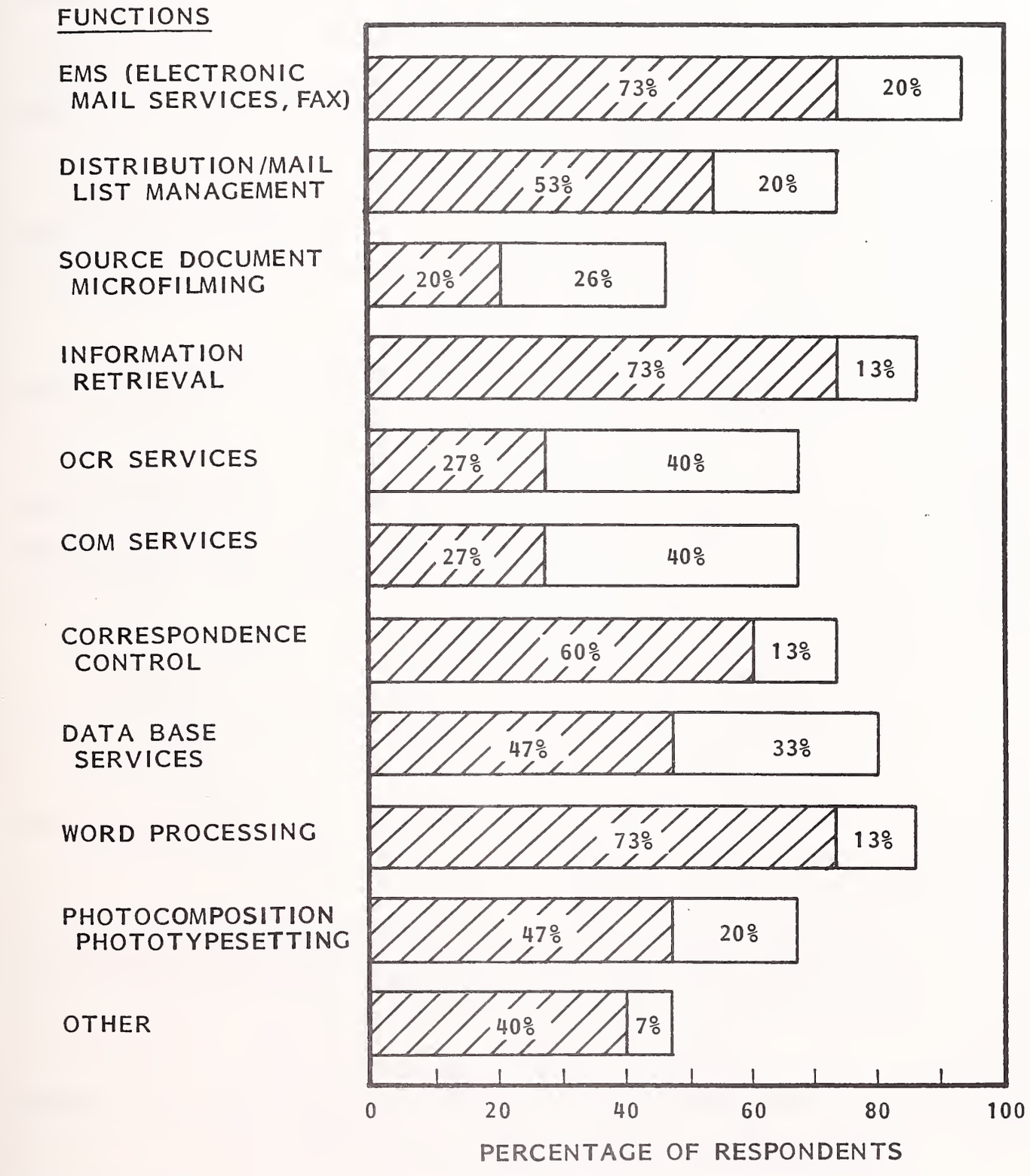
  - Twenty-seven percent of all vendor respondents presently offer OCR services. Forty percent are considering it in future plans.

  - The same percentages hold true for COM services as for OCR.

- Forty-seven percent of the respondents currently offer data base services and 33% are considering it in future plans. If these plans mature, data base services will be in fourth place behind electronic mail, information retrieval, and word processing.

EXHIBIT IV-1

CURRENT AND FUTURE OFFICE AUTOMATION PRODUCT OFFERINGS BY ALL VENDOR RESPONDENTS



I. HARDWARE VENDORS

- Exhibit IV-2 shows all hardware vendor respondents' current and possible future product offerings in the area of office automation.

  - Eighty-nine percent of these vendors currently offer word processing and the remaining 11% plan to introduce it in the future.

  - Seventy-eight percent of all hardware vendors are currently offering electronic mail services and 11% are considering offering it in the future.

  - Sixty-seven percent currently offer correspondence control and 22% are considering offering it in the future.

- If all of the vendors contemplating the addition of correspondence control actually do so, 89% will offer correspondence control. This number will only be exceeded by the 100% word processor offering and equalled only by electronic mail services.

  - There is a causal relationship between the increases in electronic mail services, word processing, and correspondence control.

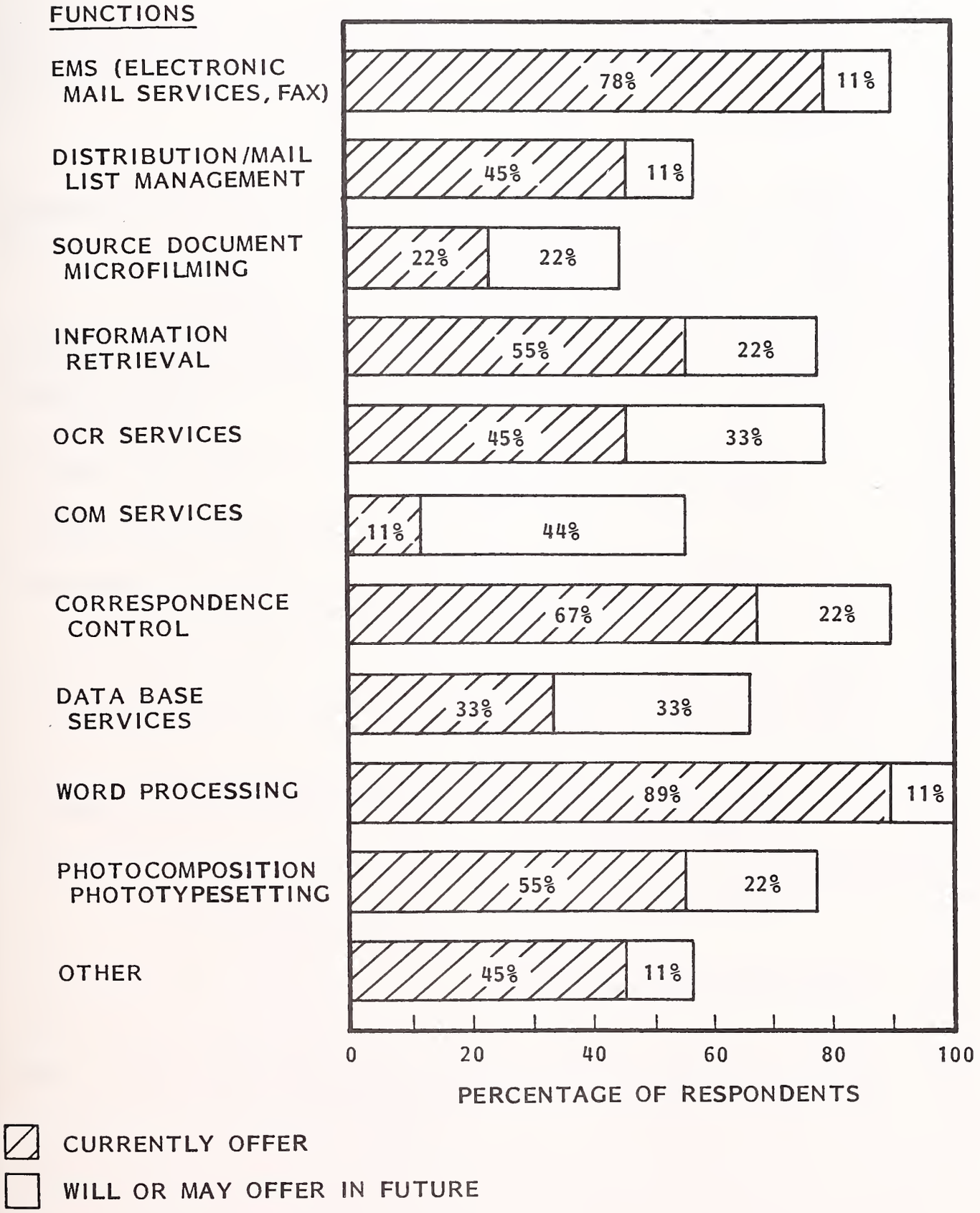
  - These three functions naturally augment each other and readily lend themselves to integration.

- Computer output microfilming services show the highest future growth rate on a percentage basis. Only 11% of hardware vendors currently offer this service, but 44% are considering it for the future.

  - These numbers reflect the vendors response to the users' expressed desire to reduce the volume of paper they handle.

EXHIBIT IV-2

CURRENT AND FUTURE OFFICE AUTOMATION PRODUCT OFFERINGS BY ALL HARDWARE VENDOR RESPONDENTS



- The possible doubling of source document microfilming offerings from 22% to 44% reflects the same response to user requests.

- The number of vendors offering data base services is expected to double in the future, going from its current 33% to 66% of all vendors. The anticipated 22% increase in information retrieval offerings, from 55% to 77%, is a corollary development.

- Together, the probable increase in data base services and information retrieval reflect vendor responses to user requests for greater, more flexible information retrieval capabilities.

- Forty-five percent of the vendors currently offer optical character recognition hardware, and an additional 33% are considering such an offering in the future.

  - A substantial increase in photocomposition and phototypesetting offerings is also under consideration.

  - Considering Exhibit IV-2 as a whole, it is apparent that the hardware vendors' business is healthy and in an expanding mode.

- Exhibit IV-3 shows the actual equipment hardware vendors offer, or plan to offer, to implement and integrate office automation functions.

  - Most respondents offer or intend to offer both small business computers and word processors.

  - Most plan eventually to offer facsimile, but not copiers.

2. COMPUTER SERVICES VENDORS

- Exhibit IV-4 shows computer services vendors and possible future service offerings in the selected areas of office automation.

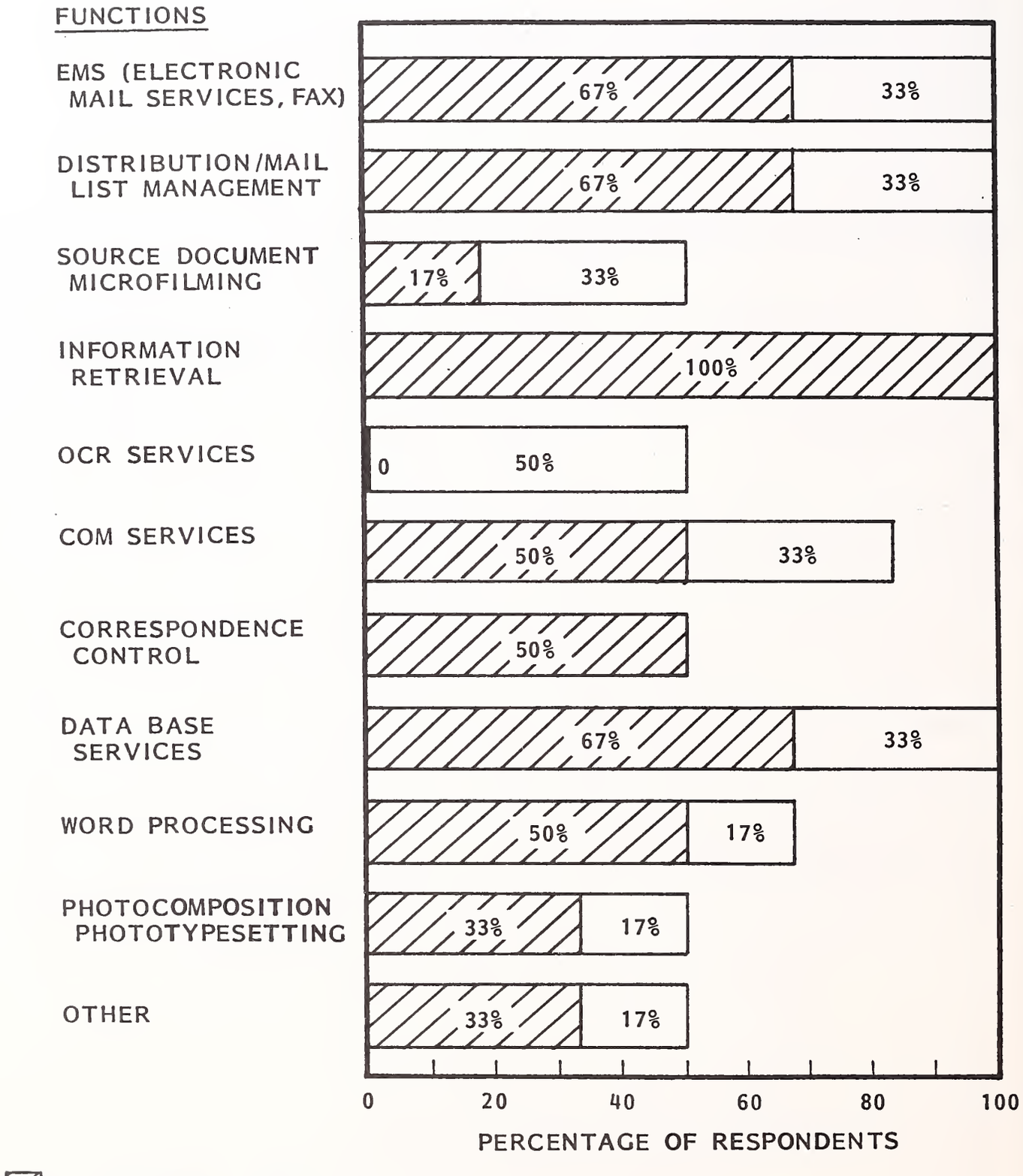
EXHIBIT IV-3

OFFICE AUTOMATION HARDWARE OFFERINGS BY ALL HARDWARE VENDOR RESPONDENTS

OFFICE AUTOMATION HARDWARE	CURRENTLY OFFERED (PERCENT)	MAY OFFER (PERCENT)	DO NOT PLAN TO OFFER (PERCENT)
SMALL BUSINESS COMPUTERS	67%	11%	22%
WORD PROCESSORS	78	-	22
WORD PROCESSOR/DATA PROCESSOR COMBINATION	78	11	11
I/O TERMINALS	67	11	22
FACSIMILE EQUIPMENT	34	33	33
COPIERS	22	11	67
PRINTERS	56	22	22
INTEGRATED PERIPHERALS SYSTEMS (MFS, PABX)	34	33	33

EXHIBIT IV-4

CURRENT AND FUTURE OFFICE AUTOMATION
PRODUCT OFFERINGS BY ALL
COMPUTER SERVICES VENDOR RESPONDENTS



- All respondents are currently offering information retrieval services.

- Sixty-seven percent are currently offering data base services and the remaining 33% are considering offering this service in the future.

- The possible future increase in data base services to equal the 100% offering of information retrieval services reflects the vendor's response to user requests for greater, more flexible information retrieval capabilities.

  - Sixty-seven percent of all computer services respondents are currently offering electronic mail services and distribution/mail list management. The remaining 33% in each category are considering future offerings of these services.

  - Increasing market demand and a desire to increase their revenues are the reasons why additional vendors are thinking of offering these services.

- A dramatic event may occur in the area of optical character recognition services. Presently, not a single computer services respondent is offering this service. However, 50% are considering such an offering.

  - Today's OCRs are sophisticated devices capable of reading different type fonts as well as bar codes. They are ideal for applications where high speed counting and sorting are required.

  - However, OCR's purchase price is too high for most businesses from a cost/justification standpoint.

- The above conditions create an opportunity for computer services vendors to increase their revenues. If they can find a way to use one or a few OCR devices to serve many customers, the high cost of the devices can be easily defrayed by the revenues they generate.

- Another opportunity for computer services companies is to offer services of IBM's 6670 Information Distributor.

  - The IBM 6670 can provide office quality printing, text and data merging, electronic collating and separating, and ink jet printing for flexibility and remote output.

  - The IBM 6670 can also be connected to IBM mainframes.

  - Office services could be provided to clients using the processing company's computers, network and IBM 6670s.

- Fifty percent of the computer services vendor respondents currently offer correspondence control service. No other vendors are considering this service as a future offering.

  - Correspondence control is easily implemented as an ancillary function of word processing. From the computer services vendor viewpoint, correspondence control will be offered as a part of word processing and/or electronic mail systems, rather than as a standalone function.

  - Another factor which deters computer services vendors in the correspondence control area is the proprietary nature of many user's controlled correspondence.

  - Computer services vendors believe that many users consider their controlled correspondence too sensitive to entrust to an outside service. Therefore, they prefer to keep correspondence control in-house. This belief is substantiated by the hardware vendor's planned increase in correspondence control offerings, as shown in Exhibit IV-2.

- Exhibit IV-5 lists the office automation hardware offered by computer services vendor respondents as a complement to their applications software. An increasing number of computer services vendors are looking at hardware sales and leasing as a means of increasing revenues.

  - Computer services vendors have gained a substantial knowledge of hardware by installing and operating their own value added communications networks (VANS) or, more often, from offering turnkey systems.

  - Many computer services vendors have had the unique opportunity of observing similar types of equipment from different manufacturers working in actual operating environments on customer's premises.

- Computer services vendors believe they have the knowledge in both computer and telecommunications technology which qualifies them to serve as systems integrators in implementing the office of the future concept.

  - Since most computer services vendors buy equipment directly from various manufacturers, they can recommend equipment best suited to the user's needs.

  - For the same reason, they can make maximum use of equipment already in place because they do not have to recommend replacements to provide compatibility with particular types of required new equipment.

  - Computer services vendors often are already familiar with a user's procedures and requirements in terms of information flow and business methods. In these cases, the vendor can accomplish systems integration with minimal disruption of normal business routine.

EXHIBIT IV-5

OFFICE AUTOMATION HARDWARE OFFERINGS BY ALL COMPUTER SERVICES VENDOR RESPONDENTS

OFFICE AUTOMATION HARDWARE	CURRENTLY OFFERED (PERCENT)	MAY OFFER (PERCENT)	DO NOT PLAN TO OFFER (PERCENT)
SMALL BUSINESS COMPUTERS	40%	20%	40%
WORD PROCESSORS	40	20	40
WORD PROCESSOR/DATA PROCESSOR COMBINATION	60	40	-
I/O TERMINALS	80	-	20
FACSIMILE EQUIPMENT	20	-	80
COPIERS	-	20	80
PRINTERS	80	-	20
INTEGRATED PERIPHERALS SYSTEMS (MFS, PABX)	20	20	60

B. VENDOR MARKET SHARE

- Office automation hardware vendors and computer services vendors are gradually heading towards office of the future information processing networks.

- Every vendor currently serving the market is planning to continue doing so.

- Manufacturers using the same automated systems technology to serve other markets are adapting their products to serve the business communications market.

  - Word processing is often the first office function to be automated.

  - IBM introduced automatic typewriters in 1964. Today they still dominate the market with installed magnetic card and magnetic tape selectric typewriters (MT/ST).

- Independent word processing or small business computer manufacturers entered into the word processing market in the early 1970s. Many of these have been acquired by the mainframe manufacturers. For example:

  - Burroughs acquired Redactron.

  - 3M acquired Linolex.

  - AM International acquired Jacquard.

  - Raytheon Data Systems acquired Lexitron.

  - Exxon Enterprises acquired Vydec.

  - Management Assistance, Inc. (MAI) acquired Wordstream.

- Independents who have not been acquired and are doing very well include CPT, Inc., Wang Laboratories, and NBI, Inc.

- Traditional office system suppliers such as Xerox Corporation and Lanier also offer word processing systems.

- Minicomputer manufacturers also have entered the word processing market, notably Digital Equipment Corporation (DEC) and Data General.

- Manufacturers of systems used for distributed data processing are now offering word processing and other office automation function capabilities. Datapoint Corporation and Four-Phase, Inc. are already involved, and Hewlett-Packard soon will be.

- IBM has brought out newer standalone systems, notably System 6, which do well replacing older installations.

  - IBM has nearly 80% of the total word processing installed base. These are predominantly standalone non-display devices.

  - IBM is expected to maintain an average annual unit increase of 20 to 25% by introducing communicating word processing capabilities.

- The independent companies are gradually reducing IBM's installed base market share and are rapidly increasing their share of annual shipments. The current annual growth rate is 30 to 40%.

  - Wang Laboratory's $322 million fiscal 1979 revenues included $93 million for office system products. The company experienced a 62% total sales increase over 1978. Currently, Wang's word processing system shipments are increasing at a 150% annual rate. They introduced their word processing system in 1976.

- Wang's most recent product announcement, the integrated information system, combines word processing, data processing, and telecommunications within the same system. Wang's steady introduction of new information processing functions assures them of a continued high growth rate of at least 50% per year for the next several years.

- Wang is rapidly becoming a significant factor in the office automation market.

- Lanier is a relative newcomer to the word processing supplier market. After many years as a dictation equipment manufacturer, Lanier introduced a word processing system about two years ago. The system contains a product manufactured by AES Ltd. of Canada which owns 36% of Lanier.

- Lanier's AES word processing system places it among the top five in the industry, not far behind Wang in number of units shipped. Lanier's revenues were $184 million in fiscal 1979, up 42% over 1978. The growth is primarily due to word processing sales. Their new Wordplex, a shared logic system, is a step towards distributed word processing and product innovation.

- Lanier is expected to continue their high growth rate of 35-40% per year for several years.

- CPT, Inc.'s $34 million 1979 revenues, all coming from word processing, show a 70% increase over 1978. Revenues for 1980 are estimated at over $50 million. CPT focuses on smaller cities and smaller companies, rather than the largest cities and very large companies.

- Xerox Corporation is currently shipping over 850 word processing units per month and will be pushing that rate up to 1,000 per month. Xerox word processing systems are expected to grow at 20 to 25% annually over the next few years.

- IBM remains number one. However, in display device unit shipments, Wang is far ahead.

- Increasing one's individual market share is difficult in a market which is increasing annually at 30 to 40%.

  - Strong potential for market gains are AM International (Jacquard), Raytheon's Lexitron Division, Digital Equipment Corporation, and MAI's Basic Four/Wordstream.

- Companies with related office automation products are developing packaged systems built around their products. More companies are introducing multi-function systems (MFS). The most common are combinations of data and word processing with communications capabilities included.

  - DEC was the first, followed by several independents; e.g., Wang, AM International, MAI, Inc. IBM has also entered this field.

  - The majority of other suppliers will follow the trend towards integrated communicating information processing.

- Between 1978 and 1984 communicating word processors will have the most rapid growth of all word processing systems.

  - Prior to 1978, fewer than 5% of the total word processor installations were communicating word processors. By 1984 they will approach 40% of the total installations.

  - Many vendors view communicating word processors as the backbone of intra-company electronic message services.

- The major advantages of communicating word processors is the potential of adding functions such as:

- Electronic mail services.

- Correspondence control.

- Distribution/mail list management.

- Information retrieval.

- Data base services.

- Facsimile equipment has been around since the 1920s, when it was primarily used by news and wire services. Business use began in the 1960s.

  - Business now accounts for 80% of all facsimile use.

- Until recently, Xerox held a 45% share of the installed base of facsimile units. Graphic Sciences and 3M shared another 25% of all installed units. The balance was shared by at least a dozen other vendors.

- The facsimile market picture is changing. New entrants such as Qwip and Panafax in the "two minute" market are gaining ground and each is capturing at least 10% of annual shipments.

- Rapicom (merger of Rapifax and Dacom) currently is the leader in the high speed (two minutes or less) fax market. Their latest product allows store and forward multiple addressing, and alternate communications over public switched networks.

- Graphic Sciences, Inc. has a full range of facsimile products. They are in an excellent position to increase their 12% plus share of the market.

- Xerox is trying to maintain their facsimile market dominance with new, faster units introduced over the past year. These new products could help maintain and possibly increase their present market share.

- IBM has developed a new data compression method for digital facsimile. It will transmit a page in about one minute. The method is under consideration as a worldwide facsimile standard by the CCITT. If this happens, IBM could make a sizeable penetration into the worldwide facsimile market.

- Compression Labs Inc., has developed a new data compression technique facsimile. It is based on a patented coding scheme called Character Symbol Matching.

  - The coding scheme combines the earlier Run Length Coding (RLC) and Optical Character Recognition to produce five times more efficiency than the RLC compression technique.

  - It is a store-and-forward facsimile message switch with intermachine and teletypewriter compatibility. The "black box" can be added onto current slow facsimile equipment for store and forward functions.

- The bulk of electronic message services is the over 200,000 teletypewriter terminals furnished by telephone companies, and Western Union.

- TWX/Telex transmission speeds are slow for today's requirements. However, replacing them with faster devices is costly, and it will be very gradual.

  - It is possible that new installations will keep up with retirements for quite some time.

- Computer Based Message Systems (CBMS) are the ultimate in interactive message systems. These high-speed systems are user-oriented and very efficient. However, they are very expensive. The number of installed subscriber terminals is expected to approach 15,000 by the end of 1979.

- Suppliers of CBMS services by public access systems include:

  - Tymnet - "ON TYME."

- Scientific Time Sharing - "MAILBOX."

- Compuserve - "PLEXUS."

- Computer Corporation of America supplies their, "COMET," CBMS system for private, intra-company networks.

- The market is approximately evenly divided between the public and private suppliers. The market, in terms of subscriber terminal installations, is expected to grow at a rate of 100% per year through 1982.

- Computer Output Microfilm (COM) processing is used by approximately 30,000 U.S. companies. Only 10% of these companies own their own equipment.

  - Ninety percent of all COM processing is done by COM service companies. The largest of these are U.S. Datacorp and Zytron (now part of National CSS). Another nationwide micrographics service company is Computer Micrographics, Inc.

  - U.S. Datacorp and Zytron also install turnkey COM systems, primarily for customers who have been using a service company and whose processing has increased to over 300,000 frames per month (an industry rule of thumb for purchase cost justification).

  - Major suppliers of COM equipment are Datagraphix, Kodak, and 3M.

  - A minor supplier, Quantor, is now owned by NCR.

  - COM equipment may be used for source document as well as for computer output microfilming.

C. MARKETING TECHNIQUES

- Vendors of office automation systems hardware and services were asked what industries and company sizes constitute their target markets.

- Exhibit IV-6 shows the level of interest expressed by all vendor respondents. There is little variation between systems hardware and computer services vendors, either in level of interest or industry selection. The few differences are:

  - The retail and educational markets were only specified by system hardware vendors.

  - The utilities market was only specified by computer services vendors.

  - The automotive industry was mentioned as a new target market by one computer services respondent.

- The industries which vendor respondents specified as target markets are those they are already serving. Major new marketing approaches and techniques will not be required. Vendors will first deal with their established customer base.

- Exhibit IV-7 reflects vendors' viewpoints of the driving forces for the use of office automation systems and functions.

  - All vendor respondents view economic justification and increasing productivity as closely related. However, the key to achieving these objectives is the effectiveness of the system.

  - Applications aimed at solving specific information handling tasks have a higher priority with system hardware vendors than with computer services vendors. The problem is deciding which application should be implemented first on the basis of user needs.

EXHIBIT IV-6

VENDOR TARGET MARKETS BY INDUSTRY CATEGORY AND COMPANY SIZE

INDUSTRY CATEGORY	TOTAL VENDOR INTEREST (PERCENT)	COMPANY SIZE			
		VERY LARGE >500 $ MILLION (PERCENT)	LARGE 150-500 $ MILLION (PERCENT)	MEDIUM 25-150 $ MILLION (PERCENT)	SMALL <25 $ MILLION (PERCENT)
MANUFACTURING	83%	75%	75%	42%	17%
BANKING AND FINANCE	75	42	42	33	25
HEALTH CARE/ MEDICAL	42	42	42	17	-
LEGAL	25	25	25	25	17
INSURANCE	25	25	25	25	-
WHOLESALE DISTRIBUTION	25	8	8	8	8
RETAIL	17	8	8	8	8
SERVICES	17	8	8	8	8
OTHER INDUSTRIES*	8	8	8	8	8

* INCLUDES UTILITIES, GOVERNMENT AND EDUCATION

NOTE: TWENTY-FIVE PERCENT OF ALL VENDOR RESPONDENTS STATED THEY WERE TARGETING ALL INDUSTRIES WITHOUT REFERENCE TO SIZE OR CATEGORY. THESE RESPONDENTS ARE NOT INCLUDED IN THIS EXHIBIT

EXHIBIT IV-7

RELATIVE IMPORTANCE OF DRIVING FORCES FOR USING OFFICE AUTOMATION, AS RATED BY ALL VENDOR RESPONDENTS

DRIVING FORCES	ALL VENDORS (PERCENT)	HARDWARE VENDORS (PERCENT)	SERVICES VENDORS (PERCENT)
ECONOMIC JUSTIFICATION	90%	91%	88%
INCREASE PRODUCTIVITY	81	82	80
APPLICATIONS	76	80	68
NETWORK AVAILABILITY	57	58	56
STANDARDIZATION	46	42	52
SECURITY	36	38	32
EMPLOYEE *	31	36	24

* COMPUTER AIDED INSTRUCTION

- Many vendors view network availability to be more important to Fortune 500 companies than to others. However, it is beginning to be important to Fortune 1000 companies.

- Most vendors view standardization, security, and employee computer aided instruction as important to users, but not as driving forces.

- Vendors were asked what level of management they considered to be the key buying points for office automation systems and services.

- System hardware vendors consider the EDP manager or the telecommunications manager the key buying points.

  - Very often both managers within a company are contacted.

  - In the future, MIS or DP managers will be upgraded.

- The buying point for vendors of basic word processing equipment is the word processing supervisor and administrative services manager. Telecommunications managers are a strong influencing factor, although they may not be the initial contact.

- An automation task force or business task force is the corporate approach of the future. Both hardware and computer services vendors are beginning to see this type of team.

- Exhibit IV-8 shows the key management buying points as perceived by vendors.

  - Vendors of standalone word processing systems often contact managers of using departments wherever they are located. The trend is to interface with both central headquarters and remote locations.

EXHIBIT IV-8

MANAGEMENT BUYING POINT LOCATION
AS PERCEIVED BY VENDOR RESPONDENTS

BUYING POINT LOCATION	ALL VENDORS (PERCENT)	HARDWARE VENDORS (PERCENT)	SERVICES VENDORS (PERCENT)
CENTRAL HEADQUARTERS	64%	67%	60%
REMOTE LOCATION	14	11	20
BOTH CENTRAL AND REMOTE	22	22	20

- Sixty-four percent of all vendors consider the central headquarters as the location where buying point management decisions are made. They do not foresee a change in this structure.

- Exhibit IV-9 reflects the vendors' views of factors influencing the organizational decision process for office automation systems.

- Respondents discussed several factors relating to their future office automation products and services. Sixty-seven percent of all vendor respondents see future office automation products and services as extensions to their present offerings.

  - Obtaining the maximum degree of enhancement on present products and services protects the user's investment in equipment and training.

  - Extending the present product line is viewed as an evolutionary progression towards new products.

- Twenty-seven percent of all vendor respondents intend to offer new separate products as well as extensions of present products.

  - Customizing to user's unique problems and requirements are often considered as separate products or services.

  - Only system hardware vendors are considering separate products along with data product extensions.

- Six percent of the vendor respondents were not sure whether their office automation products and services would be separate or extensions. The commitment to office of the future products is so recent, this decision has not been made.

- Exhibit IV-10 shows the vendors' views on their organizational sales force for office of the future products and services.

EXHIBIT IV-9

ORGANIZATIONAL FACTORS INFLUENCING
OFFICE AUTOMATION DECISION PROCESS
AS PERCEIVED BY VENDOR RESPONDENTS

INFLUENCING FACTORS	ALL VENDORS (PERCENT)	HARDWARE VENDORS (PERCENT)	SERVICES VENDORS (PERCENT)
CENTRALIZED VERSUS LOCAL CONTROL	81%	80%	84%
EDP MANAGEMENT VERSUS OFFICE MANAGEMENT	71	62	88
SERVICES VERSUS IN-HOUSE	69	64	76

EXHIBIT IV-10

OFFICE OF THE FUTURE SALES FORCE

SALES FORCE	ALL VENDORS (PERCENT)	HARDWARE VENDORS (PERCENT)	SERVICES VENDORS (PERCENT)
USE EXISTING SALES FORCE	36%	22%	60%
USE A SEPARATE SALES FORCE	21	22	20
USE EXISTING NOW BUT SEPARATE LATER	29	34	20
UNDECIDED	14	22	-

- Fifty percent of all vendors will eventually have separate sales forces for office of the future products and services.

- Many vendor respondents stated that their sales force structure would change as product plans develop.

- It is clear that the industry is in its infancy and changing as it grows.

D. MAINTENANCE AND SERVICE

- Vendors were asked how maintenance and service is going to be handled for office of the future products and services. Will they establish a separate maintenance and service organization, or simply expand the present service staff?

  - Sixty-four percent of all responding vendors indicated that their maintenance and service organizations will remain essentially the same. Several hardware vendors say they have combined separate maintenance organizations, formerly dedicated to specific product lines, into a single maintenance organization. However, specialized skills are still maintained.

  - Twenty-two percent of the responding vendors indicate they will set up separate maintenance and service organizations for office of the future products. The majority of vendors who plan to have separate maintenance and service organizations are in the computer services sector. The separate maintenance organizations will be primarily for hardware the vendors plan to offer.

  - Fourteen percent of the responding vendors are uncertain about their plans for maintenance and service organizations. Decisions will be made when their development plans are more concrete.

- Fifty percent of all vendor respondents intend to separate (unbundle) maintenance and service costs from the purchase or lease price. An additional 14% will unbundle these costs for purchase and bundle for equipment rental.

- Twenty-two percent of all vendor respondents will bundle the maintenance and service costs in the purchase price. These costs are in the form of maintenance agreements or contracts and, therefore, are considered bundled.

- The remaining 14% of the vendors are uncertain just how these costs will be defrayed. This is particularly so for computer services vendors who plan to offer hardware for the first time.

E. TRAINING AND SUPPORT

- Operator training for office automation products and services is provided by 100% of all vendor respondents.

  - Ninety-three percent of these vendors plan on using their present training staff rather than separate personnel.

  - Companies offering word processing systems are rapidly increasing their training staff. However, word processing instructors remain within the present training organization.

  - New titles for operator trainers, such as marketing support staff, are becoming well known. Their position requires a general knowledge of the hardware, and specific knowledge of software. A recommended, and often required, qualification for marketing support positions is office procedures experience.

- Operator training is provided either at the user's site, at the vendor's plant, or at a vendor's special educational facility.

- Forty-three percent of all vendor respondents bundle basic training costs into the purchase price of the system. However, additional operator training or advanced training is sold separately.

- Twenty-nine percent of the responding vendors make an additional charge for basic operator training.

- Forty percent of the computer services vendor respondents indicate that the training costs are separate contracts due to the large number of user application manuals and computer education courses involved.

- It is clear that vendors' sales, maintenance and training procedures will generally continue along the same path as previously. However, there is a gradual shift in focus of the training.

  - Greater attention is paid to customer training and orientation. Personal attention and training aids are receiving more emphasis.

  - Vendors are paying more attention to users' lack of familiarity with technical terms and equipment.

  - This is reflected in the changing qualifications for marketing support personnel. Employees used to be selected primarily on the basis of technical background. Today, an office background and a comfortable familiarity with technology is considered most desirable.

- Each vendor has opinions on meeting the users' unmet needs in office automation functions. These opinions vary with each vendor. The common need expressed by all vendors is to improve information handling productivity. Some comments are paraphrased in the following statements.

- The purpose is to increase the productivity and effectiveness of management. The method is to emphasize the integration of functions to tie all of the capabilities into one system.

- Serious contenders in the office of the future will have to offer a broad range of products and services; everything for the automated office.

- Working closely with the user from defining organizational information processing requirements to final step-by-step implementation. The customer and vendor should determine the overall problem and identify specific applications in the order of their need to be automated.

- Office automated functions are evolutionary steps toward the office of the future. The evolution will be towards distributed information processing.

- Continuing to develop systems which are transparent to the user: uncomplicated keyboards, English-based languages, voice input, etc.

- Specific goals mentioned by responding vendors include:

  - Improve turnaround time.

  - Improve worker job satisfaction.

  - Improve internal and external communications.

  - Provide easy to use tools for management.

  - Continue to reduce customers' costs.

- Specific office automation functions vendors are emphasizing to satisfy unmet users' needs include:

- Access to major data bases through information retrieval.

- Merging text and data.

- Integration of word and data processing.

- Terminal to terminal communications or software to handle the interconnection.

V USER ATTITUDES, EXPERIENCES AND REQUIREMENTS

V USER ATTITUDES, EXPERIENCES AND REQUIREMENTS

A. ATTITUDES TOWARDS OFFICE AUTOMATION

- Users' attitudes towards automation in the office environment are generally favorable. In a few cases (less than 10%) there is a positive, progressive viewpoint. These are predominately large organizations which have already automated several office functions.

- A more cautious attitude is expressed by the majority of users. They are generally favorable towards the office of the future concept but are aware of many obstacles and problems associated with its implementation. They view office automation as a piece-meal process, gradually evolving into the office of the future.

- A completely integrated system could be realized with existing technology but the major problem is a "people" one. The "people" are top management and clerical personnel.

- Management does not understand how an integrated system will increase their managerial effectiveness.

  - Management thinks of office automation in terms of unrelated, task oriented devices; a word processor to increase typists' productivity, for example.

- A key ingredient of management's reluctance to fully automate the office is the lack of a sound return on investment analysis of the costs and benefits accruing to office automation.

- Clerical workers do not understand the technology and are afraid of it. They believe that at best they will have to learn new skills and at worst their jobs will be eliminated.

- However, experience has proven that workers must learn new skills, but few if any jobs have been eliminated to date. Fully integrated offices could change this in the future.

- Workers who have learned the skills are upwardly mobile. New career paths have opened up for them. Therefore, clerical opposition to the office of the future can be overcome.

- A few large organizations which have some office automation are ready to implement the office of the future concept now.

- At the other end of the spectrum, there are a very few users who are satisfied with their present office operations. They can see no reason for "complicating the operation" or "upsetting the routine."

- To summarize general user attitudes: most users think of the office of the future in terms of task-oriented, unrelated devices rather than an integrated network for information flow. Even the most progressive users occassionally lapse into this kind of thinking.

- The majority of users believe that the office of the future will be the end result of an evolutionary growth rather than the result of implementing a master plan with a definite time schedule. The foregoing paragraphs discussed user attitudes in general. The following paragraphs cite specific examples.

1. THE PROGRESSIVE ATTITUDE

- The first example is a very large bank. They already have seven of the ten outlined office automation functions installed and operating. Of the remaining three, OCR service is currently being installed and will be operational before January 1980. They are also actively considering electronic mail and correspondence control.

- The bank's four year plan for office automation started in December 1978, under the direction of a specialist, "Project Manager of Advanced Office Systems."

- In this case, management is committed to the office of the future concept. What resistance there is, comes from operating personnel.

- This resistance is being overcome by involving all levels of personnel in the transition phase. Advisory committees have been formed and ideas are sought from everyone. The purpose is to give everyone a stake in the success of the program.

- The bank believes this is a more humanistic approach than inviting a "think tank" in to revolutionize the system. They have even employed a counselor to deal with personal concerns on a one to one basis.

2. THE AVERAGE ATTITUDE

- The second example is a medium sized insurance company. This company currently has five of the office automation functions outlined. In the past they also had source document microfilming and optical character recognition (OCR).

  - The company discontinued microfilming because they found it easier to make and handle hard copy.

- The company discontinued OCR because it was too costly. They returned to key punching.

- The company does not believe they have "unmet needs" which could be fulfilled with office of the future systems, although they may return to microfilming.

- The company believes it is extremely difficult to select office automation equipment because there are too many different systems available and too many variables between systems.

- Recommendations for office automation are originated by department heads with the final decision resting with the Chief Executive Officer and the Chief Financial Officer.

3. THE SKEPTICAL ATTITUDE

- The third example is a medium-small manufacturer in the Midwest. Currently they have in-house information retrieval and use an outside service for distribution/mail list management. They are considering electronic mail services.

- In the past, this company has tried source document microfilming, correspondence control and word processing. These automated functions were generally unsatisfactory. Problems were encountered in inducing staff to accept new ideas and training in new procedures.

- Recommendations for office automation systems originate with department heads and implementation must be approved by the Chief Executive Officer.

- The company believes their office is running adequately. They do not foresee any changes before 1984.

B. EXPERIENCE IN OFFICE AUTOMATION

1. IN-HOUSE

- Respondents favor in-house installation over outside services for most office automation functions.
  - In all but a few cases, computer mainframes are already in place for data processing.
  - Standalone word processing equipment is available at reasonable costs.
  - Most other task oriented office equipment is also available at reasonable cost.

2. OUTSIDE SERVICES

- Respondents favor contracting for outside services where the cost of owning equipment cannot be justified.
- Examples are:
  - OCR services.
  - COM services.
  - Photocomposition/phototypesetting.
- Often these services have been long established with outside vendors and users see little reason for bringing them in-house.
- Exhibit V-1 shows the use by all respondents of in-house equipment versus the use of outside computer services for office automation functions.

EXHIBIT V-1

OFFICE AUTOMATION FUNCTIONS: IN-HOUSE VERSUS
OUTSIDE COMPUTER SERVICES - ALL USER RESPONDENTS

FUNCTION	IN-HOUSE		OUTSIDE SERVICE	
	INSTALLED (PERCENT)	CONSIDERING (PERCENT)	INSTALLED (PERCENT)	CONSIDERING (PERCENT)
EMS (ELECTRONIC MAIL SERVICES, FAX, ETC.)	31%	33%	6%	8%
DISTRIBUTION/MAIL LIST MANAGEMENT	67	11	6	3
SOURCE DOCUMENT MICROFILMING	58	14	3	-
INFORMATION RETRIEVAL	69	11	3	3
OCR SERVICES	19	28	-	6
COM SERVICES	28	19	19	6
CORRESPONDENCE CONTROL	25	19	-	11
DATA BASE SERVICES	53	11	8	-
WORD PROCESSING	78	11	-	-
PHOTOCOMPOSITION/ PHOTOTYPESETTING	42	19	8	3
OTHER	22	-	3	-

PERCENT OF ALL RESPONDENTS WITH AUTOMATED FUNCTIONS INSTALLED OR UNDER CONSIDERATION ON IN-HOUSE SYSTEMS OR WITH OUTSIDE SERVICES

- When a new function is under consideration, studies are made to determine whether an in-house installation or computer services contract is most cost effective.

  - Cost effectiveness is the primary consideration between in-house versus outside computer services implementation.

- Exhibits V-2 through V-4 show the banking, insurance and manufacturing industries' preferences between in-house installations and outside services for office automation.

  - The exhibits also show there is little difference in the degree of automation between industries.

  - However, banking and insurance industry offices are somewhat more automated than manufacturing industry offices.

- Volume is a determining factor in choosing between an in-house installation or outside services.

  - Low volume, or small companies, favor outside computer services.

  - Increase in volume, or company size, causes a re-evaluation of the cost effectiveness between the two choices.

- Outside services are frequently used to test a new application such as electronic mail.

C. EFFECT OF COMPANY SIZE ON CURRENT OFFICE AUTOMATION

- Exhibit V-5 shows substantial differences in the degree of office automation between companies of different sizes.

EXHIBIT V-2

OFFICE AUTOMATION FUNCTIONS: IN-HOUSE VERSUS OUTSIDE COMPUTER SERVICES - BANKING RESPONDENTS

FUNCTION	IN-HOUSE		OUTSIDE SERVICE	
	INSTALLED (PERCENT)	CONSIDERING (PERCENT)	INSTALLED (PERCENT)	CONSIDERING (PERCENT)
EMS (ELECTRONIC MAIL SERVICES, FAX, ETC.)	30%	30%	-	10%
DISTRIBUTION/MAIL LIST MANAGEMENT	70	10	-	-
SOURCE DOCUMENT MICROFILMING	80	10	-	-
INFORMATION RETRIEVAL	70	-	10%	-
OCR SERVICES	20	30	-	10
COM SERVICES	60	-	10	-
CORRESPONDENCE CONTROL	40	10	-	10
DATA BASE SERVICES	60	10	20	-
WORD PROCESSING	70	30	-	-
PHOTO COMPOSITION/ PHOTOTYPESETTING	20	20	-	10
OTHER	20	-	10	-

PERCENT OF BANKING RESPONDENTS WITH AUTOMATED FUNCTIONS INSTALLED OR UNDER CONSIDERATION ON IN-HOUSE SYSTEMS OR WITH OUTSIDE SERVICES

EXHIBIT V-3

OFFICE AUTOMATION FUNCTIONS: IN-HOUSE VERSUS OUTSIDE COMPUTER SERVICES - INSURANCE RESPONDENTS

FUNCTION	IN-HOUSE		OUTSIDE SERVICE	
	INSTALLED (PERCENT)	CONSIDERING (PERCENT)	INSTALLED (PERCENT)	CONSIDERING (PERCENT)
EMS (ELECTRONIC MAIL SERVICES, FAX, ETC.)	25%	25%	-	8%
DISTRIBUTION/MAIL LIST MANAGEMENT	75	8	-	8
SOURCE DOCUMENT MICROFILMING	67	8	8%	-
INFORMATION RETRIEVAL	58	17	-	8
OCR SERVICES	25	25	-	8
COM SERVICES	25	33	25	8
CORRESPONDENCE CONTROL	33	25	-	25
DATA BASE SERVICES	33	17	-	-
WORD PROCESSING	83	8	-	-
PHOTOCOMPOSITION/ PHOTOTYPESETTING	67	-	16	-
OTHER	42	-	-	-

PERCENT OF INSURANCE RESPONDENTS WITH AUTOMATED FUNCTIONS INSTALLED OR UNDER CONSIDERATION ON IN-HOUSE SYSTEMS OR WITH OUTSIDE SERVICES

EXHIBIT V-4

OFFICE AUTOMATION FUNCTIONS: IN-HOUSE VERSUS OUTSIDE COMPUTER SERVICES - MANUFACTURING RESPONDENTS

FUNCTION	IN-HOUSE		OUTSIDE SERVICE	
	INSTALLED (PERCENT)	CONSIDERING (PERCENT)	INSTALLED (PERCENT)	CONSIDERING (PERCENT)
EMS (ELECTRONIC MAIL SERVICES, FAX, ETC.)	45%	45%	-	-
DISTRIBUTION/MAIL LIST MANAGEMENT	55	18	18%	-
SOURCE DOCUMENT MICROFILMING	45	27	-	-
INFORMATION RETRIEVAL	82	9	-	-
OCR SERVICES	9	27	-	-
COM SERVICES	-	27	18	9%
CORRESPONDENCE CONTROL	-	18	-	-
DATA BASE SERVICES	64	-	9	-
WORD PROCESSING	73	-	-	-
PHOTOCOMPOSITION/ PHOTOTYPESETTING	36	36	9	-
OTHER	9	-	-	-

PERCENT OF MANUFACTURING RESPONDENTS WITH AUTOMATED FUNCTIONS INSTALLED OR UNDER CONSIDERATION ON IN-HOUSE SYSTEMS OR WITH OUTSIDE SERVICES

EXHIBIT V-5

EFFECT OF COMPANY SIZE ON CURRENT
OFFICE AUTOMATION BY INDUSTRY

SIZE OF COMPANY	INSTALLED (PERCENT)	CONSIDERING (PERCENT)	DO NOT HAVE (PERCENT)
BANKING			
>$1 BILLION	75%	15%	10%
$500 MILLION - $1 BILLION	60	25	15
$100 - $500 MILLION	45	40	15
<$100 MILLION	65	25	10
INSURANCE			
>$500 MILLION	80	20	-
$100 - $500 MILLION	63	25	12
<$100 MILLION	45	22	33
MANUFACTURING			
>$500 MILLION	80	10	10
$100 - $500 MILLION	41	26	33
<$100 MILLION	40	20	40

- The largest companies in each of the three industries are making the greatest effort toward automating and integrating office functions.

- Large companies are more aware of the available technologies.

- Large companies are more conscious of the long-range cost savings, and the benefits to mangerial efficiency inherent in the office of the future concept.

  - Many large manufacturing firms are already using an extensive terminal network for distributed processing.

  - Some suppliers offer word processing and computer-based telephone management systems as a part of their distributed processing networks.

- Large corporations, with national and international operations, are actively pursuing an evolutionary course leading to full implementation of the office of the future.

- Medium to smaller corporations have fewer office automation functions. However, many of them are considering further automation, particularly in the area of word processing systems.

- An exception to the automation as a function of size trend, is the small bank or financial institution.

  - Small banks rely on automation to remain competitive with larger institutions.

  - Many small banks use computer services vendors for data and information processing.

D. EFFECT OF USER COMPANIES' DATA PROCESSING STRUCTURE

- The data processing structure of the responding companies shows variations between companies in each category as well as variations between industries.

1. BANKING INDUSTRY

- Half of the responding banking and financial companies are located in states which permit unlimited branch banking.

  - Data processing by these institutions generally uses a centrally located computer, with an extensive network of on-line terminals to connect each branch to the DP center.

  - On the average, these banks and their branches have integrated seven out of the ten office automation functions listed in Exhibit V-1.

- Twenty percent of the responding banks are located in states which permit limited branch banking.

  - Their data processing structure is essentially the same as the unlimited branch banks.

  - On the average these banks and their branches have integrated six out of the ten office automation functions.

- Thirty percent of the banks are located in unit banking states.

  - All of these banks use electronic data processing, either in-house or an outside service. However, since their operations are centralized they do not require extensive terminal networks.

- On the average, these banks have integrated 5.6 out of the 10 office automation functions.

- From the foregoing, it is apparent that banks with on-line DP networks have integrated more office automation functions than banks without DP networks.

2. INSURANCE INDUSTRY

- Sixty-seven percent of the insurance company respondents use a central computer with an on-line terminal network for data processing. On the average, these companies have integrated 6.4 of the 10 office automation functions listed in Exhibit V-1.

- Thirty-three percent of the insurance company respondents use a central computer without an on-line terminal network for data processing.

  - On the average, these companies have integrated only 3.2 of the 10 office automation functions.

  - Their principal use of office automation is in standalone word processing systems.

- From the foregoing, it is apparent that insurance companies with on-line DP networks have integrated more office automation functions than insurance companies without DP networks. The contrast in the insurance industry is greater than the contrast in the banking industry.

3. MANUFACTURING INDUSTRY

- Eighty percent of the manufacturing company respondents have on-line terminal sytems. These systems are predominately used for distributed data processing and factory data collection. Most of these respondents are just beginning to automate office functions.

- On the average, these companies have integrated 4.9 out of the 10 office automation functions listed in Exhibit V-1.

- Twenty percent of the manufacturing respondents have a computer without an on-line terminal network. On the average, these companies have implemented only three out of the ten office automation functions.

- As with the banking and insurance industries, manufacturers with on-line DP networks have integrated more office automation functions than manufacturers without DP networks.

- The logical explanation for the greater integration by companies with on-line facilities is that they have the vitally important digital communications network already in place. Integration is simply a matter of connecting the office automation device to the line through an interface which will assure compatibility of signal levels, impedances and other electronic parameters.

- A protocol or line discipline may also have to be established. Usually this will be done with software. However, if it is not desirable to incorporate line discipline into an existing computer, a relatively inexpensive, microprocessor based, monitoring and control unit can be used for this purpose. These units are available with more than adequate capacity for almost any office of the future system configuration.

E. ECONOMICS

- Exhibit V-6 shows that the driving forces behind the movement toward the office of the future are the need to:

  - Increase managerial effectiveness.

  - Reduce the cost of performing office functions.

EXHIBIT V-6

RELATIVE IMPORTANCE OF FACTORS RELATING
TO IMPLEMENTING OFFICE AUTOMATION

FACTORS	ALL RESPON-DENTS (PERCENT)	BANKING RESPON-DENTS (PERCENT)	INSUR-ANCE RESPON-DENTS (PERCENT)	MANU-FACTURING RESPON-DENTS (PERCENT)
MANAGERIAL EFFECTIVENESS	90%	94%	88%	82%
ECONOMICS	88	84	95	80
WORKER PRODUCTIVITY	87	80	93	91
FASTER TURNAROUND	83	78	82	78
EMPLOYEE SATISFACTION	74	76	75	70
SECURITY	64	74	67	62
SKILLED PERSONNEL AVAILABILITY	66	68	72	58

- Increase white collar worker productivity.

- Traditional methods of cost justification have not been extensively used to evaluate the office of the future because there is a lack of valid input information needed for such an evaluation.

  - Managerial effectiveness does not lend itself to quantitative measurement.

  - Measuring white collar productivity can also be difficult.

  - Since there are no totally integrated office systems installed, there is insufficient data for evaluation.

- One large, multinational, manufacturing respondent is committed to come as close as possible to an all digital information network. This company started using word processing two years ago. Today they have a 22 station network serving eight different buildings. All stations are linked to each other and to the corporate mainframe computer by a communications network.

  - Two years ago the ratio of managers to secretaries was 5:1; today it is 6:1. This ratio will increase to 7:1 in 1980.

  - The company is in a high growth period. Managerial positions are increasing at three times the rate of clerical positions.

  - Planned expansion of the network will continue through 1983. Additional word processors will be installed domestically and abroad. The international sites will also be linked to the corporate center.

  - Word processors are now being linked to phototypesetting equipment.

- This manufacturer has seven out of the ten office automation functions connected into the communications network.

- Remote computing is used extensively for engineering and scientific work.

- Electronic mail, distribution/mail list management and some grammatical aids are being evaluated, using a timesharing computer service.

- COM services will continue to be processed by an outside service.

- The cost effectiveness of some automated office functions can be approximated.

  - The cost/benefits ratio of word processing, and to a lesser extent of facsimile, is fairly clear.

  - The benefits are most apparent in processing and transmission time savings.

  - Previous INPUT studies determined that executive secretaries spend an average of 32% of their time typing. Clerk typists spend an average of 60% of their time typing.

- Based on an average rate of 5.8 pages per hour, and summer of 1978 average salaries, the cost per page is $1.55 for executive secretaries, and $1.21 per page for clerk typists. Assuming that a 20% decrease in typing cost can be obtained through word processing, the savings equated to equipment amortized over three years are:

  - $3,492 for each executive secretary.

  - $5,076 for each clerk typist.

- With regard to facsimile, assuming the facsimile system is obtained on a rental basis, the average machine cost per page is between $0.50 and $0.80, with the lower cost corresponding to a higher number of pages. Transmission charges

vary from $0.05 to $0.15 per page for 100 to 1,000 pages per month transmitted. The lowest cost per page correlates with the highest number of pages transmitted.

- Determining the cost/benefit ratio for a computer-based electronic mail system (EMS) is relatively simple and the results are reasonably accurate.

- The average cost per message runs from $0.75 to $1.00 per message for a CBMS system.

- The principal benefits for all three of the above systems are transmission time savings, with CBMS providing the maximum savings. The dollar value of time savings varies between individual users.

- Without references to time, the calculation of cost/benefits of these systems will invariably show that the Postal Service is still a bargain. However, the increase in span of control and managerial effectiveness are the real benefits. These factors cannot be immediately evaluated.

- A separate, computer based intelligent electronic mail system (above the non-intelligent level of Telex, TWX or facsimile) is cost-prohibitive for most companies.

- Providing EMS as an add-on to an existing system or service greatly reduces the cost per message.

  - Trial tests can be conducted in one department, for example, through any one of the remote computing companies which offer the necessary software.

  - Compuserve, Computer Corporation of America and Tymnet are examples of such companies.

- Adding EMS to communicating word processors can be very cost effective. These systems show a favorable ratio for automatic typing. Adding functional capabilities can increase the effectiveness of the basic system.

- The high cost of specialized automated systems, such as phototypesetting and COM, makes the use of outside computer services vendors the most cost effective for all but the highest volume users.

  - After word processing, COM is often the largest part of the office automation budget. However, one respondent would consider "paying twice what we are now to retain and increase the applications of COM."

- Calculating or estimating the "Return on Investment" in the office of the future is an even more nebulous and dubious process than trying to determine its cost effectiveness. Not one respondent would hazard a guess in this area.

- There is an extra premium to be paid for being a part of the leading edge in the office of the future. Nevertheless, to quote one respondent (bank), "We enjoy our reputation of being a progressive company. We are willing to pay the price."

- Later entrants benefit from economies of scale and the increased performance/reliability of technical refinements. The risk is that the early entrant may have established such a long lead in the competitive race that he cannot be overtaken.

F. BUYING POINTS AND THE BUYING CYCLE

- The traditional planning, decision and purchasing points, which form the buying cycle, are changing to include office automation functions.

  - Changes are most noticeable in progressive, rapidly growing companies.

- Planning committees are expanding to include Telecommunications Directors, and Office Administrative Services, or Advanced Office Systems Managers.

- Data Processing Managers are moving closer to the Executive Suite.

  - They are heavily involved at the planning, decision and buying points associated with all DP related equipment, including remote computer services.

  - DP managers are normally a part of the Management Planning Committee which also includes top management people and a General Administrative Manager.

- Decisions to buy and actual purchases of standalone automated office systems are generally made at the departmental or corporate purchasing level. This is the most common method in use today.

- The integration of data processing and office automation systems with telecommunications is basic to the office of the future concept.

  - New planning and coordinating committees are being formed, and new management titles and corporate departments introduced to manage the integration.

- New titles include:

  - Vice President Corporate Administrative and Communications Systems Division.

  - Manager, Office Systems and Telecommunications.

  - Manager, Telecommunications and Planning.

- Project Manager, Advanced Office Systems.

1. BANKING

- In the banking industry, planning and decisions involving large capital expenditures are made by an Executive Steering Committee composed of the CEO and senior officers. The committee accepts recommendations from second and third level management:

  - Operations Division.

  - Bank Services Division.

  - Data Processing Division.

  - Administrative Management Services.

  - The steering committee of one progressive bank recently began requesting recommendations from equipment user employees.

- Banking industry respondents expect little change in the decision structure through 1984.

2. INSURANCE

- In the insurance industry, executive management makes the final decisions on large capital expenditures for equipment.

- Planning and recommendations come from a broad range of second and third level management, including:

  - Data Processing Managers.

  - General Administrative Services Managers.

- Facilities and Procedures Managers.

- Planning and Methods Managers.

- Office Administrative Managers.

- Business Systems and Planning Managers.

- Insurance respondents foresee little change in the structure of the decision making body through 1984.

3. MANUFACTURING

- In the manufacturing industry, executive management makes the final decision on large capital expenditures.

- New positions have been added to the executive decision-level team:

  - Vice President Human Resources.

  - Vice President Corporate Administrative and Communications Systems.

- Planning and recommendations come from second and third level management including:

  - Data Processing Manager.

  - Management Information Systems (MIS) Manager.

  - Administrative Services Manager.

- New members have been added to the recommendations level including:

  - Information Services Manager.

- Manager, Office Methods and Services.

- Manufacturing respondents believe there will be additional changes in the final decision making body before 1984.

4. OBSTACLES

- The decision point is where major obstacles to implementing the office of the future are encountered. Exhibit V-7 lists these obstacles and shows their importance.

- Resistance to change by management and clerical personnel is the first obstacle.

- The second and third obstacles - proving cost effectiveness and management unawareness of benefits are actually different manifestations of management's resistance to change.

  - Management does not understand the technology.

  - There are no sources known to management where sound office automation advise can be obtained.

- Ninety percent of banking respondents, 75% of insurance respondents, and 54% of manufacturing respondents rank these three as the relatively greatest obstacles. The lower percentage for manufacturing indicates more technical knowledge at the top management level.

- The technology must be made more transparent to management and the office user if these obstacles are to be surmounted.

EXHIBIT V-7

MAJOR OBSTACLES TO IMPLEMENTING
OFFICE AUTOMATION AS RATED BY RESPONDENTS

FACTORS	ALL RESPON-DENTS (PERCENT)	BANKING RESPON-DENTS (PERCENT)	INSUR-ANCE RESPON-DENTS (PERCENT)	MANU-FACTURING RESPON-DENTS (PERCENT)
RESISTANCE TO CHANGE: TOP MANAGEMENT AND CLERICAL	39%	80%	38%	18%
PROVING COST EFFECTIVENESS: RETURN ON INVESTMENT	19	-	31	18
MANAGEMENT UNAWARE-NESS OF BENEFITS	12	10	6	18
TRAINING	11	-	13	17
NEED FOR CENTRALIZED SUPPORT GROUP	7	-	-	17
COST TOO HIGH	7	10	12	-
OTHER	5	-	-	12

- An Assistant Vice President respondent for a large insurance company states, "Decisions need to be made outside the data processing department. They are not familiar with the office, personnel and text procedures."

- A mid-level manager for a large manufacturing company said, "To a degree, the clerical worker's resistance is simply a reflection of the attitude of the boss."

- Today's management suffers from a wealth of data and a dearth of information.

  - They are swamped with computer print-outs, reports and trade journals.

  - What the manager needs is a method for rapidly assimilating information and highlighting key facts.

- Of the three remaining obstacles shown in Exhibit V-7, only one, "Cost too high," is an obstacle to the purchasing decision. The other two are addressed in the section on user needs.

  - It is true that some automated office functions are cost prohibitive to many companies. However, when high cost is a valid obstacle to a desired function, it should be allowed for in system capacity, but deferred in installation.

  - Sometimes, "costs too much" is another way of expressing resistance to change.

- The problem is a difficult one. The decision makers themselves probably cannot determine to what extent their decisions are based on logic and facts as opposed to attitudes and feelings.

G. CURRENT PRODUCT ASSESSMENT

- Most respondents have a wide variety of equipment installed. Each company's installed base has been accumulated over many years. No respondent could provide complete information on maker and models of every type of equipment installed.

- Equipment areas where respondents are most knowledgable are:

  - Mainframe computers and minicomputers.

  - Word Processors.

  - Microfilm and microfiche.

  - Teletypewriter (TWX/Telex) and facsimile.

- Equipment areas less familiar to most respondents are:

  - Photocomposition and phototypesetting.

  - Terminals and other peripherals.

1. MAINFRAME COMPUTERS

- Among those interviewed, IBM retains a 75% share of installed mainframe computers. Burroughs and NCR account for another 20% between them. An assortment of other mainframes and small business computers make up the remaining 5%.

  - Over half of IBM installed mainframes are System/370 Models 145 and 158.

- A few IBM Series 3033s are installed at respondent locations along with 370s.

- Often minicomputer based systems are being used by respondents in addition to a mainframe, or in distributed processing network systems.

2. WORD PROCESSORS

- Among respondents, slightly over 30% of all word processors installed are IBM. These are divided between mag card, Magnetic Tape Selectric Typewriters (MTSTs), 3700s and System 6.

  - Mag Card and MTSTs continue to be replaced by System 6 and 3700 series units, or standalone and shared resource units of other manufacturers.

- Another 30% of all word processors installed are Lanier systems.

- The remaining 40% are spread among ten manufacturers listed below:

  - CPT, Inc.

  - Wang.

  - Redactron (Pre-Burroughs).

  - Olivetti.

  - Xerox.

  - Vydec.

  - 3M Company.

- DEC.

- Jacquard (AM International).

- Telex.

- New installations, over the past one to two years, favor Wang 25s and 30s, Lanier, IBM 3700, and System 6.

- Some very large installations are now merging word and data processing, using IBM 3791 and 8100 systems. Further developments are expected from IBM in the next six to nine months.

- Smaller installations are merging word and data processing by using several methods. A common method is to add a word processing terminal to a based small business computer.

- Exhibit V-8 shows the extent of data and word processing mergers by the responding user companies.

  - Forty-five percent are merging, or planning to merge, the two functions.

  - Primarily, mergers are occurring in companies where an internal network is in place or being implemented.

  - Twenty percent of the respondents do not intend to merge.

  - The remaining respondents are interested in merging, although they have no plans to do so.

  - It is notable that the merging of text and data is far from universal, with significant short term and longer term resistance.

EXHIBIT V-8

DATA PROCESSING AND WORD PROCESSING
MERGING: COMPANY-WIDE

USER RESPONDENT ATTITUDES	ALL RESPON-DENTS (PERCENT)	BANKING RESPON-DENTS (PERCENT)	INSURANCE RESPON-DENTS (PERCENT)	MANU-FACTURING RESPON-DENTS (PERCENT)
MERGING				
YES	45%	40%	58%	28%
NO	33	20	42	45
DON'T KNOW, NOT SURE	8	20	-	-
DO NOT HAVE WORD PROCESSING	14	20	-	27
MERGER TIME FRAME				
NOW	25	-	28	34
LESS THAN 1 YEAR	13	25	-	33
1-2 YEARS	37	50	29	33
2-5 YEARS	25	25	43	-

- Some specific user attitudes are expressed in the following quotes and paraphrased comments.

  - "We're having a problem with our DEC OEM supplier (DEC shared resources word processor) - it's a classic software problem, needing a lot of programmers to keep it operational."

  - "All purchases must now go through the data processing department to obtain standardization to our recently installed HP distributed data processing system." Word processors being linked to the Hewlett-Packard DDP system are: Vydec, Wang, AM International.

  - Vydec, Four Phase "Forward," Xerox 850, and IBM System 6 could not provide enough working space and/or memory at any one time for one high volume user.

3. MICROFILM AND MICROFICHE SYSTEMS

- Thirty-three percent of the respondents with in-house microfilm equipment are using Kodak. Twenty-five percent each are using 3M and Bell & Howell equipment.

- The majority of respondents who currently have microfilm or microfiche in-house systems want to use them for additional applications.

4. COMPUTER OUTPUT MICROFILM (COM)

- Microfilm services used by respondents are either on in-house Datagraphix equipment or computer generated onto mag tape and processed by outside computer services vendors.

- The ratio of in-house COM to outside computer services vendor COM will remain fairly constant for the next few years.

5. PHOTOTYPESETTING AND PHOTOCOMPOSITION

- Seventy-five percent of respondents who have in-house phototypesetting or photocomposition systems are using Compugraphics equipment.

  - The balance use AM International Varityper equipment.

  - Connecting the word processor or CPU directly to a phototypesetter is a future goal.

6. ELECTRONIC MAIL SYSTEMS (EMS)

- Respondents who have an in-house EMS service are using public or private teletypewriters, such as Telex/TWX or facsimile units, such as Xerox, 3M or Telefax.

  - Some respondents indicate that today's Telex/TWX are too slow. These respondents are looking at advanced systems.

  - A few respondents said they are considering facsimile "only in the distant future," or "not for five years."

- Computerized PABX equipment is used by a little more than 8% of the respondents.

  - Rolm computerized switchboards are used at all but one of the respondents' installations.

  - Based on the responses, the PABX portion of the interconnect market will show a marked increase among all three industries. This switching equipment allows communications cost control and management.

- The following general comments about communications express the attitude of many respondents:

  - There is a need for better and faster communications, both in the office and outside the office.

  - More communications features will be used in the future.

H. UNMET NEEDS

- Respondents in all three industries expressed a need to improve information flow. Their remarks are paraphased in the following statements:

  Banking

  - The biggest need is greater management skill in handling information. They need to know how to get information in and out of the system. When management takes on budgetary responsibility for maintaining services, their information handling skills will improve.

  Insurance

  - Any office which is turned into a communications environment will offer better management.

  - Need an internal communications system capable of handling both incoming and internal correspondence.

  Manufacturing

  - Telex services are too slow and cumbersome for today's requirements.

- Terminal and equipment compatibility is needed throughout the system, for point to point communications.

- On-line capabilities for information retrieval are related to information flow. Respondents consider information retrieval as important as information flow. All three industries desire more information retrieval, although specific applications vary between industries. The remarks are paraphrased below:

  Banking

  - On-line terminals are needed with files on magnetic tape or disk to reduce paper filing and storing.

  - Executives need small screen CRTs to access data base and stock market information.

  Insurance

  - On-line file systems to reduce paper storage and obtain instant information.

  - On-line claims submission from hospital to insurance company to avoid handling reams of paper.

  Manufacturing

  - There is too much paper today.

  - The need is for information directly from the computer.

- Respondents from all three industries expressed a need for operator training on word processing equipment. Their remarks and suggestions are summarized below:

- Vendor training schools are best, but sending everyone is too time consuming.

- Training in the work environment is ineffective.

- Training in a controlled environment will be tried next, with vendor trained supervisors serving as teachers.

- Audio visual aids might shorten the employee training time.

- One vendor has just introduced cassette training tapes. Hopefully, they will prove helpful.

- Vendor site training is the most successful of the methods we have tried.

- Additional areas users mentioned as unmet needs are highlighted below:

  - Guidelines on office of the future planning:

    . Open-space concept.

    . Office configuration.

    . Power requirements.

  - More speed and less specialization in word processors.

  - More integrated equipment.

    . Word processor with graphics.

    . Microfilm with data base.

. Word processors with phototypesetter.

- The following are direct quotes from a very large insurance company's responses to the "unmet needs" portion of the questionnaire.

  - "Would like to see a multifunction terminal with voice, image, data - probably will be by 1990."

  - "By 1985-1987, we will see voice recognition devices and scratch pads. Older people need to have electronic devices that don't change the way they work - to overcome the age barrier."

  - "Digitized speech, file retrieval and storage."

  - "A low-cost, points-addressable type printer, in color."

  - "Merging data and image on Fax printers."

  - "A text-data merging device for letters, data inquiry - should see this soon."

  - "An integrated electronic message system."

  - "Low-cost videoconferencing."

  - "Usage - sensitive pricing on communications."

  - "Software applications like IBM's 'ADF,' 'DMS,' to break the bottleneck of producing the systems."

VI FUTURE PRODUCTS AND SERVICES

VI FUTURE PRODUCTS AND SERVICES

A. MARKET SEGMENTATION

- The office of the future market will be divided into three segments, according to size and type of user. Each segment will be served by a different category of vendors.

- The first segment will contain large national and multinational companies within the Fortune 500. The top 50 will be the leading edge in the move towards the office of the future.

  - They will have highly sophisticated computer installations. Many of these will include intelligent communications networks with a combination of public, private, and specialized common carriers.

  - These corporations will move quickly to decentralize their communications networks to allow for some form of public intelligent network - Tymnet, Telenet, or the proposed SBS system for example.

  - The largest companies many elect to buy a private intelligent network for intracompany communications. Vendors of these systems include Tymnet, Telenet, and Computer Corporation of America (COMET).

- Another approach the largest companies might use is to select a mainframe suppliers' network such as Digital's DECnet. Corporations of the size in this first segment have the technical expertise to undertake a conversion of this magnitude.

- A few leading edge office automation manufacturers have been developing plans, installing pilot projects, or gradually implementing integrated corporate information networks for electronic business communications. These efforts are most often research and test projects for a commercial product offering. Among the companies are: IBM, Xerox, Sperry Univac, Honeywell, and 3M.

- Large computer or telecommunications equipment manufacturers will be among the first companies to implement intelligent information networks.

- There are several user companies in the banking and insurance industries which have substantial installations. Among these are: Bank of America, Citicorp (New York), Continental Illinois National Bank & Trust Company, Bankers Trust Company (New York), First Bank System, Inc. (Minneapolis), and Allstate Insurance Companies.

  - Government agencies, large university systems and the next layer of Fortune 100 companies are candidates for early office of the future implementation.

  - The Fortune 500 will follow these leaders.

- No single vendor in business today can supply all of the equipment and services required to implement these large, complex systems. Users will have to deal with several vendors, but they will select those who are accustomed to furnishing large installations.

  - IBM and similar large mainframe manufacturers will be primary suppliers.

- Satellite Business Systems (SBS) will target the telecommunications portion.

- Suppliers of smaller systems will be able to obtain a share of this first market segment by furnishing branch systems to interconnect to the main trunk.

- The second market segment will be composed of medium to large size corporations.

  - With the exception of word processors and computerized PBX, these companies will initially favor public intelligent networks for most of the automated office functions studied.

  - Most mainframe and minicomputer vendors, as well as remote computing and public intelligent network services, are likely suppliers to this market.

  - Distributed data processing vendors are in an excellent position to serve this broad user base. Among these vendors are: Datapoint Corporation, Hewlett-Packard and Four Phase.

- Small to medium size companies form the third market segment. Most of these companies are local or regional. Many have a single office. Only a few have 20 or more locations. Other characteristics of this segment are:

  - Single or limited number of products.

  - Relatively small number of customers.

- Many of the organizations in this segment are new to automated office functions. In terms of numbers, they are the largest potential market. Many of them are turning to automation as a means to stay competitive.

- There are numerous vendors who can satisfy the automation needs of the third market segment. Often, an integrated data and word processing system will meet the requirements of a company with a single location. However, the inclusion of communication capabilities to allow for future expansion is desirable.

- The Xerox telecommunications network, XTEN, is aimed at local loop distribution for companies of all sizes.

- There are vendors or combinations of vendors in business today who can supply every segment of the office of the future market.

- A fully automated, completely paperless office of the future was opened in Washington, DC late in the spring of 1979. The office serves as a headquarters and showcase for Micronet, Inc., a management consulting firm in the field of office automation. The office equipment is on lease from 17 sponsoring companies.

B. LEGAL IMPACT AND HURDLES

- The laws and regulations governing telecommunications are being changed. The Communications Act of 1934 is being rewritten. The Federal Communications Commission (FCC) is being encouraged to continue promoting competition and make basic structural changes in the telecommunications industry.

  - The FCC is cognizant of the interference to television and radio reception resulting from computer operations. This fact, coupled with the proliferation of interconnect devices requiring FCC approval, is causing the agency to assume jurisdiction of equipment installed on the customer's premises.

- The increasing use of satellites, which do not recognize state boundaries, is causing the FCC to assume jurisdiction over some intra-state services. Regulation of these services was previously reserved to the states.

- New legislation to replace the 1934 Act will be enacted in 1981-1982. However, it will not be fully resolved until 1984-1985.

  - Following enactment, the FCC will assume full jurisdiction over customer premises' equipment and increase their regulation of certain intra-state services.

  - For a few years, the FCC will continue to regulate AT&T's rate structure to prevent them from matching the services and rate structures of their essentially unregulated, intercity competitors.

  - The FCC will make a corollary effort to decrease the differential between the Bell switched service costs and the costs of other carriers.

  - Competition will be encouraged, but not to the extent where protection of universal, high-quality telephone service will be jeopardized.

- There will be some relaxation of the 1956 consent decree. The telephone industry will be permitted to acquire or create subsidiaries to furnish some services denied to them under the decree. However, using revenues from regulated services to subsidize these separate entities will not be permitted.

  - The emerging policy is apparent in the conditions the FCC placed on General Telephone and Electronics (GTE) acquisition of Telenet and the tentative ruling on AT&T's proposed Advanced Communications Services (ACS).

  - FCC is not going to continue defining services by differences in equipment. The dividing lines between voice, data communications, and

data processing have been blurred by advancing technology, particularly very large scale integration (VLSI). Services will be defined by the end user market rather than by equipment differences.

- The regulatory confusion and proliferation of service companies will continue through 1985. Sometime after 1985, a shake out will occur.

C. ROLE OF THE U.S. POST OFFICE

- Over the past few years, the U.S. Postal Service has steadily lost business to the telecommunications industry. When the integrated voice, data and graphic systems, envisioned by the office of the future, become a reality, the post office will lose even more business.

- The foregoing remarks apply principally to business mail. The post office is also losing a great deal of personal correspondence. The increased first-class rates and the occasional long delays in delivery have made the postal service the butt of many jokes.

- At the same time, long distance telephone rates continue to decline. This fact, coupled with the general public's preference for verbal over written communications has led to an ever increasing volume of long distance calls.

- The post office is making strong efforts to recoup these losses through electronic mail services. In 1971, Western Union and the Post Office inaugurated Mailgram services. This is an exclusive arrangement between the two.

- Originators of Mailgrams send their messages to Western Union by electronic means such as the telephone. Western Union electronically transmits the messages to a post office near their destination. At this point, hard copies are made and final delivery is completed by letter carriers. The annual revenues from Mailgrams exceed $50 million.

- Western Union International and Western Union (which are no longer related to one another) have applied to the FCC for a license to operate an international mailgram service. Other domestic and International Record Carriers (IRC) have filed objections with the FCC to prevent the service from starting. Essentially, the other carriers would like to end the exclusive USPS/WU arrangements for domestic mailgrams. The FCC's decision on WUI's application for international mailgrams is expected soon.

- The U.S. Postal Service, with technical support from Comsat, is testing an international, facsimile-based electronic mail service called Intelpost. Initially, Intelpost will offer service between New York City, Washington, DC, and seven foreign nations, including major Western European countries.

- Electronic Computer-Originated Mail (ECOM) is a postal service development program which has been underway for many years under the general supervision of RCA. ECOM is designed to be a high-volume, low-cost, domestic electronic mail service, similar to Mailgram. ECOM intends to use Western Union's Westar Satellite and their Infomaster computer system.

  - ECOM is scheduled to begin service in 1984 and be fully operational by 1990. The estimated cost per message is 2-3¢, plus end carrier delivery costs.

  - The FCC has declared it has jurisdiction over ECOM. If this declaration is correct, FCC authorization would have to be obtained before the system is placed in service.

- The Post Office has filed suit against the FCC ruling. One basis for this suit is that the Postal Reorganization Act placed the Post Office under the jurisdiction of the Postal Rate Commission.

- The FCC order places the Post Office in the position of being under the jurisdiction of two regulatory agencies.

- These jurisdictional disputes will probably be resolved before the start-up of ECOM in 1984. Meanwhile, other carriers will have made substantial in-roads on the volume of mail currently handled by the Post Office.

- The postal service is facing increased competition from private EMS offerings. Large amounts of first class mail are being diverted to these services.

  - This competition will increase as services, such as Graphnet, SBS and XTEN are placed in operation.

  - The postal service has a limited ability to cut costs. The annual movement of 100 billion letters has been automated to the currently feasible extent. Personnel accounts for 85% of post office costs.

D. IMPACT OF TECHNOLOGY

1. HARDWARE

- Hardware design must focus on ease of use for automated functions to be accepted in the office environment and as a part of the corporate information network. Human factors are the ultimate key to success or failure in implementing the office of the future concept. Design goals should be to:

- Provide multifunction terminals which are far easier to use than today's single function terminals.

- Provide executive work stations requiring no technical skill to operate. Information should be instantly available at the touch of a key. Operation of the equipment should not interfere with thought processes or concentration.

- Voice actuation is a developing technology which is applicable to executive work stations. Within the next decade, this technology should develop the capabilities and pricing structure required for this application.

- User transparency will characterize the next generation of office automation products. All operational codes will be imbedded in the firmware. Large scale, and very large scale integration (VLSI) technologies provide the ability to incorporate increasing computational power, logic, and memory into what would appear to be simple, small devices.

- Microprocessor based computers have made digital processing available on an inexpensive, mass basis.

- Although certain cost factors are increasing, the learning curve effect and economies of scale will hold equipment prices substantially constant, while the use of multifunction terminals and networks will reduce the costs per function.

  - Declining memory and processor costs will free funds for the development of user-oriented, "friendly" systems.

  - User transparent, intelligent, multifunction terminals will pave the way for the executive work station.

  - Word processors will lose their separate identity and be incorporated in the multifunction station.

- Microcomputers will be increasingly used in combination with telephone circuits for information retrieval. Access to data bases, stock market reports, news wire services, weather and travel information will be provided.

  - The same combination will be used to transmit information, on a store and forward basis, in applications involving packet switching.

  - Practically the entire spectrum of electronic mail may eventually be handled by this combination, in both the transmit and receive directions.

- Microcomputers, microprocessors and digital telecommunications have changed the whole approach to computer control of complex industrial plants.

  - Today's and tomorrow's approach is based on decentralized control, distributed data acquisition and distributed information processing - all made possible by the "micros."

  - The telecommunications network links these "nodes" and provides a path for information flow and also for corporate message traffic.

  - The whole approach is known as distributed data processing (DDP).

- Some users and vendors consider DDP as the door to the office of the future. Their responses are summarized as follows:

  - Offices are the control centers for the organizational "bodies."

  - Various office of the future peripherals are the organizations "senses."

  - Telecommunications are the organizations "nerves."

  - "By adding functional extensions to our DDP, we've created the first phase of the office of the future."

- A trend towards merging data and word processing is apparent, particularly in companies who are implementing an internal information system. Some companies do not consider the merger desirable.

- The commonality of hardware and logic requirements allow data processing and word processing terminals to share these facilities, although separate software application packages are needed.

- The respondents' remarks and reactions to merging data and word processing are summarized below:

  - "Technology may expedite merging but not if it doesn't suit the user."

  - "Many large companies welcome merger as complementing their needs."

  - "Top management saw a need for merger to place the flow of vital data and text information under one executive."

  - "Security of word processors is a concern."

  - "DP wants to take over word processing, but is leery about dealing with typists."

- Packaging design will also be changed by developing technologies.

  - Plasma, gas discharge and electroluminescent displays will gradually reduce the use of Cathode Ray Tubes (CRTs). There is some evidence that long-term use of CRTs is damaging to eyesight.

  - Touch panel screens will be used for executive desks.

  - Many users cannot, or will not, become trained operators. Operations will be simplified. Instructions will be written in plain English and displayed on the screens.

- Keyboards for executive work stations will use more membrane key switches than the full travel key switches of today's terminals or typewriters. This will produce a level or flat keyboard appearance.

- Non-impact printers, which are quiet, will see increasing use.

2. COMMUNICATIONS

- Telecommunications are fundamental to the office of the future. The rapid transmission of information to wherever it is needed is as important as the acquisition and processing of that information.

- There are development occurring in telecommunications technology which will increase the pace of the evolution towards the office of the future. In the 1980s these advancements may reach a revolutionary speed.

- Developing telecommunications technologies which will impact the office of the future include; fiber optics, VLSI, satellites, and possibly cable television.

  - Optical fiber cable has certain advantages over copper wire cable for telecommunications. Included are greater bandwidth, immunity to noise, and lower attenuation.

  - Greater bandwidth means more channels can be transmitted; immunity to noise means low susceptiblity to interference; lower attenuation means longer distances between repeaters.

  - Light energy is more suited to high bit rates than electromagnetic energy.

  - The materials used for optical fiber are more plentiful than copper or aluminum and the fiber manufacturing process requires less energy.

- The above factors make optical fiber an excellent medium for digital transmission and a logical replacement for copper cable, particularly in metropolitan areas.

- The switched telephone network is going digital, particularly in heavily populated or industrial areas.

  - High-speed, solid-state switches and VLSI technology are making the change from analog to digital networks technically and economically feasible.

  - The human voice must be encoded for digital transmission and decoded for the human listener at the receive end. The encoding/decoding device is called a codec. Thanks to VLSI technology, codecs are available today, with the circuitry on a chip less than one-quarter inch square.

  - The ubiquitous microprocessor is also being extensively used in digital networks. It is being increasingly used to implement switching, monitoring and control functions.

- Satellite communications has been available for some time and has made a substantial impact on telecommunications, including trans-oceanic international and domestic long distance communications and television. Some channels are available for exclusive business use.

  - Current and future business oriented satellite systems are discussed in Chapter VI Section E.1.

  - Technical advances which will be applied to satellites to assure maximum use of their capabilities include time division multiple access, quadrature phase shift keying and packet switching.

- Most of these techniques have been used on some terrestrial systems, but their applications to satellites involves some unique circuitry and problems.

- There are two finite limits on the use of communications satellites. There are a limited number of geostationary orbital slots and a limited number of frequencies suitable for communications.

  - The technical solution to the first problem is the space station or orbital antenna farm concept.

  - The solution is technically feasible, but there are many problems associated with political and regulatory jurisdictions, property ownership and legal responsibilities.

- The frequency congestion problem is aggravated by the fact that current satellites share certain frequencies with terrestrial microwave systems. This was a technical necessity at one time. The proliferation of both types of systems has caused some acute frequency assignment and radio frequency interference problems.

  - The classical solution to these problems is to go to higher frequencies.

  - This solution will certainly be applied to the current situation, but there is a limit to how high one can go.

  - Radio frequency interference may well be the ultimate limit on microwave radio communications - both terrestrial and satellite.

- One virtually untapped transmission medium with a large potential for data transmission is Cable Television (CATV). In 1972, the FCC issued a report and order requiring all new CATV installations in the top 100 market areas to provide a capability for two-way, non-voice transmission. The top 100 markets include almost all of the heavily populated industrial areas in the U.S.

- The primary, coaxial-cable system used for CATV transmission is broadband. Cable can theoretically carry 40 TV channels although 36 is a more practical limit. Current FCC regulations require a minimum capacity of 20 channels.

- The advent of satellite relays for television signals and low-cost, receive-only earth stations has created a boom in the CATV business.

- Many CATV operators are looking for ways to diversify their business and increase their revenues.

- A substantial portion of their capability is unused, particularly in the sub-VHF band, and is suitable for high-speed data transmission.

- The facility is more suited to analog than to digital transmission. However, modems to make the necessary digital to analog and analog to digital conversions are available.

- The use of cable television transmission facilities should appeal to businesses with a heavy volume of data traffic between several locations within a 10 to 50 mile radius.

  - Banks, with several branches located within a city or county, are an example of a business that might use CATV facilities.

- CATV ties directly to consumer usage as mentioned earlier.

E. NEW PRODUCT OPPORTUNITY DEFINITIONS

1. VENDOR PLANS

- The discussion of vendor respondents' products and services plans, presented in Chapter IV shows:

- All responding vendors are addressing, or plan to address, the office of the future market.

- All of the service vendors, and the majority of the hardware vendors, consider the merger of data processing and word processing as the most logical first step. All but a few respondents will provide this capability.

- Several vendors view multifunction work stations as a progressive step towards integrated office functions.

- Many vendors consider distributed information processing as the dominant operating mode for the office of the future.

- Vendors are noticing changes in the organizational structure of leading-edge customers.

  - The buying point is shifting from the Data Processing Manager to a new type of manager with a title such as "Advanced Information Systems Manager."

  - These managers are oriented more towards applications than technology, although they may have a technical background.

- The "Advanced Information System Manager" frequently coordinates the planning activities of a task force composed of representatives from the Data Processing, Telecommunications, and Office Administrative departments. Representatives from user groups are often included.

  - The purpose of the task force is to achieve maximum integration of the data processing, information processing, telecommunications, and office automation functions.

  - The intent is to achieve an integrated, interactive system for the rapid processing and dissemination of all types of information.

- Digital telecommunications are generally considered as the arterial network for interconnecting the functional subsystems into a totally integrated system. Satellite systems are expected to serve as a significant portion of the arterial network.

- Current commercial satellite systems use remotely located earth stations with very large antennas. The earth stations are accessed by land line and/or terrestrial microwave links.

- American Satellite Corporation (ASC), a Fairchild Industries subsidiary, is authorized by the FCC to provide satellite communications services within the U.S. ASC's Satellite Data Exchange (SDX) services provide voice, data, facsimile, and video communications for business, industry and government users.

  - ASC recently announced it is converting its entire system to digital transmission.

  - Transmission rates are 56 kilobits per second or greater.

  - Sperry-Univac, Dow Jones and Western Bancorp Data Processing Company are examples of SDX users.

  - AT&T and General Telephone offer all digital (DDS networks). However, many users consider the FCC approved tariffs too high.

- Satellite Business Systems (SBS), a joint venture of Comsat, IBM and Aetna Casualty, proposes to begin operations in January, 1981. SBS will be an all digital system offering integrated voice, data, facsimile, and video services to widely dispersed geographic locations.

  - SBS will launch its own satellites. Two will be placed in geo-stationary orbit and one will be reserved as a spare. The first launch is scheduled for 1980.

- The earth stations will use smaller antennas and be located on the customers' premises.

- Transmission rates will be up to 6.3 megabits per second.

- As previously stated, SBS is aimed at the first market segment, which includes the Fortune 500 companies.

- The proposed Xerox Telecommunications System (XTEN) is a high-speed all digital, nationwide network. It will offer a wide range of intra-company services to a broad market of business users.

  - XTEN plans call for a 200 city network to reach more than 3,000 corporations; each of which has more than 20 locations. The system is scheduled to begin operations in 1982.

  - XTEN has been given tentative approval by the FCC and the proposed action has been opened up for comments. This phase of the licensing process will be completed in December, 1979.

  - Transmission will be via RCA's Satcom, or Western Union's Westar Satellite.

  - The user to earth station link will be via a private line, terrestrial microwave system. From the users' viewpoint, this is essentialy an on premises earth station.

  - The transmission rate will be 256 kilobits per second.

- Teleconferencing will receive added impetus with the availability of SBS and XTEN. On premises earth stations and the increasing costs of travel are a combination which will increase the use of Teleconferencing.

- AT&T's proposed Advanced Communications Service (ACS) enhances and expands the Bell System's digital transmission capabilities.

  - Maximum transmission rates will be 56 kilobits per second which is suitable for a very broad market. However, it can accomodate only slow-scan video.

  - ACS is extremely flexible. It has the ability to interconnect incompatible equipment and software.

- ACS's flexibility creates a standardized interface. The existence of this interface will make it easier for all suppliers to compete for non-mainframe and non-central site business.

- Flexible, user-defined networks are another ACS advantage. Users can define and redefine their networks as their needs change; even within the working day.

- ACS start-up and expansion costs are relatively low; this is true for data communications users as well as the larger community of non-data communications users.

- The FCC has tentatively decided to allow AT&T to offer a wide variety of computerized communications services providing they are offered by separate subsidiaries. The separate subsidiary concept will certainly apply to ACS.

  - AT&T will have a major role in data communications services markets, despite the inconvenience of setting up separate subsidiaries.

  - AT&T will not be deterred by the existence of public intelligence networks, the proposed SBS and XTEN, or mainframe network architectures.

2. USER NEEDS

- User responses to questions regarding their needs for products and services are discussed in Chaper V. The responses show:

  - Users favor owning their word processing equipment. This equipment is available at reasonable cost.

  - A significant number of users favor computer services vendors for COM, OCR and phototypesetting services. Their usage of these services is not great enough to warrant equipment purchases.

  - Cost-effectiveness is the principal factor in deciding between ownership and outside services; or between implementing or not implementing an office automation function.

- Faster and better intra-company communications is high on the respondents' lists of specific function needs.

  - All types of communication, incoming and intra-company mail, and telephone systems need improvement.

  - "Too often, time-sensitive information is useless by the time it filters through the internal mail system."

- The need for improving information flow and handling is related to a need for more information retrieval.

  - Users frequently mention a requirement for various on-line applications to quickly obtain information.

- Users also link record storage and retention to information flow. They want to reduce the volume of hard-copy storage. This is particularly true of the banking and insurance industries, although manufacturers are also interested.

- Eighty percent of the user respondents would like to see word and data processing integrated by their companies. Forty-five percent believe it is already happening.

- All user respondents expressed a strong need for word processor operator training.

  - User opinions are that training must be conducted at the vendor's site, or in a non-work environment to be effective.

  - Underlying the stated need for training is a need for user transparent equipment.

- Users link "improved management effectiveness" and "better management" to the need for better communications and information flow:

  - Users point to the need for simpler terminals and equipment for top management. They employ phrases like "user transparent," "friendly" and "forgiving."

  - The need for an "Executive CRT" to display on-line information was cited.

  - A further need, particularly for management, is "plain English language" instructions. The use of data processing language erects a barrier management is reluctant to cross.

- The majority of user respondents say top management support must be gained if the office of the future is to be implemented.

- "Management unwillingness" and "unawareness of the need for advanced technological innovation" were cited as principal obstacles to planning for integrated office automation systems.

- Users also said there is a need for some kind of Corporate Advisory Group on office systems - "to accept inputs on user needs and requirements."

3. RESOLUTION OF VENDOR PLANS AND USER NEEDS

- How closely do the vendors' plans meet the users need? Exhibit IV-1 charts the vendor plans. Exhibits III-2 and V-1 chart the users needs. A comparison between these exhibits shows that the vendors will be ready to meet the users' needs when the users are ready to take the necessary actions to satisfy those needs.

- Frequently, users must first identify their needs by answering questions of the following type:

  - What information is needed to operate the business?

  - Who needs the information, and when?

  - How long is the information useful?

  - How and where is the information created?

  - How is the information moved?

- Both users and vendors believe integration will be a step by step process. User needs will establish the priorities and time schedules for integrating various functions.

- Often the first step will be to determine which functions should be automated and/or integrated.

- Minimizing business interruptions and including existing installations to the maximum feasible extent will have a strong influence on integration scheduling.

- Vendors and users have the same perceptions of the driving forces behind the movement towards the office of the future, but the perceptions are stated differently.

  - Vendors believe economic justification is the primary driving force with increasing productivity a strong second. If productivity can be increased enough, the economics can be justified.

  - Users consider increased managerial effectiveness as the primary driving force. More effective management will make the business more competitive and provide substantial, long-range economies.

  - Users also perceive management's resistance to change as the greatest obstacle to the office of the future. Clerical workers are also reluctant to change. But, as one respondent puts it, "The manager's attitude is automatically reflected by his staff."

- Systems consultants, as well as vendors of products and services, should begin an educational program to increase management awareness of the benefits inherent to the office of the future, including:

  - Increasing information throughput to provide the complete up-to-date facts required for timely decisions and effective management.

  - Increasing the ability to rapidly access significant information, without having to review voluminous documents.

- Increasing the ability to confer with remotely located associates, without extensive travel or elaborate prior arrangements.

- Top managers are not likely to participate in educational seminars or conferences which include participants other than their peers. This fact must be kept in mind while designing and conducting educational programs addressed to top management.

APPENDIX A: INTERVIEW PROGRAM

APPENDIX A

INTERVIEW PROGRAM

INTERVIEW TYPE	USER RESPONDENTS					VENDOR RESPONDENTS		
	BANKING INDUSTRY	IN-SURANCE INDUSTRY	MANUFAC-TURING INDUSTRY	ALL OTHER	TOTAL USERS	HARDWARE SUPPLIERS	COMPUTER SERVICES	TOTAL VENDORS
ON-SITE	-	-	1	-	1	3	3	6
TELEPHONE	10	12	10	3	35	6	3	9
TOTAL	10	12	11	3	36	9	6	15

APPENDIX B: QUESTIONNAIRES

1. Which of the following Office Automation Services are of interest to you? (check all that apply)

FUNCTION	IN-HOUSE		OUTSIDE SERVICE	
	INSTALLED	CONSIDERING	INSTALLED	CONSIDERING
EMS (Electronic Mail Services, FAX, etc.)				
Distribution/Mail List Management				
Source Document Microfilming				
Information Retrieval				
OCR Services				
COM Services				
Correspondence Control				
Data Base Services				
Word Processing				
Photo Composition/ Phototypesetting				
Other _____ _____ (specify)				

Comments: _____

_____

_____

_____

2. How much are you spending per month on each of the functions defined in the previous question?

FUNCTION	CURRENTLY SPENDING	WOULD CONSIDER SPENDING
EMS (Electronic Mail Services, FAX, etc.)		
Distribution/Mail List Management		
Source Document Microfilming		
Information Retrieval		
OCR Services		
COM Services		
Correspondence Control		
Data Base Services		
Word Processing		
Photo Composition/ Phototypesetting		
Other _____ _____ (specify)		

3. a. What hardware do you have installed or plan to install to implement the services mentioned in question 1 and 2?

3. b. What hardware would you consider to implement these services?

4. What services not currently automated would you consider desirable, but not mandatory to an Office Automation System?

5. a. Please rate on a scale of 1-5 (5=high, 1=low) the relative importance of the following factors as they apply to implementing the office of the future:

	RATING	COMMENTS
a. Economics		
b. Worker Productivity		
c. Faster Turnaround		
d. Security		
e. Employee Satisfaction		
f. Skilled Personnel Availability		
g. Managerial Effectiveness		
h. Other _____ _____ (specify)		

5. b. What do you consider to be major problems or obstacles in implementing Office Automation Services?

6. a. Are word processing and data processing merging in your company?

Examples:

- Accounting
  - Payroll/employee mailings
  - A/R records/letters to delinquent accounts

6. b. How rapidly is the merger occurring?

7. What management levels make the decisions to implement "Office of the Future" applications; e.g., EDP Management, Telecom Management, Administrative Services Management, MIS?

FUNCTION	1979	1984	COMMENTS
EMS (Electronic Mail Services, FAX, etc.)			
Distribution/Mail List Management			
Source Document Microfilming			
Information Retrieval			
OCR Services			
COM Services			
Correspondence Control			
Data Base Services			
Word Processing			
Photo Composition/ Phototypesetting			
Other _____ _____ (specify)			

8. What "unmet needs" do you have which could be met with "Office of the Future" services?

1. What role do you envision for your company in the office automation services market?

_____

_____

_____

a. Which, if any, of the following office automation services are you currently offering or considering?

FUNCTION	OFFERED		FUTURE PLANS	EST. 1979 $ REVENUE DERIVED FROM SERVICE	% GROWTH (AAGR)
	YES	NO			
EMS (Electronic Mail Services, FAX, etc.)					
Distribution/Mail List Management					
Source Document Microfilming					
Information Retrieval					
OCR Services					
COM Services					
Correspondence Control					
Data Base Services					
Word Processing					
Photo Composition/ Phototypesetting					
Other _____ _____ (specify)					

Comments: _____

_____

_____

2. If you are offering or considering offering office automation services, what are your target industries:

INDUSTRY (MFG., BANKING, ETC.)	SIZE OF COMPANY			
	SMALL	MEDIUM	LARGE	VERY LARGE

3. Please rate on a scale of 1-5 (5=high, 1=low) the relative importance of the following factors as driving forces for use of office automation:

FACTORS	RATING	COMMENTS
a. Economics (Justification)		
b. Applications		
c. Security		
d. Network Availability		
e. Standardization		
f. Increase Productivity		
g. Employee CAI		

4. a. At what level of management are the key buying points? (check all that apply)

_____ EDP Manager

_____ Communications Manager

_____ Other _____
(specify)

b. Where are they located?

_____ Central Headquarters

_____ Remote Location

5. Please rate the following factors on a scale of 1-5 (5=very important, 1=unimportant) in the office automation decision process:

a. _____ Services vs. in-house

b. _____ Centralized vs. local control

c. _____ EDP vs. office management

6. What hardware are you offering/considering offering with office automation services?

a. _____ Small Business Computers

b. _____ Word Processing

c. _____ Combination of Word Processing and Data Processing

d. _____ I/O Terminals

e. _____ Facsimile Equipment

f. _____ Copiers

g. _____ Printers

h. _____ Integrated Peripherals Systems (MFS, PABX)

7. a. Are future office automation services extensions of present data product lines or will they be separate products/services?

_____ Extensions of present product lines

_____ Separate products/services

Comments: _____

_____

_____

b. Do you or will you have a separate sales force for Office of the Future products?

☐ Yes ☐ No

Comments: _____

_____

_____

c. Will equipment maintenance and service be separate from present maintenance and service staff?

☐ Yes ☐ No

Comments: _____

_____

_____

d. How will maintenance and service costs be handled?

_____ Separate (unbundled)

_____ Bundled

_____ Other

Comments: _____

_____

_____

7. e. Will operator training be provided by present training staff?

☐ Yes ☐ No

Comments: _____

_____

_____

f. How will operator training costs be defrayed?

_____ Separate (unbundled)

_____ Bundled

_____ Other

Comments: _____

_____

_____

8. What are major user "unmet" needs which your services will target?