EXECUTIVE WORKSTATION ACCEPTANCE:
PROBLEMS AND ...

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INPUT Planning Services for Management

EXECUTIVE WORKSTATION ACCEPTANCE:
PROBLEMS AND OUTLOOK

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EXECUTIVE WORKSTATION ACCEPTANCE:
PROBLEMS AND OUTLOOK

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EXECUTIVE WORKSTATION ACCEPTANCE:
PROBLEMS AND OUTLOOK

EXHIBITS

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I INTRODUCTION

I   INTRODUCTION

- This report is part of INPUT's Information Systems Program (ISP). It is de-signed to help information systems (IS) and corporate management assess the opportunities and problems associated with executive computing by:

    - Identifying executives' information and computing requirements.

    - Analyzing current and projected vendor offerings.

    - Recommending executive computing support strategies.

A.   REASONS FOR PREPARING THIS REPORT

- The end-user revolution is spreading into the executive suite. Many vendors are touting products as being executive workstations or executive information systems. These products are purported to improve executive productivity and greatly assist the company's strategic planning process.

- Are these new products or merely old products packaged in wood paneling and technological window dressing? Regardless, the executive is a very influential user. A dissatisfied executive user can be a major deterrent to the strategic use of information systems.

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- In the 1983 poll of INPUT clients, executive computing was one of the major areas of interest. Since executive computing includes personal computers, communications, and decision support software, it embraces most aspects of end-user systems.

B. SCOPE AND USE

I. SCOPE

- This report will focus on the computing needs of middle managers and above, with emphasis on senior and executive management in Fortune-1000-sized companies. Hardware products designated as executive workstations, as well as personal computers, portable computers, intelligent workstations, intelligent telephones, and integrated systems will be included. Software will include personal computing, decision support, and executive information systems.

- This report addresses the following major issues:

  - What is an executive workstation?

  - What are the current experiences of executive users?

  - What are current and projected executive hardware and software offerings?

  - What are executives' information and computing needs and how do they differ from other end users'?

  - Which applications are best suited to executives?

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- What level and type of executive will benefit the most from executive workstations and systems?

- What support structure is required to support the executive: How does it differ from other users'?

- What are the key factors for successfully implementing executive workstations and systems?

2. USE

- This report provides:

    - Guidelines for installing and implementing executive workstations and systems.

    - A status report for executive workstations and systems.

    - Planning aids for developing executive information systems.

- This report should be of interest to the following people:

    - Senior IS managers.

    - Managers of end-user computing.

    - IS planners.

    - Product planners for workstations, personal computers, and decision support and personal computing software.

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C.   METHODOLOGY

- The information for this report was gathered from the following sources:

    - Over 25 interviews with senior IS managers and executive users who either have installed or plan to install executive workstations. Copies of the questionnaires are contained in Appendices A and B.

    - Over 10 in-depth interviews with vendors of hardware and software products used by executives. Appendix C contains a copy of the vendor questionnaire.

    - INPUT's own studies on end-user computing.

- INPUT has taken the best practices and proposals and subjected them to further analysis to serve as the basis for this report.

D.   OTHER RELATED INPUT REPORTS

- Interested readers are referred to the following INPUT reports:

    - Micro-to-Mainframe Systems Experiences, May 1984.

        - Will concentrate on the experiences of organizations that use personal-computer-to-mainframe systems. It will also identify systems requirements and project future effects.

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- <u>Micro-to-Mainframe Communications</u>, May 1984.

  - Will analyze, in detail, personal computer communications modes, their advantages and limitations, and how these communications are likely to change in the next two to three years.

- <u>Managing the Acceptance of Office Systems</u>, December 1983.

  - Identifies the key factors and techniques for increasing the acceptance of office systems.

- <u>Impact of Office Systems on Productivity</u>, November 1983.

  - Establishes the framework for understanding the productivity problem and for evaluating office systems.

- <u>The Opportunities of Fourth-Generation Languages</u>, September 1983.

  - Analyzes the extent to which fourth-generation languages are used and how they fit into the information systems strategy.

- <u>Organizing the Information Center</u>, August 1983.

  - Discusses how to organize an information center, including chargeback methods.

- <u>Personal Computers Versus Word Processors: Resolving the Selection Dilemma</u>, June 1983.

  - Compares and contrasts PC and WP roles in the office environment for today and the future. It also includes a methodology to assist decision makers in making cost-effective selections that reflect each organization's unique environment.

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- _The Impact of the Office of the Future_, December 1980.

  . Describes the expected effects of the "office of the future" on both the organization and the people within it.

- _Managing the Integration of Office Automation in the EDP Environ-ment_, November 1980.

  . This report focuses on the tactical issues involved in managing the integration of office automation into the organization.

E.   REPORT ORGANIZATION

• The remainder of the report is organized as follows:

  - Chapter II is an Executive Summary.

  - Chapter III describes the executive user and defines executive work-stations.

  - Chapter IV describes the vendors' view of executives' needs and lists the products vendors provide to satisfy that need.

  - Chapter V relates implementation experiences for executive work-stations and systems.

  - Chapter VI contains Conclusions and Recommendations.

  - Appendix A is a copy of the Executive Workstation Questionnaire for IS Executives.

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- Appendix B is a copy of the Executive Workstation Questionnaire for Users.

- Appendix C is a copy of the Vendor Questionnaire.

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II EXECUTIVE SUMMARY

II   EXECUTIVE SUMMARY

- This Executive Summary is designed in presentation format to help the busy reader quickly review key research findings. It will also provide an executive presentation, complete with script to facilitate group communications.

- The key points of the entire report are summarized in Exhibits II-I through II-6. On the left-hand page facing each exhibit is a script explaining that exhibit's contents.

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A. EXECUTIVE WORKSTATION ACCEPTANCE: PROBLEMS AND OPPORTUNITIES

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- This report is part of the End User Systems Program of INPUT's Information Systems Program (ISP).

- Executive workstations have no clear product identity. Personal computers, portable computers, workstations, intelligent telephones, and integrated systems have all been identified as executive workstations.

- INPUT surveyed Information Systems (IS) executives who have had experiences with executive computing. Various hardware and software vendors were also interviewed to determine their view of the executive market.

- The report analyzes the experiences of companies using executive workstations. Their successes and failures are reported in order to highlight the potential benefits and disappointments associated with executive systems.

- Recommendations are made to help IS develop an executive computing strategy. The risks and rewards of executive systems are identified to maximize the likelihood of developing a successful executive computing strategy.

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EXHIBIT II-1

- II -

EXECUTIVE WORKSTATION ACCEPTANCE: PROBLEMS AND OPPORTUNITIES

- **Executive Workstations Are All Things to All People**

- **Two Perspectives**

  - **IS**

  - **Vendors'**

- **Experiences**

- **Conclusions and Recommendations**

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B.   THE EXECUTIVE IS NOT THE MAIN USER

- Top executives spend 70% to 90% of their time communicating with others. Most workstations do not enhance this activity. The executive also requires concise, strategic information. Usually this information is found in many sources within and outside the corporation. To access all this information requires sophisticated software and communications. Only then can a workstation provide a means for retrieving this information in a more timely manner. Since executives do not have a compelling need for a workstation, their use of these devices will primarily be discretionary.

- Senior and middle managers are more directly involved with functional information. This information can be derived more easily from current computerized files. These managers would be more interested in using an executive system than would the executive.

- Although INPUT's respondents have installed most of the executive workstations at the middle-management level, the respondents believe that the eventual primary user of executive workstations will be senior management, followed by middle managers, then executives.

- Senior executive users will be rare. Instead, users will mainly be people who are used to using computers. As younger managers who have used computer systems in their previous jobs enter the executive ranks, the workstation will begin to appear more often. The promotion of the computer generation to the executive suite will have a much greater impact on the number of executives using executive workstations than will the workstation's aesthetic features.

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EXHIBIT II-2

THE EXECUTIVE IS NOT THE MAIN USER
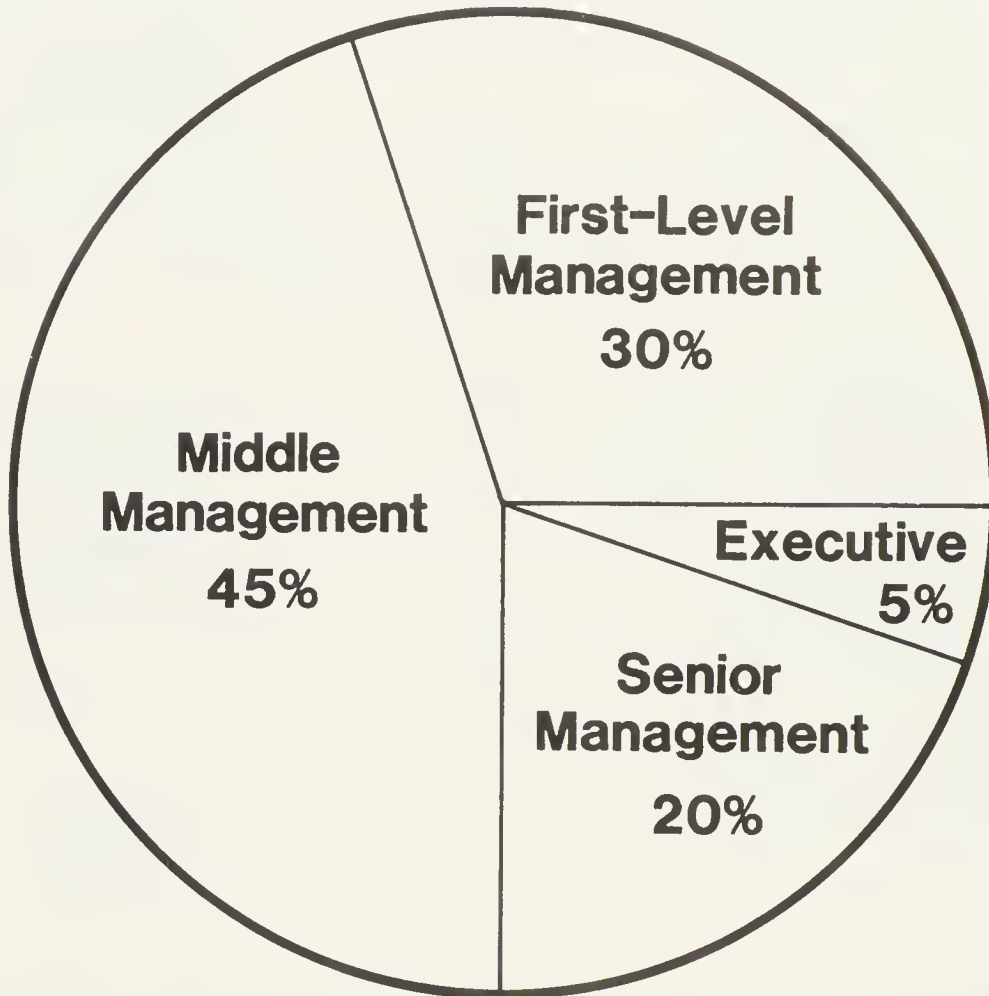
**Percent Executive Workstations
Installed by Respondents**

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UEEX

C.   EXECUTIVE HARDWARE PRODUCT DISTINCTIONS WILL BLUR

- A variety of products have been labeled executive workstations. They include:

    - Intelligent telephones. These units provide telephone management and limited data communications functions.

    - Workstations. These range from terminals with no memory to workstations that rival personal computers in their processing power. Workstations' strength is data communications, usually via a physical connection to a mini or mainframe computer.

    - Personal computers' strength is local processing power. PCs are beginning to communicate with host computers via telephone links.

- The above features are merging into one device. It may be called an executive workstation but will probably be viewed generically as a multifunctional workstation. The executive's workstation requirements will vary. Some will want pointing devices such as a mouse or touch screen or color graphic displays or even voice recognition. The workstations of the near future will allow customization by selecting the features that satisfy an executive's unique requirements.

- Portable workstations that weigh under 10 pounds will become less exensive and richer in function.

    - Local processing will expand past text processing and activity management to include financial analysis and scheduling functions.

    - Communications capabilities will improve to provide easier and faster transmission of information to local and mainframe computers.

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EXHIBIT II-3

EXECUTIVE HARDWARE PRODUCT DISTINCTIONS WILL BLUR

Intelligent Telephone

Workstation

Personal Computer
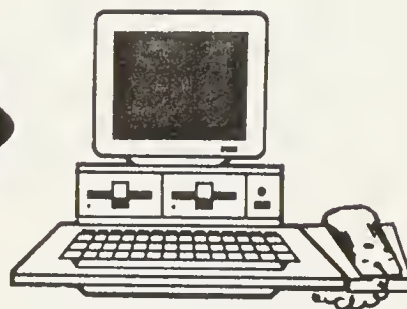
Multifunctional Workstation

1984

1986

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D.   SOFTWARE IS THE KEY TO SUCCESSFUL EXECUTIVE SYSTEMS

- Executive systems must integrate decision support, graphics, data base, and communication systems. They must transcend one local computer to include systems and information on the corporate mainframe computer.

- The executive is a casual user who will not want to invest a large amount of time in learning and relearning systems. The interface to this user must be intuitive. It must require minimal training and must be free of awkward syntax. The challenge is to develop lower level software that is conducive to the executive's use. The requirements of this type of software exceed the requirements of current personal computer users.

- The executive requires information from many sources. Local information is just the rudimentary requirement. The executive needs high-quality information. This information usually resides on corporate and public data bases.

- To satisfy information and computing requirements, software will need to be developed on local, regional, and corporate computers. The executive, however, must not be aware of this multicomputer environment. If these interfaces become visible to the user and require relatively complex responses to navigate this complex labyrinth of computers and data bases, the workstation will become a paperweight on the executive's desk.

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EXHIBIT II-4

- |7 -

SOFTWARE IS THE KEY TO SUCCESSFUL EXECUTIVE SYSTEMS

- **Integrated Systems**

- **Intuitive Systems**

- **Broad Span of Information Sources**

- **Transparent Interfaces**

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E. AN ENRICHED SUPPORT NETWORK IS A PREREQUISITE FOR SUCCESSFUL EXECUTIVE COMPUTING

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- Executives usually have staff personnel to coordinate and summarize the vast amount of information that they need to make decisions. These staff personnel are specialists and usually analytically oriented. They are usually knowledgeable computer systems users.

- Although line manager subordinates do interface directly with the executive, most of the detailed information on their functional areas is communicated to the executive's staff.

- Executive computing is heavily dependent upon decision support systems. These systems require model development and programming via user-oriented languages. The executive staff is the logical source of model development and this type of programming.

- The role of IS is to provide training to the executives and their staff. IS will create the interfaces to data bases and underlying systems. Most IS interfaces are with the executive's staff and line managers.

- Even if executives do not have workstations on their desks, through the effective use of support networks they may still receive the benefits of executive computing.

EXHIBIT II-5

AN ENRICHED SUPPORT NETWORK IS A PREREQUISITE FOR SUCCESSFUL EXECUTIVE COMPUTING

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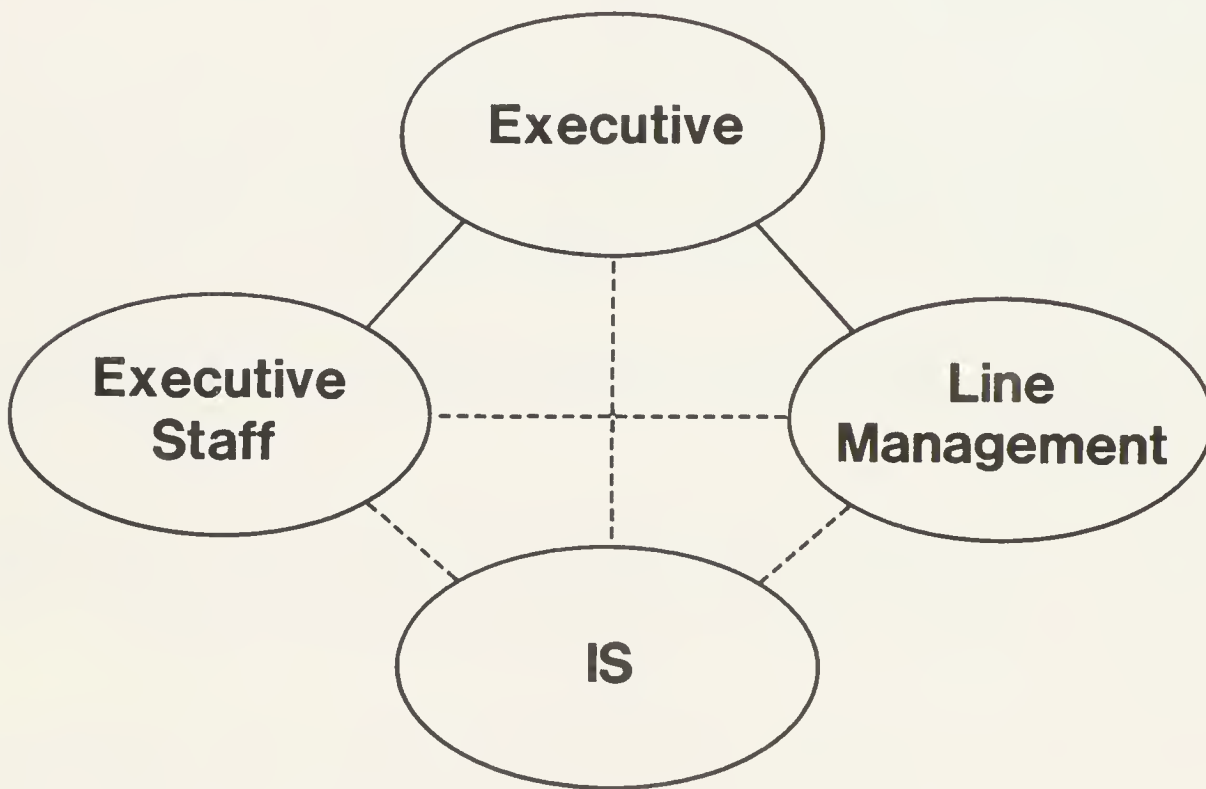
F.   THE EXECUTIVE WORKSTATION IS A CONCEPT, NOT A PRODUCT

- Executive computing is not dependent upon any specific hardware device. The information is the important component, not the packaging.

- Each executive's needs are unique. The executive has the power to demand systems that conform to these needs. There must be a means to customize these systems to not only satisfy the executive's needs but also provide an interface that encourages their use.

- Executive systems require extensive planning. IS should take a prominent role in this process since it knows the extent of technical resources required. IS knows how difficult a task it might be to satisfy the needs and resources required.

- IS must also take an active role in system planning because it has the most to gain or lose.

  - A successful executive computing installation can increase the rapport between IS and senior management. This will also increase executives' awareness of the potential benefits of information systems.

  - An unsuccessful installation may reinforce the belief that information systems derive little benefit from their high cost and that computers should remain relegated to the operational sector of the company.

- The driving force in the emergence of executive computing is not slowed by hardware but by the executive's desire to use the system. If executives are not asking for executive workstations, don't rush to install them. The risk of rejection is too great.

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EXHIBIT II-6

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THE EXECUTIVE WORKSTATION IS A CONCEPT, NOT A PRODUCT

- Customized System

- Well-Planned System

- High Risk to IS

- Don't Rush Installation

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III EXECUTIVE WORKSTATIONS: ALL THINGS
TO ALL PEOPLE

III   EXECUTIVE WORKSTATIONS: ALL THINGS TO ALL PEOPLE

- Does the executive workstation exist? The following are some statements by analysts and executives on this topic.

    - "Executives will require faster response times and more local pro-gramming power - there is no future among executive workstations for dumb terminals."

    - "There is a trend towards smart terminals that present information in a more complete form, and are more convenient for the user (exec-utive)."

    - "An executive does not want a terminal on his desk."

    - "The company that will have a competitive advantage in the 1980s and maybe into the 1990s is the one that gets its executives into the computer age."

- There is also confusion about who the executive user is:

    - Chief executive only?

    - Senior executives?

    - Middle managers?

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- All managers?

- All of the above?

- None of the above?

- This chapter will identify the executive user from both an organizational and functional perspective. The needs of these users will then be discussed. This will be followed by functional requirements for an executive workstation and the chapter will conclude with a definition of the executive workstation.

A. THE EXECUTIVE USER OR NONUSER

- Is it realistic to assume that the executive floor of major corporations' head-quarters will be lit by the pale glow of hundreds of mahogany-encased color terminals, one on each executive's desk? Probably not.

- The need or desire for senior level personnel to interact with computer-based information depends upon organizational, functional, and personal requirements.

1. THE ORGANIZATIONAL PERSPECTIVE

- Exhibit III-1 shows a typical organizational hierarchy. The top level, the executive, would appear to be the target market for executive workstations. But can an executive's productivity be improved by utilizing these devices?

- The higher level executives have the following characteristics that are associated with their job responsibilities:

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EXHIBIT III-1

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ORGANIZATIONAL STRATA

Executive

Senior
Management

Middle
Management

First-Level
Management

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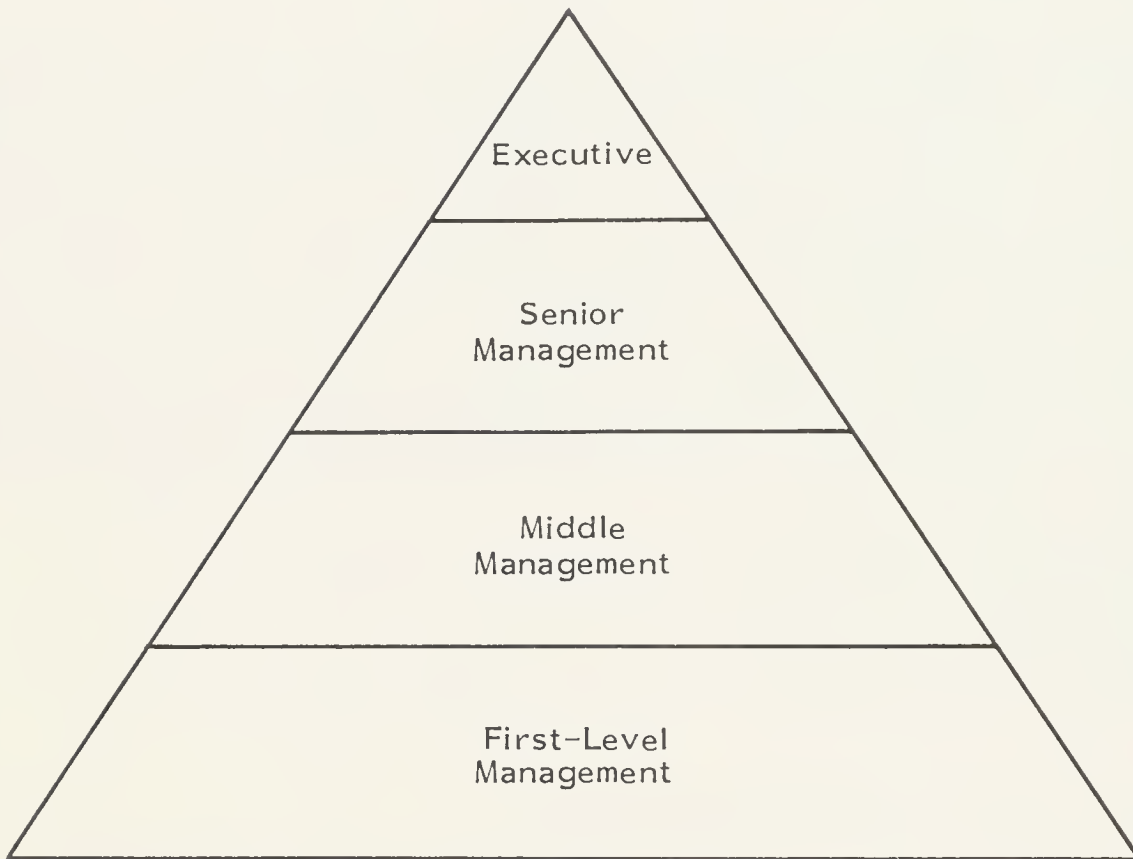
- They spend from 70 to 90% of their time working with others. When they work alone it's usually away from the office.

- They spend time with people outside their direct chain of command.

- The breadth of the topics they discuss is impressive. They will discuss and use anything that is related to their business and to the achievement of their goals.

- Many of their daily activities are unplanned. They usually react to others' initiatives. The executive is sought out by others for direction, guidance, approval, and opinions. Their time with others is spent in short, disjointed conversations of usually less than 10 minutes.

- Executives are influence peddlers. They create a network of cooperative relationships among subordinates, peers, outsiders, and superiors. The network is developed through a variety of face-to-face methods that include:

  - Hiring.

  - Firing.

  - Transferring personnel.

- Executives use their interpersonal skills, budgetary resources, and information to influence people and events.

- Finally, the executive is the ultimate delegator. He or she uses subordinates to sift through information that will provide the kernels of intelligence needed to make a decision.

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- The lower the level in the organizational pyramid, the more detailed the information. Exhibit III-2 shows the organizational pyramid with the informational needs associated with going up or down the organizational strata. Note that lower levels of management must be interested in much higher volumes of information.

    - The first and middle-management levels focus on operational and tactical concerns. Management control systems are paramount.

    - Objectives concern operating efficiencies and have a planning horizon of up to three years.

    - Since these management levels deal with detailed information, the quality of this data is relatively low.

        . Much of the information is irrelevant to the strategic success of the organization.

        . Since lower management is responsible for day-to-day operation, they must review all information. Strategically significant, higher quality information is extracted, summarized, and sent up the pyramid.

- Senior and executive management is concerned with strategic issues. Their subordinates and staff extract pertinent (high-quality) information from the vast internal and external data sources. The staff and subordinates manipulate and enhance the information. The executive analyzes this distilled, high-quality information and then delegates actions that guide the strategic direction of the organization.

- The executive and senior management levels have a broader view that crosses functional barriers. The lower levels' perspective is very narrow. Their field of vision is centered on a specific function, such as cost accounting for a particular product component.

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EXHIBIT III-2

INFORMATION NEEDS BY MANAGEMENT LEVELS
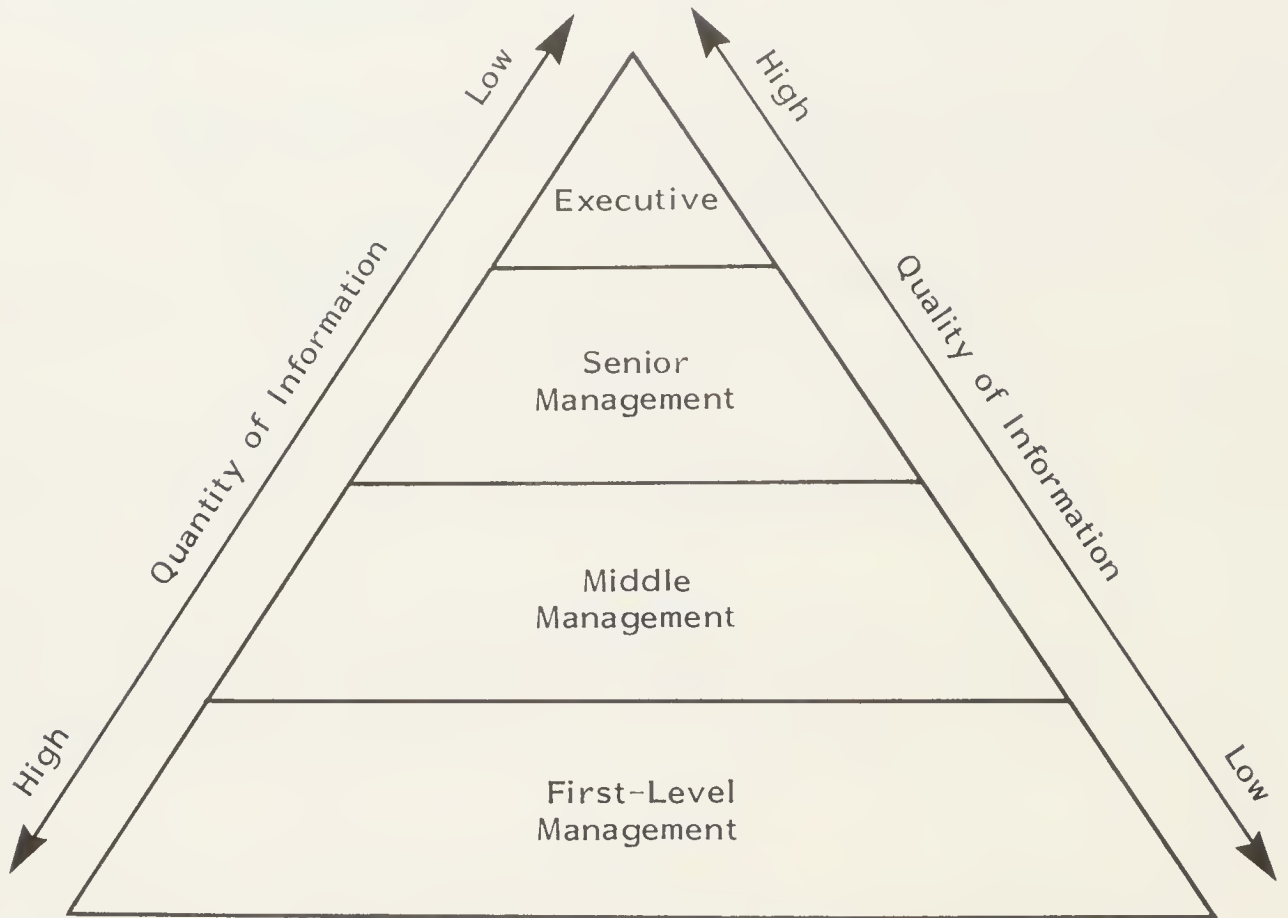
- Lower management's narrow focus and vast informational requirements lend themselves to computer-aided management tools.

- Upper management's interest in high-level, summarized information from multiple sources is less conducive to productivity improvement through automation.

● In INPUT's poll of users and information systems (IS) executives on who should use executive workstations, senior management was identified as the key user group. As reflected in Exhibit III-3, the other management groups were also good candidates for using executive workstations.

- First-level management had the lowest number of respondents who believed that they should be executive workstation users.

- In each management category, 50% of the respondents believed that they should be users of executive workstations. This reinforces the idea that there is a lack of distinctions among the actual users of executive workstations.

2. FUNCTIONAL PERSPECTIVE

● In the previous section, the executive was defined as a generalist with a broad view that crossed functional boundaries. But there are also upper level managers who are responsible for specific functions, for example:

- Chief financial officer.

- Head of marketing.

- Head of manufacturing.

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EXHIBIT III-3

USERS OF EXECUTIVE WORKSTATIONS

Percent of Respondents
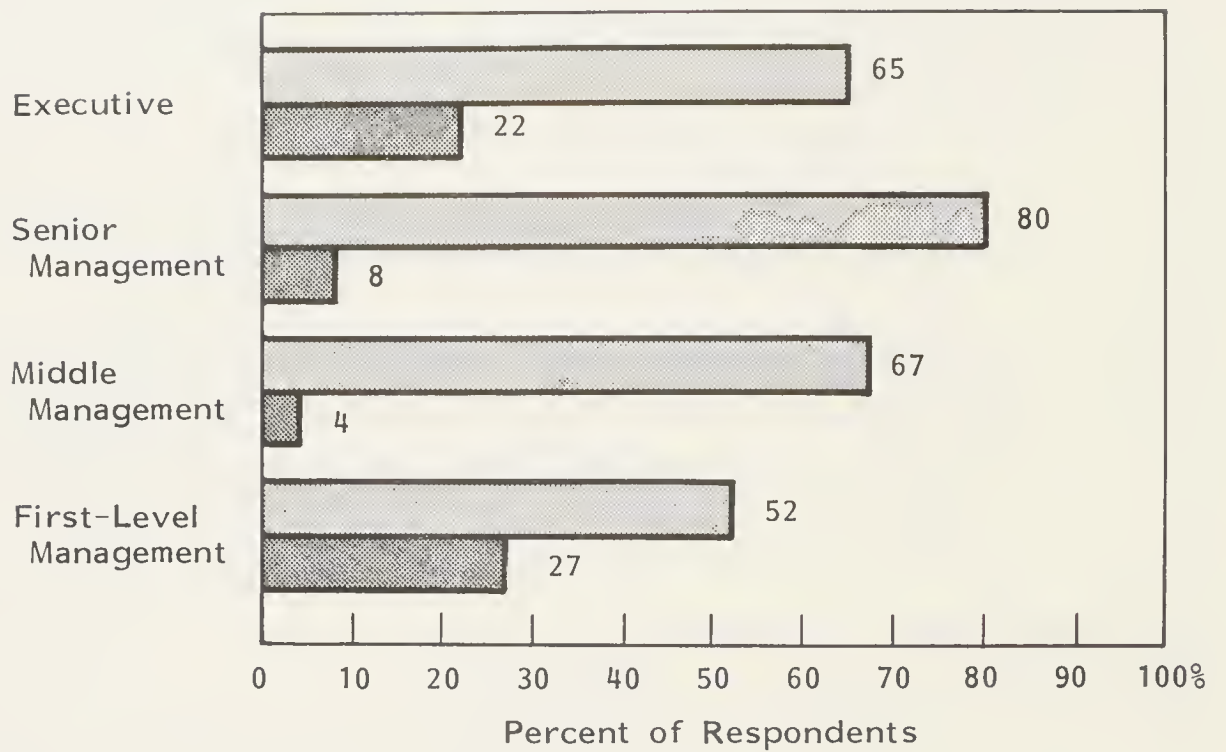
☐ Should be users of Executive Workstations

▨ Should not be users of Executive Workstations

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- Chief operating officer.

- Head of information systems.

- These managers have data-driven activities and are usually analytically oriented. Their background may have included direct contact with computer-based information and they may even rely on it for decision making.

- The more data intensive the function, the higher the dependency on the computer. Although they may not directly interface with the computer, they are aware of its power.

  - The personal computer has been used to varying degrees of success by these executives and their staff and subordinates to assist in decision support activities.

  - There is a large group of vendors and IS managers that categorize personal computers as executive workstations because they use them themselves. After all, isn't an executive workstation, by definition, any workstation (personal computer) used by an executive?

- Although the personal computer has been used either directly or indirectly by these executives, it has not been the total solution.

  - Long training time is required. The executive, for the most part, does not have the time nor the interest to spend the many hours required to learn user friendly languages, such as VisiCalc and Lotus 1-2-3.

  - Executives are casual users at best. They will use the system one hour a week or less. Even if they learned these languages, the knowledge wouldn't be retained. The executive workstation's use may be delegated to staff.

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- Even in these functional levels, the executive requires quality information from many sources. The standalone personal computer will not satisfy this need.

- Analytically oriented executives have a greater need for computer access than do generalists, but the time of even these executives is still centered on strategic issues and influence peddling. The need for computer assistance may translate to frustration and dissatisfaction with current alternatives.

3. PERSONAL PERSPECTIVE

- The executive, like other end users, can be classified into three broad categories:

    - Computerphobics.

    - Computerphiles.

    - Computernormals.

    a. <u>Computerphobes</u>

- This fear usually must be overcome at the lower levels of the organization. It is accomplished by training, use, demonstrated benefit, and even management edict. In the executive suite, however, the fear need not be conquered. An executive that does not want to use a computer will not use one.

- Executives may fear that they appear less than stately.

    - Being trained by a very junior person may be viewed as an erosion of power. Even worse, executives may appear less than brilliant during this training period.

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- There is also the fear of causing a catastrophic error that would affect corporate data. The fear is not so much the cost of correcting the error but that the company will find out who did it.

- Many executives have avoided learning to type. In fact, a keyboard can be viewed as an antistatus symbol. Image is important and can be the true reason for not wanting a computer: the executive doesn't want to appear silly.

- The key to arresting these fears is to demonstrate a sufficient benefit worthy of overcoming them. Unfortunately, at the executive level these benefits are elusive and difficult to demonstrate.

  - Since most of the executive's time is spent communicating, any tool that aids communication may be of enough benefit to arrest their fears. Telephone-based workstations, such as Northern Telecom's Dataphone, may receive higher acceptance.

  - The driving need for quality information will require executives to indirectly interface with computers. Executives will delegate computer access to their support staff. This will probably prove the best remedy for computerphobia.

b. Computerphiles

- On the other extreme from the computerphobes are the computerphiles. These people love their computers. They are the hobbyists in pinstripe suits.

  - They receive publicity not only for having workstations on their desks, but also in their houses, cars, and vacation villas - they even have portables for good measure.

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- Computerphiles are known for accessing the corporate data bases first thing in the morning (around 7:00 a.m.) and sending electronic inquiries to their subordinates immediately.

- The computerphiles' biggest danger is getting involved at the detailed, operational level of the organization. The ripple effect of their daily questions can cause the company to become totally reactive.

  - Lower level management will have workstations on their desks but purely as a defensive measure. They should be able to see the same information their superiors see, ideally before their supervisors see it.

  - The strategic potential of the computer will not be realized; instead, it will become merely a pawn in the game of technological one-upmanship.

- The information systems organization is also in a reactive position. Although the executive's computerphilia will loosen the budgetary purse strings, there is a cost in spending time and resources catering to the executive's latest whim.

- The solution is to redirect the executives' attention to the strategic focus of their jobs. This may seem an impossible task, especially due to their organizational position. There is hope, however. Executives do believe they are using the computer systems to aid strategic decision making. If the destructive effect of their actions can be demonstrated, they may change. A more positive approach may be to assign staffs to the executives to provide the strategic information they require. This information may be provided by hard copy reports, or the executives can access it via their workstations. A close working relationship with this staff will build credibility and allow executives to perform the jobs for which they're being paid.

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c.   Computernormals

• Most executives are computernormal. They are aware of the hype of the information revolution as well as the 1-3% of their company's revenues that are being spent on computing.

• The executive is very busy. The motivation behind an executive workstation is mainly curiosity. As with the computerphobe, the benefit to the executive of an executive workstation is unclear.

    - The higher levels have the need for kernels of quality information, but the time spent in receiving and assimilating this information must be very short. The delivery mode, whether hardcopy, interpersonal, or computer terminal, is based upon personal preference.

    - The lower level executives must sort through more information than their superiors. The benefit of using computers is more apparent. The executive computing environment may be dictated by one's superiors.

        . If one's boss is a computermaniac, one must use the computer to survive.

        . If one's boss is a computerphobe, the delivery mode of the boss's requirements must not include computer communication. The means of attaining this information is under the boss's direct control.

        . Some executives heavily utilize electronic mail (both voice and text). If one's boss is sending electronic memoranda, one had better use a workstation to receive these communications.

• Overcoming the impediments to the use of workstations can be accomplished by focusing on the important aspects of the executive's job. For example:

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- Communication - the ability to stay in contact with a large, diverse network of people within and outside the organization.

- Obtaining high-quality, strategic information - the ability not only to receive this information but also to receive timely reformulations of it as assumptions change. Executive information systems (which also can be called high-level decision support systems) are addressing these needs. These systems will be discussed in the next chapter.

- The amount of direct computer use by the executive is primarily based on personal preference. The executive's support staff will be the primary user of computer-based information.

4. SUPPORT

- The executive's support network is extensive:

    - One vendor defines an executive as anyone who has a personal secretary. This vendor estimates there are 300,000 executives in industry and this number will remain constant for the next three years.

    - The subordinates are also part of the support network. The subordinates can be divided into line managers and staff.

        . The line managers are responsible for managing the organization. They report the high-quality, strategic information to their superiors. The information is very narrow. They provide supportive information upon request and their interface with their superiors is relatively infrequent.

        . The executive's staff has more frequent interaction with executives. Staff members manipulate information. Their view is

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broad - across the executive's entire organization. The staff personnel are usually the closest direct contact the executive has with heavy users of computer technology.

- How does one support the executive user? Since executives' time is very valuable, it is unrealistic to assume they will spend hours learning a computer system. If executives use workstations, they will be casual users. The systems must be very easy to use and self-documenting.

    - The software and hardware should not differ from the way the executive performs normal operations.

    - The information needed, regardless of source, must be easily accessible by the executive.

- IS support should be barely visible to the executives and highly visible to their staffs.

    - IS should provide initial training, although this may be performed by the executive staff. The behind-the-scenes activities, however, are extensive. IS must provide high-level software that can access data from multiple sources (internal and external). The necessary security must be maintained, yet the executive must be able to access information with a minimum of effort, ideally by one operation (i.e., by pressing one key or speaking one word).

    - The executive staff will be the primary interface with IS. This staff will require training and ongoing support. They will be the identifiers of data, computational, and communication needs. Most likely, the executives' needs and problems will be communicated with their own staff, not IS. It is important that IS establish a good working relationship with staffs. The success of executive systems could hinge on the rapport between IS and the executive staff.

INPUT

5. THE GOLDEN RULE

- An unknown prophet coined the corporate golden rule: "The person with the gold makes the rules." Although this may appear cynical, it may be very relevant to executive workstations.

  - The executive workstation may provide an executive's first direct contact with the computer revolution.

  - The utility these workstations provide to the executive may have a direct impact on corporate computing expenditures.

- Executives, by the very nature of their corporate position, can dictate personal preferences for the systems and devices they use.

  - Status consciousness could dictate a device that looks elegant but may not provide functional capabilities.

  - Some executives demand a workstation that is unobtrusive - it has a small footprint and fits into the executive's decor.

  - Others may want the workstation to be very visible, an open sign of the technological inclination of the executive.

    - One executive even had an IBM 3270 terminal prominently displayed on his desk. His peers and subordinates were impressed. A few weeks after the terminal's installation, someone noticed that the terminal was not plugged in. Apparently the executive believed it was important to support computerization . . . or maybe he just wanted to impress his peers.

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INP

- Some vendors are providing blackboard-sized screens for presentation displays and video conferencing. Other vendors are providing smaller screens as part of the strategy of providing a small-footprint device for the executive's desk.

- The executive workstation is a personal preference device. It must be consistent with the executive's needs, wants, and status. Executives will dictate the type of device they get. After all, they have the gold.

B.   WHAT IS AN EXECUTIVE WORKSTATION?

- This section will investigate the components of an executive workstation. They will be examined from the perspective of the executive, described in the previous section, and the IS organization. The vendors' perspective will be investigated in the next chapter.

- Hardware, software, and communication requirements will be discussed. The discussion will culminate in the next section, which defines executive systems.

1.   HARDWARE: FORM OR FUNCTION?

- What does an executive workstation look like? Is it smart or dumb? Does it have a keyboard? Does it look like a piece of fine furniture? Does the executive care what it looks like?

- As the title of this chapter states, the executive workstation can be all things to all people. There are components that are substantive and there are others that are pure marketing sizzle. Either aspect can sell the workstation. But the substantive features are the prerequisites for maximizing the benefits from the executive system.

INPUT

a.   Smart or Dumb?

- The proliferation of personal computers in business has resulted in the simplistic idea that an executive workstation is merely a personal computer.

  - The problem with this line of thinking is that the personal computer, on a standalone basis, cannot access corporate data (or any other data) unless it is entered into the system.

  - The alternative of downloading information from other computers is not trivial. It is an exercise that the executive (or most anyone else) wants no part of.

  - The high incidence of executive communications cannot be addressed by a standalone system.

- Alternatively, a terminal with no standalone computing capability is more attractive.

  - Mainframe mentality exists.

    - A labyrinth of passwords and cryptic codes are usually required to wend one's way through the multiple data bases and systems required to get information.

    - There is a heavy dependence on the IS organization. There is no local control.

    - Response times can be aggrevatingly slow.

  - The executive's personal and private information may be stored on the corporate computer. Despite assurances to the contrary, the privacy of this information may be compromised.

IN

- The obvious solution is to have a device with some local computing capability that can access and easily download information. This need is no different from other end users'. The solution can also take the form of personal computers networked with local or corporate computers containing software to ease the dispersion of information among computers. The only possible exceptions are the executives' environments and the support staffs at their disposal. This may mean that an executive may have a local computing network composed solely of support staff.

- The local computing contained in the executive workstation should be at least 256K so that executives can perform some analysis on their own if they so desire. Remember, friendly software costs resources.

b.   To Key or Not to Key

- "The executive abhors the keyboard. It is demeaning. It connotes negative status." These cries have been made by analysts and vendors alike. In fact, many have pointed to the executive's loathing of keyboarding as a major roadblock to computers entering the executive suite.

- American ingenuity has come to the rescue and built a better mousetrap - or mouse. The Xerox Star introduced the mouse, a cursor moving device that has revolutionized keyboarding. The mouse was also embraced by Apple - first by the LISA and now by the MacIntosh. Other vendors are adding mouse software and providing mouse peripherals to be added to other personal computers. But in all cases, the keyboard still exists - how else can one enter data? The amount of keyboard use has diminished but acceptance of our cute little rodent is far from universal. As one user said, "The mouse is an excellent pointing device for someone with three hands."

- Touch screens, a more direct way of indicating preference for menu items, are also beginning to appear. Again this is merely a pointing device, but it has

INPUT

a disadvantage compared to the sleek mouse - a fatter finger. The relatively large size of a finger may make it difficult to edit small characters in the body of a report, for example.

- An even more direct solution is just to tell the workstation which alternative one wishes to select. Current technology provides for voice recognition of up to 100 words but reprogramming for different voices (or for the same voice with a cold) may tax the patience of the executive. Noise can also play havoc with the verbal command. The question of whether an executive would rather speak clearly into a microphone or press one key is subject to some debate.

- Mice, touch screens, and voice activation are methods of cursor movement. For an executive who only reviews information, this can replace most keyboarding. For other executives who wish to send textual messages or perform computerized analysis, the keyboard is here to stay. Whether these alternatives are beneficial will be a personal decision.

- Exhibit III-4 shows that respondents to INPUT's survey thought the mouse and possibly the touch screen products were not essential parts of executive workstations. Voice as a cursor-moving device also is purely optional. Voice via incorporating a telephone into the workstation received a more positive reception (see section B.3 of this chapter).

- In summary, the respondents believed that nonkeyboard cursor movement devices have benefits that are more marketing related than functional.

c.   Aesthetics: Sizzle or Substance?

- There are some people who would define an executive workstation as a "wood-paneled terminal." This may seem extreme but the aesthetics of the workstation can be the determining factor as to whether a workstation is placed on the executive's desk. Once on a desk, aesthetics have little to do with use.

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EXHIBIT III-4

- 43 -

HARDWARE FEATURES FOR THE EXECUTIVE WORKSTATION

Include Feature

Percent of Respondents

Exclude Feature

Percent of Respondents

INPUT
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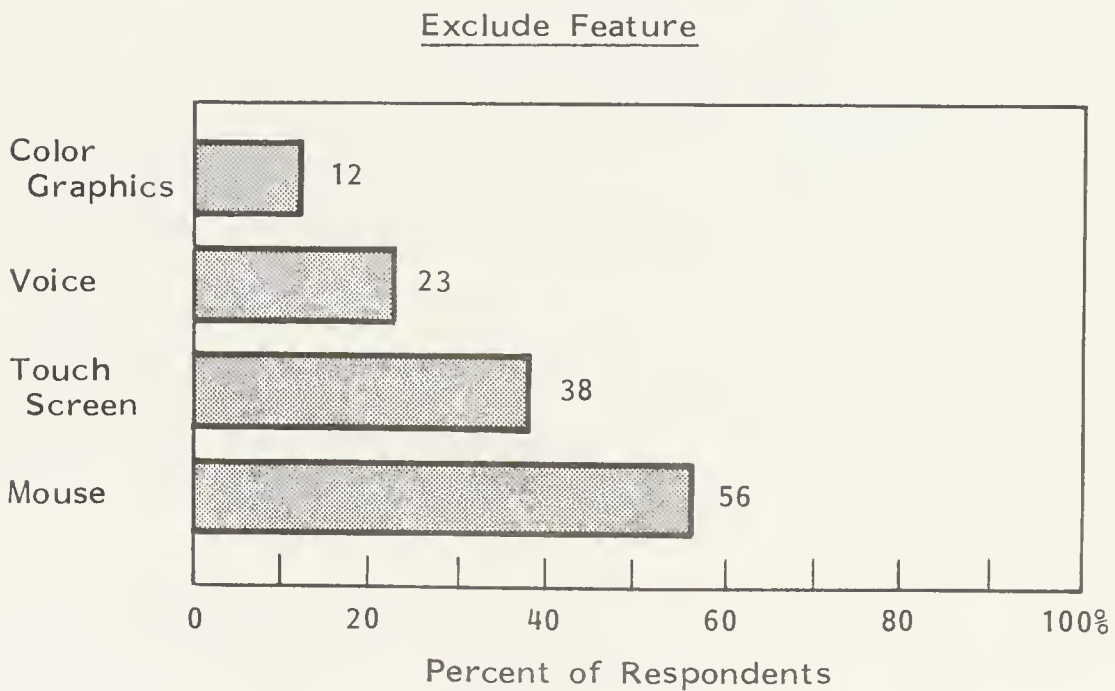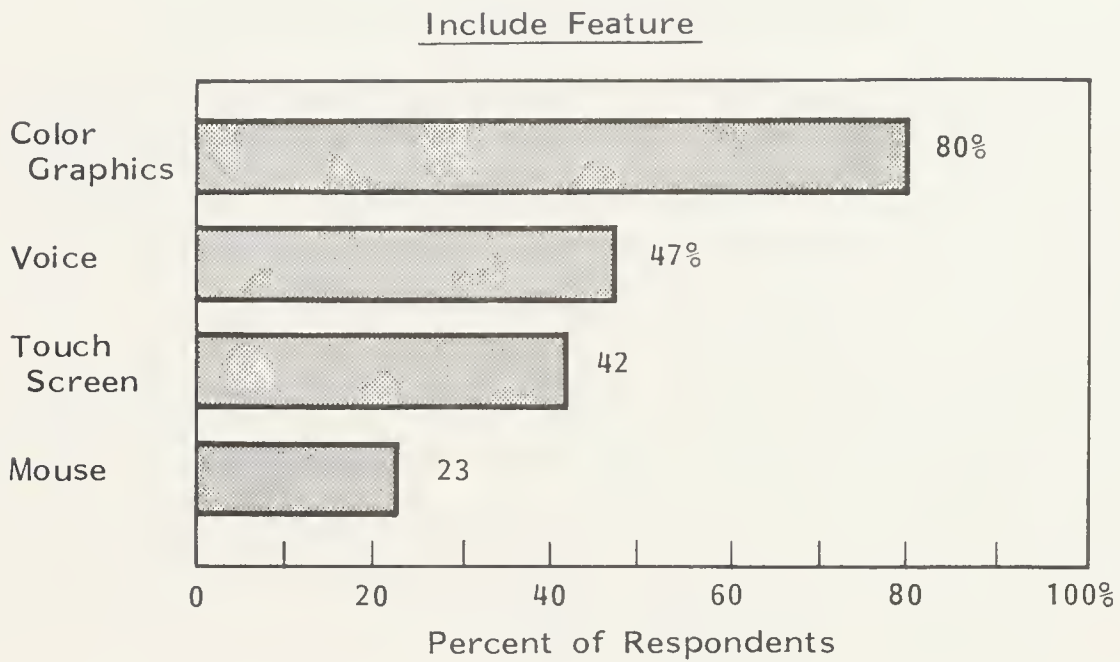
- Exhibit III-4 indicates that respondents (IS executives and users) believed that high-resolution color graphics are essential to the executive workstation.

  - Looking more closely at this response, there are two components to the very high demand for high-resolution color graphics: the graphics themselves and high-resolution color displays.

    . Graphics are almost essential to the executive workstation. Since the executive deals with high-quality, summary information, graphic representations of data can greatly assist in determining trends, aberrations, and possible problems.

    . High-resolution color display is definitely an aesthetically pleasing nonessential. The resolution of the display should be of sufficient quality to accurately represent geometric forms – circles should not look like ellipses. The need for color, however, is pure aesthetics and it's slow. One vendor said that the need for high-resolution color for the executive is very small but the demand is high.

  - The display size falls in the category of personal preference. Exhibit III-5 shows that most respondents thought either a standard 12-inch terminal or a larger-than-standard size is preferable for an executive workstation. Only 14% stated that smaller display sizes are preferable. This is contrary to the small-footprint strategy being promoted by many vendors.

    . Respondents stated that if an executive was to review information, the screen must be of sufficient size to easily interpret information.

    . The smaller screen sizes were more appropriate for portable workstations and intelligent phone systems.

IN

EXHIBIT III-5

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EXECUTIVE WORKSTATION SCREEN SIZE

Standard 12"
Display

50%

Smaller Than
Standard

16%

Larger Than
Standard

34%

Percent of Respondents

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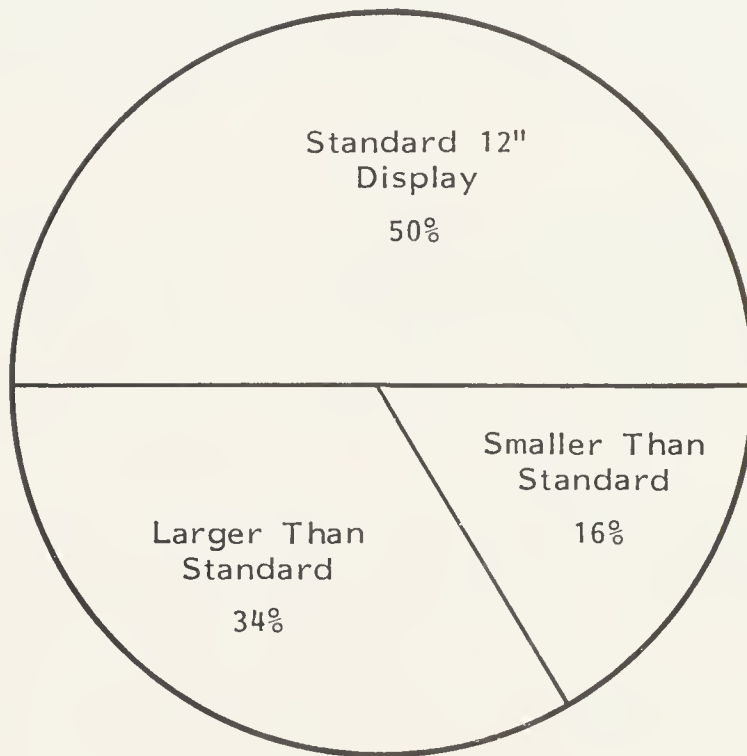
.   The conflict between adequately sized displays and small-foot-
     print displays on executives' desks is being addressed by
     vendors.   Some vendors are providing detachable displays
     (Wang); others are using an electronic blackboard concept (Santa
     Barbara Laboratories).

- The question of furniture-like appearance is purely status related.   This
  aesthetic should not be minimized. A cumbersome metal terminal in battle-
  ship grey will not find its way onto many executives' desks. Some executives,
  however, may not be very receptive to spending an extra $2,000 to encase a
  workstation in rosewood.

- The executive workstation should be aesthetically consistent with the execu-
  tive's status and personal preference.   The aesthetics of visually pleasing
  workstations removes only an initial impediment; it may make the difference
  in getting the workstation on an executive's desk but it won't motivate them
  to use it.

  -    One vendor related that a customer made an initial order of eight
       workstations for their top executives and had them encased in rose-
       wood. The customer anticipated that they would order another group
       of terminals within two months for the next level of executives.
       Months passed and no orders were received. The workstations were
       aesthetically consistent with the executives' lofty status and were
       placed prominently on their desks. The executives, however, had no
       need to use them except to monitor the activity of their holdings in
       company stock. Since the company's stock price was falling, even that
       activity was diminishing. The company eventually removed the work-
       stations and gave them to middle managers who had a need and desire
       to access computer information.

INP

- The appearance of the workstation is important but the executive must be motivated to use it. Beautiful furniture is not a motivator but an ugly terminal may never enter the hallowed doors of the executive suite.

2. SOFTWARE: THE MEANS TO EXECUTIVE COMPUTING

- Once the executive workstation is on the desk, the executive must be motivated to use it. The main motivation is to obtain the strategic, high-quality information executives require. How they obtain this information is important when executives are directly involved and unimportant when they are not.

    - Executives are concerned with the human-computer interface. They want to, ideally, take one action (press one key, for example) and obtain the information they require in a format most conducive to their specific needs.

    - The amount of programming required to get this information is irrelevant to them. Their sole interest is what they must do to get the information.

- Executives cannot be bothered by syntax. They are looking for a method of improving their own productivity. The executive wants to be able to retrieve, analyze, disseminate, and, in some cases, modify information the same way they do now. Vendors have tackled this need by using icons: pictorial representations of the office. Although the pictures are cute, it is unlikely that an executive will require a picture of a file cabinet in order to store or retrieve information. Some people believe that icons are a breakthrough in user friendliness; others believe it's embarrassingly simple minded. Personal preference, again, is the key to whether an executive has an icon-laden system or merely words on a screen.

INPUT

- Windows, or multiple-information representations on a single screen, are more universally seen as beneficial. Since many decisions are based upon multiple information sources, the ability to view sources simultaneously on one screen can be very beneficial. The screen size must be large enough to allow for easy viewing, otherwise this feature will never be used.

- The systems used by executives can be grouped into the following categories:

  - Decision support.

  - Conferencing.

  - Information transfer.

  - Information retrieval.

  - Personal processing.

  - Activity management.

- Decision support systems range from spreadsheet systems to complex model programs. At the executive level the modification of assumptions and the execution of the system must be relatively easy. Other than the computer-philes, very few executives will spend the time to develop programs. There will be many executives who will rely on their staffs to not only modify but also execute these systems. A growing number of executives, however, will want to perform "what if" analyses themselves. This is, in part, due to the emergence of computer-literate executives. Executives do not want to spend time explaining changes they want in a financial model, for example, if they can easily make the changes themselves.

IN

- Decision support software must be developed at two levels.

    - The analytical level, which defines the model. This is performed by the executive's staff and IS department.

    - The execution and modification level. This is performed by the executive. A bridge must be programmed between these two levels by IS. IS must also design the executive level of the decision support system so that it is easy to use and even customized the way executives want.

- Conferencing is a telecommunications system that facilitates human interaction, ranging from telephone mnagement to videoconferencing. Section B.3 of this chapter will discuss communications.

- Information transfer is defined here as the transfer of information that originates at the workstation. This includes electronic mail (both text and voice), data transfer (uploading) to other computers, and facsimile transmissions.

- The heart of the executive's needs is information retrieval, the ability to access information from multiple locations quickly and easily. Information retrieval is in all forms - voice, data, text, graphics, and video.

- Personal processing is interactive, computer-assisted writing, calculating, and drawing. These applications are typically called personal computing, word processing, and interactive graphics. Personal computing becomes less important at the higher echelons of the corporation. This level is mainly interested in accessing information from a wide range of sources and in performing "what-if" analysis, either directly or indirectly. Graphic representation of the results is important and is probably the most frequently used component of personal processing. Word processing at the executive level will only be used for electronic mail (information transfer).

INPUT

- Activity management systems include electronic tickler files, calendaring, and scheduling systems. Activity management systems are rarely used, although the calendaring feature has had its supporters. The executive usually has a secretary to maintain a calendar (which can be done electronically). The advent of truly portable computers (under 10 pounds and small enough to fit in a briefcase) may provide an effective tool for executive activity management.

- Exhibit III-6 reflects the response to INPUT's survey of the software that is included in an executive's system. Over 90% of the respondents said that decision support and information retrieval should be included in the system. Information transfer, primarily in the form of electronic mail, was also an important feature.

- The key to an executive using a workstation is whether it helps efficiency. Use must not be hindered by syntax-laden software. The interface to the information must be easy without being insulting. To accomplish this the interfaces should be customized to the executive's needs. Be careful not to overrestrict the functionality of software the executive can use. The use of the software must be intuitive. It must not limit the executive but instead should support business objectives.

3. COMMUNICATIONS: THE EXECUTIVE COMPUTING LIFELINE

a. Data

- In the previous section, information retrieval was one of the key categories of executive systems. The need for information from diverse sources presents a complex challenge to the IS organization.

  - The executive requires information from the corporate data base (or in most cases, from multiple data bases), public data bases, departmental data bases, and possibly from personal data bases.

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EXHIBIT III-6

SOFTWARE FEATURES FOR EXECUTIVE WORKSTATIONS

Include Feature

Feature	Percent
Decision Support	93
Information Retrieval	92
Information Transfer	85
Activity Management	61
Personal Processing	60
Conferencing	47

Percent Respondents

Exclude Feature

Feature	Percent
Decision Support	0
Information Retrieval	0
Information Transfer	8
Activity Management	13
Personal Processing	24
Conferencing	17

Percent Respondents

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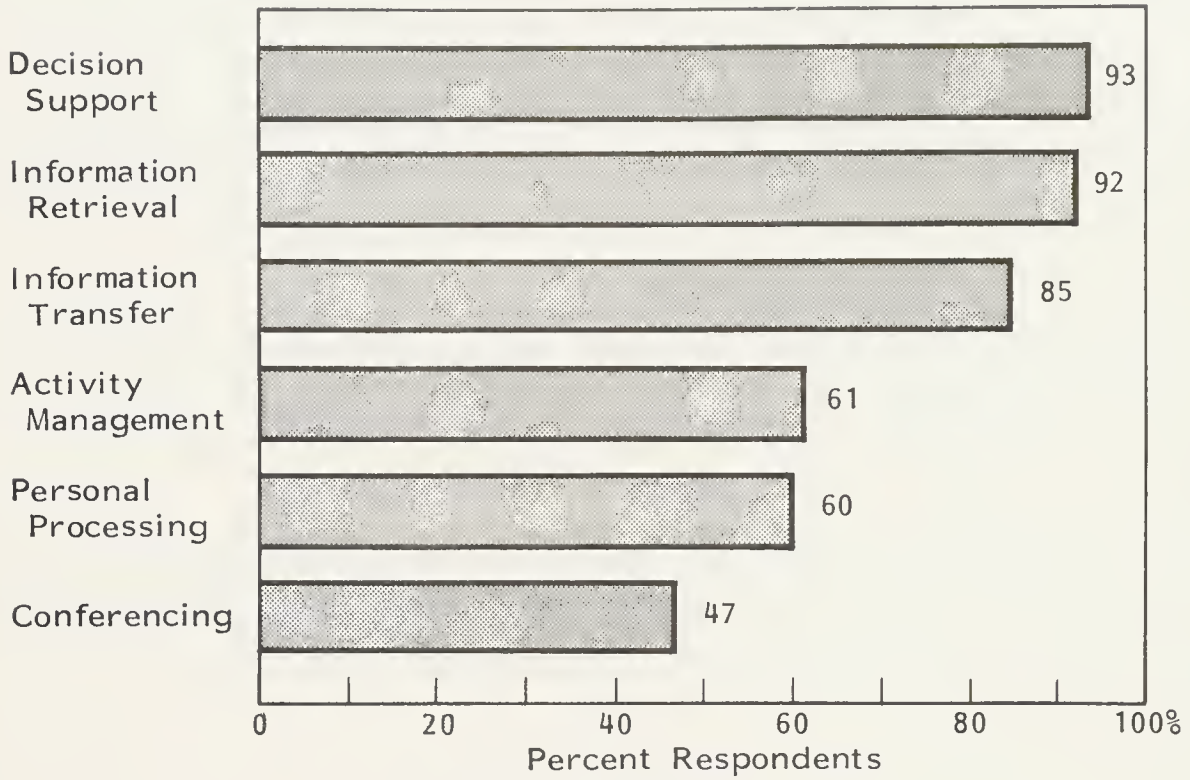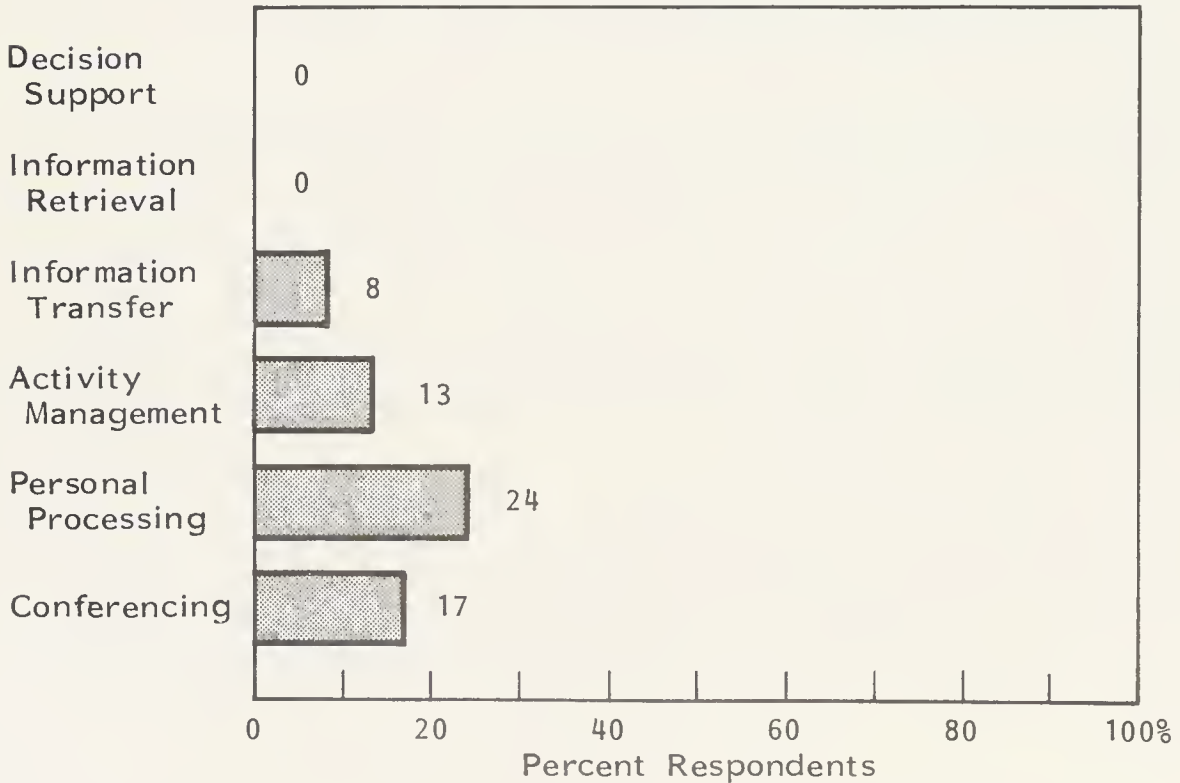
- The executive will not perform multiple log-on procedures, identify cryptic passwords, or perform complex functions to retrieve this information. These functions must be performed automatically and yet still maintain security.

- The data access must be fast. IS has felt the wrath of many users as a result of five-second response times. Executive users will be even more impatient and their wrath more destructive.

- The first step to solving this complex problem is to identify the executive's primary information needs. The sources of this information and its timeliness is determined next.

  - Some information (such as financial statements) is only required monthly or quarterly. Other information, such as shipments to key customers and stock prices, may be required hourly.

  - The less time-sensitive information can be transmitted and stored locally at the executive's computer system, thus reducing the access time and line traffic.

  - The need for time-sensitive information should be slight, but the executive's access should receive priority. The log-on protocol should be automated, with security residing at the terminal level.

- Executive systems require in-depth analysis of the executive's information needs and sources. Most of this analysis will be performed with a staff. The system will be packaged for executives so they can obtain the information without knowing the complexities involved. If the information is outside the corporate data network, it may require manual entry. The executive's staff is again a key resource in determining the importance of the data and implementing procedures to manually enter information where required.

INI

- The complex and diverse information needs of the executive will translate into data networking that may include local area, wide area, and public networks. It will require gateways among these networks and protocol compatibility. In other words, executive systems have all the complex telecommunication demands of office systems, along with the added factor of a very powerful user. The implications of a less than successful executive system will be felt throughout the entire IS organization.

b.   Voice

- A primitive executive workstation is already on the executive's desk. It is the telephone.

- Enhancements to the basic telephone include speakerphones, autodials, personal telephone directories, and teleconferencing. Some telephones have added a small screen to allow for some rudimentary terminal functions. Some analysts believe that executive workstations must incorporate the telephone.

  - As much as 80% of an executive's communications are external; the telephone is a permanent fixture on every manager's desk.

  - One measurement of the user friendliness of a device is how it compares to the telephone.

- One major reason for incorporating the telephone into the workstation is to effectively compete for valuable deskspace. The future use of telephone features for voice recognition/commands is possible, although currently this application is rare.

- Voice response terminals such as DEC's DECtalk[T.M.] are beginning to appear. Again the application of having a terminal read to someone appears to be on the high end of the personal preference/pampering scale.

- Voice annotation and voice mail appear to have more benefits.

    - WANG's Alliance system with voice annotation is one example of an office system that provides for voice notes on electronically generated text. For the executive who prefers to verbally respond to memoranda, this type of device would be welcomed.

    - Voice mail is store and forward of voice messages. Voice mail can be viewed as a much larger answering machine or as voice electronic mail. It has not been that widely received because of storage (one second of high-quality, digitized voice requires from 1K to 8K bytes of storage, depending upon the type of compression used). The need to deal with a recorded message or push a confusing array of telephone keys has also discouraged its use.

- Some vendors are including dictation capabilities in their workstations. The desire is to replace word processing, since most executives dictate letters rather than write or type. The secretary keys the letter either into a system for electronic mail or onto paper for nonelectronic distribution.

- Integrating voice and data environments for the executive in particular and for the office in general requires a local network that allows the sharing of expensive resources.

- One example of a self-contained system currently on the market is the System Information Manager (SIM) from Sydis Inc. It contains the following components:

    - Application server that runs office system applications.

    - Voice server that converts analog voice to digitized voice, digital voice to analog voice, edits, transfers, and stores information in voice form.

INI

- File servers that store data on 160MB Winchester disks.

- An interface to PBX that provides telephone function and a gateway to other SIM systems.

- Desktop workstation connected in a star network configuration. Connections are made over standard twisted pair wire (i.e., standard telephone line). Each connection supports four 65-kilobytes-per-second communication channels:

  . One channel for system commands.

  . One channel for voice.

  . Two channels for data.

- Voice-data integration is a corporate office system solution requiring interfacing between PBX and local-area networks that have gateways with corporate computer networks. The executive workstations may be part of this network but will not be the reason for creating this environment. More commonly, the executive workstation may incorporate a telephone function with limited telephone management capabilities. Two connections for the workstation will be required: one for voice and one for data. INPUT believes that the widespread use of totally integrated voice and data networks is still at least five years away.

c.   Executive Workstations: INPUT's Definition

- The executive workstation is an information appliance with the purpose of providing the executive with a means for easily retrieving, disseminating, and performing manipulations of high-quality information.

INPUT

- Most executives need both personal computing and access to remote computers. They also require a telephone. Thus the executive should have one compact unit that incorporates all of these requirements.

- There are currently three forms of executive workstations:

  - Intelligent telephones that are essentially small, voice-oriented screens that make data-oriented tasks difficult. Very few have local processing capabilities.

  - Multifunctional terminals strive for full compatibility with host computers. They have no local processing capability and no telephone capability.

  - Personal computers' emphasis is on single-function local computing. Communication and compatibility have been poor. Communications, however, shows signs of improving. The IBM PC/3270 is a prime example, but this communication interface is limited to an IBM environment. Some telephone capability is becoming available via communication vendors.

- Executive workstations must have a broad generic capability and must permit personalization by users or their staffs. Workstations must be easy to use. The functions must be performed in a logical manner with a minimum of input. The workstation must perform many tasks and yet the executive must be confortable using it. Commands and responses required by the system must contain no syntax and should be in English. Exhibit III-7 summarizes the functions that should be included in an executive workstation.

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EXHIBIT III-7

EXECUTIVE WORKSTATIONS

Mini/Mainframe Computer

Public Data Bases

Departmental Data Base

PBX

LAN

Corporate Data Base
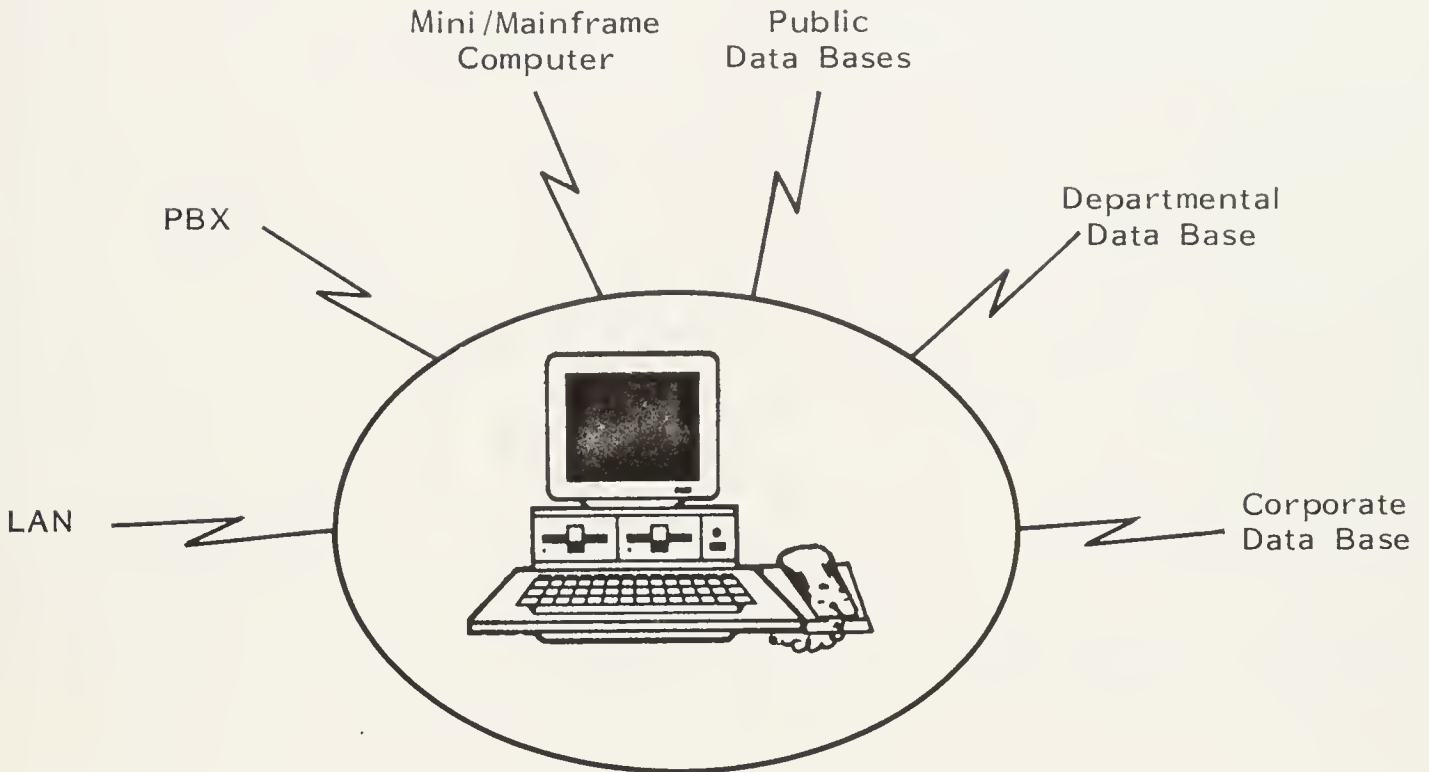
Decision Support
Information Retrieval
Information Transfer
Personal Computing
Personal Data Base

Telephone
Telephone Management
Personal Telephone Directory

INPUT
UEEX

IV EXECUTIVE COMPUTING FROM THE
VENDOR'S VIEWPOINT

IV EXECUTIVE COMPUTING FROM THE VENDOR'S VIEWPOINT

- Vendors believe that there is confusion in the marketplace with regard to the definition and capabilities of executive workstations.

  - Very few vendors have a product that is classified solely as an executive workstation.

  - The range of computing products spans from the handheld calculator to the mainframe computer, as depicted in Exhibit IV-I. Most of the current executive computing products have focused on the standalone category but the need for quality information is expanding the executive's sphere (via the workstation) to include access to mini- and mainframe computers.

- This chapter will examine the vendors' responses to the demand for executive computing. Hardware, software, and executive information systems will be analyzed. The future direction of these products will be forecasted and the implications that these products will have on the information systems (IS) organization will be identified.

INPUT

EXHIBIT IV-1

- 60 -

SPECTRUM OF COMPUTING

Low | Standalone Single User | Multiuser | High

Hand-Held Calculator | Portable Computer | Personal Computer | Workstation | Mini-Computer | Mainframe Computer
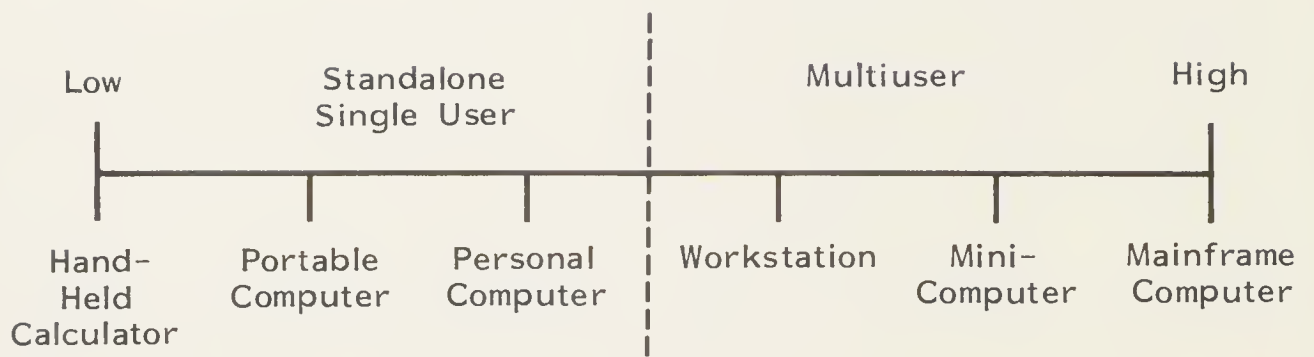
A. HARDWARE

- "Workstations previously available for executives had been terminals designed for IS, requiring extensive training and a keen need by the executive. Management workstations are easier to use but lack sophisticated features. Most were designed to work with only one type of computer system."

  - The above comment by a major vendor means that executive users have been driven by a demand for information, in spite of the workstation they use.

  - Other executives are just as eager to access this information but less willing to endure the hardship of standard workstations.

- Vendors typically define executive workstations as desk appliances that in most cases are connected to mainframe computers (but with connections that are transparent to the user). It offers communication and data retrieval in a familiar manner. In other words, the medium changes from paper to electronic representation but the format does not.

  - The above definition appears to include only workstations connected to mainframes.

  - Many personal computers are being used by executives because of inadequate executive software. In many companies, mainframe software is not designed for end-user analysis.

- In this report executive workstations will be categorized into the following product categories:

  - Personal computers.

INPUT

- Briefcase-sized portables.

- Workstations.

- Intelligent telephones.

- Special-purpose systems.

I.   PERSONAL COMPUTERS

• Personal computers are the shot that started the end-user revolution. Executives, as well as other end users, were attracted to the personal computer because it was the easiest way to manipulate information directly.

• Initially, executives using personal computers were hobbyists - executives who enjoyed tinkering. Some executives used their staff for programming and data entry, and did program execution themselves.

- Vendors responded with friendlier human-computer interfaces. The addition of icons, windows, touch-actuated screens, and mice was aimed at making the personal computer friendlier.

- Bit-mapped display screens made displays of business graphics commonplace. Bit-mapped display screens allow every dot on the display to be individually turned on or off by setting or resetting the corresponding memory bit. The result is an ability to portray complex images very clearly. The ability to instantaneously access graphic representations of business information became invaluable to many executives.

• The original user friendly personal computer is the Xerox Star. Some analysts don't include the Star as a personal computer because of its Ethernet requirement for printing and communication.

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INl

- The requirement has been removed in a new model.

- It is important to note that Xerox was the first to use icons, windows, and a mouse.

● Apple has followed suit with LISA and MacIntosh, providing the added advantage of being less than one-half the price of the Star.

● To improve the IBM PC's user interfaces, third-party vendors are supplying peripherals:

- Light pens.

- Mice.

- Voice recognition.

● Personal computers have become personal devices. As the demand for information from diverse sources has increased, the need for communications in personal computers has also increased.

- Communication software was initially developed to emulate terminals, but at the price of losing personal computing capabilities.

- Data transfer software has been developed to allow the manipulation of remotely located information. Unfortunately, this software is not easy to use.

- Personal computers are being produced that focus on communication. This is clouding the destinction between workstations and personal computers.

INPUT

. IBM 3270 PC and IBM PC XT/370.

. DEC Professional series.

- The personal computer as a purely standalone device will have little use in the executive suite. Vendors view the executive as being communication oriented and the personal computer manufacturers are leaving the executive market to software and workstation vendors.

2. BRIEFCASE-SIZE PORTABLES

- Portable computers range in size from notebook-sized to suitcase-sized. The weight range is even more vast, from under 8 pounds to over 40 pounds.

- The executive is not likely to lug a 40-pound, suitcase-sized computer on business trips. The briefcase-size computer, however, has the size and weight to facilitate the use of a computer on many business trips.

    - Ease of transport may provide additional motivation for the executive to learn about and use a computer.

    - Executives can easily take their computers home to play with during their free time. Executives can learn to use the computer at home without fear of demeaning themselves in front of subordinates.

- Portable computers (briefcase size) can cost from $1,000 to $8,000, depending on function.

    - The lower priced portables provide limited word processing, calendaring, limited memory (64K), and communication capabilities.

    - The more expensive products have features similar to full-sized personal computers with built-in software.

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INP

- Software includes: decision support (spreadsheets), projection and models, data base queries, project management, and business graphics.

- Hardware features include: 256 K-bytes of RAM; 384 K-bytes of bubble memory; a built-in memory designed to access all mainframe computers with the capability to download information into bubble memory; and a flat-panel, bit-mapped display.

- The portable computer can be the executive's personal electronic notebook. It can perform personal organization functions:

  - Personal recordkeeping.

  - Telephone management.

  - Calendaring.

  - Calculation.

  - High-level text management.

- The communication capability of the more advanced models can combine to provide all the functions required by the executive. The capability of transferring information stored on the portable to office or mainframe computers for more advanced analysis must be improved to make the portable even more useful.

- Portable computers are a key component in satisfying the executive's computing needs. The advances in silicon chip technology will reduce the size, weight, and cost of these computers. The increasing use of firmware will greatly increase the functional capabilities of the portables. The executive

INPUT

desk may no longer be the target location for executive computing; the brief-case may be its new home.

3. WORKSTATIONS

- The distinctions between workstations and personal computers are blurring. However, main purposes remain distinct.

    - The personal computer's main purpose is the manipulation of personal (single-user) data; it usually performs a single function at a time.

    - The workstation is a multifunctional communication device. It draws on shared corporate data and primarily relies on mainframe software.

- Section A.I above discussed the evolution of personal computer communications to workstation status. The IBM 3270 PC is an excellent example of a personal computer that is also a workstation (albeit only for IBM mainframes).

- An example of a workstation that has personal computer features is the Exxon 750 Professional Workstation. It has the following features:

    - Up to seven windows that can contain:

        . Displays and edit texting.

        . Spreadsheets.

        . Business graphics.

    - High-resolution, monochrome, bit-mapped display.

    - Floppy and hard disk storage.

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INF

- 512 kilobytes to 1 megabyte of main storage.

- The ability to run both 8- and 16-bit software.

- Communications.

  . Interacts with most mainframe computers.

  . Accesses public information via asynchronous communications.

- Multitasking that allows a user to work on a task in one window while a task in another window is being printed or computed.

- The ability to transfer data between windows.

- Cost of approximately $7,750.

• Exhibit IV-2 compares the Exxon 750 and the IBM 3270 PC. There is very little difference between the two, yet one is a workstation and the other is a personal computer. The key difference is that the Exxon 750 is designed to communicate with most mainframe computers, whereas the IBM 3270 PC is designed to communicate only with IBM mainframes. The compatibility with IBM mainframes and the ability to download information to the workstation from these computers favors the 3270 PC. The degree of multifunctionality and the interaction with non-IBM mainframe access favors the Exxon 750.

• Workstations are beginning to feature the same ammenities as personal computers.

- Mice and touch screens, for example, are options beginning to appear on many workstations.

INPUT

EXHIBIT IV-2

- 68 -

IBM 3270-PC VERSUS EXXON 750

	IBM 3270-PC	EXXON 750
Maximum Number of Viewing Windows	7	7
Display	Color	Monochrome
Main Storage	256K - 640K	512 kilobyte - 1 megabyte
Auxiliary Storage	Floppy and Hard Disk	Floppy and Hard Disk
Communications	Cable connection to IBM 3274 only and Asynchronous Option	Asynchronous and direct connection to most mainframes

* Includes cost of display monitor

IN
UEE

- Displays (especially for color graphics) tend to be of higher resolution than those of personal computers.

- Workstations tend to be significantly more expensive than personal computers.

  - The average configuration of a personal computer for business applications costs approximately $3,500.

  - Workstation prices range from $6,000 to $30,000.

- Workstations are being produced for specialized users.

  - The high-end-priced workstations tend to be used for CAD/CAE/CAM applications where high-quality color displays are required for detailed graphic presentations.

  - Workstations are also being outfitted for executive use.

    . Wood paneling on workstations is being added to make them consistent with executives' decor.

    . Keyboards are being redesigned or even eliminated for the executive user.

- In the future, workstations will become more customized. Customization will be for different job functions and corporate status.

  - Workstation vendors will embrace customization as a key differentiation between their products and personal computer vendors'.

  - More local memory and storage will be included in workstations. This will allow more personal computing and more functions to be performed simultaneously.

INPUT

- Vendors will include more PROM-based software (firmware) in their workstations. This firmware will include basic personal computing applications and file transfer programs.

4. INTELLIGENT TELEPHONES

- The point of least resistance to an executive's desk is the intelligent telephone. Since the executive is comfortable using a telephone, expanding the functionality of the telephone is a good transition to directly using computer-based information.

- Intelligent telephones are produced primarily by PBX manufacturers:

    - Northern Telecom's Displayphone.

    - Mitel's Kontact.

    - Bell Laboratories' Epic.

    - Datavox Communications' Datavox I.

- Typical intelligent telephones cost under $2,000 and include the following features:

    - Speakerphone.

    - Autodial.

    - Personal telephone directory.

    - Advanced telephone features.

IN

- Automatic redial.

- Predial of frequently called numbers.

- Recall listing.

- Calendaring.

- Automatic log-on to external systems (via build-in modem and ASCII communications).

- Small display (7", 40 x 80 characters).

- Function keys, some of which can be assigned by the user.

- Some systems have limited memory and computational capabilities.

- One of the advantages of the intelligent telephone is its compact size. This can become a severe disadvantage if the user requires more than casual use of the data processing functions of the device.

  - The small screen and keyboard make accessing and manipulating data a physically uncomfortable task.

  - Data communications are usually limited to slow access via standard telephone lines with no local file-transfer capabilities.

- Many standard-sized workstations are beginning to include telephone features. Even portable, briefcase-size portable computers such as Convergent Technology's Workslate include telephone management functions. Thus the future of the intelligent telephone will be limited to executives who have very limited data processing requirements or to ones who want to appear more technically oriented than they are.

INPUT

5.   SPECIAL-PURPOSE SYSTEMS

●   There is a small group of vendors who are producing integrated executive systems. These systems are packaged for the executive and their support staff, and have no other users.

●   An example of an executive integrated system is one being developed by Santa Barbara Laboratories, Inc. (SBL), called the CENTERPOINT 1000$^{T.M.}$ Executive System.

    -    One of the key features is that the executive workstation has no key-board.

        .   The executive's workstation has voice and touch screen operation. It uses icons for the filing and retrieval of information. All messages are stored via voice recognition.

        .   The system stores information in all forms: text, graphics, voice, and video.

        .   It communicates via various protocols, including Ethernet, X.25, and SNA.

        .   It has a CP/M-86-compatible personal computer and built-in calculator functions.

        .   A telephone with data phone functions is also included.

        .   Word processing from the executive's workstation is done by dictation through the workstation.

INP

- The secretarial workstation includes the same capabilities as the executives' workstation: a separate data entry screen and keyboard. Commands, prompts, and access to voice messages are via touch screen, leaving the keyboard solely for text entry.

- Freezeframe and full-action video conferencing is optionally available.

- The system has 1.25 M-bytes of RAM, and 70 M-bytes of hard disk is required to store voice messages and graphics.

● SBL will begin marketing this system in mid-1984 and no price range has been quoted by the company, although it will not be inexpensive. The market is limited to upper echelon executives who have private secretaries, a strong need for information access, and some manipulation capability. The Ethernet communication capability can tie the executive into other office system users and corporate mainframes. But again, this limits the market to only those companies with a strong commitment to end-user computing. Commitment in this case also translates into a large budget for end-user and executive computing. Exhibit IV-3 shows a sample configuration of the SBL system.

6.   FUTURE PRODUCTS

● Exhibit IV-4 summarizes the products currently being used for executive workstations. The executive workstation has ranged from portable to personal computers, and on up to integrated systems. For the most part, the distinctiveness of the executive workstation will disappear. This does not mean that all workstations will be the same.

- Workstations will have customized keyboards and screen styles directed at specific functional users.

- Workstations will be produced modularly. So, as in purchasing a car, the user can select color, style, and functional features.

INPUT

EXHIBIT IV-3

SBL EXECUTIVE SYSTEM

Office Layout

A typical executive suite layout showing the system ((1) (2) (3)), with optional WP printer (4) and optional teleconferencing room equipment ((5) (6) (7)).
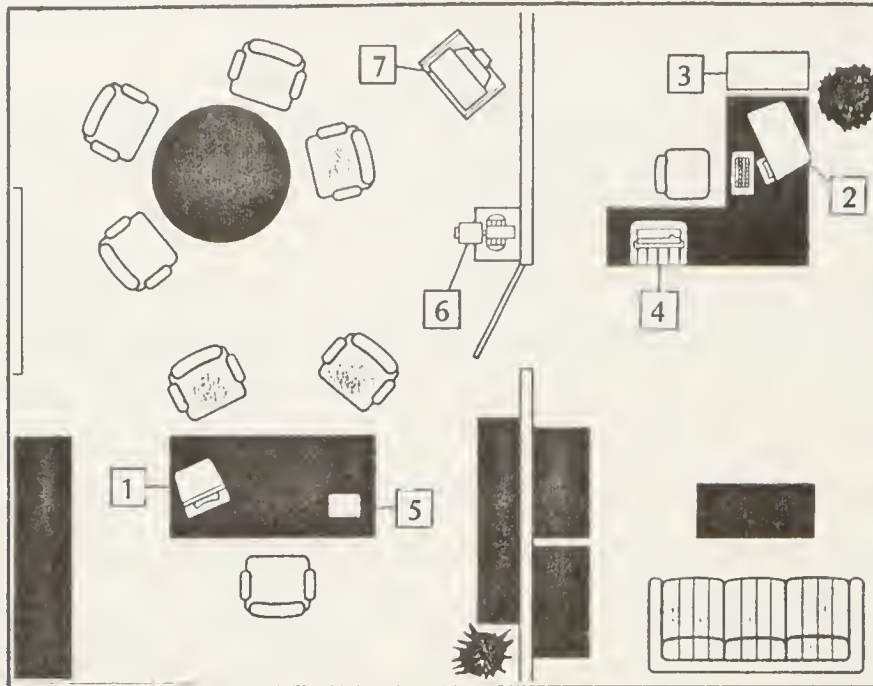
The Video Teleconferencing Option

An overhead camera (5) sees and can store documents placed on the desk directly beneath it.

A robotic room camera (6) can focus and zoom in on the executive, or at people at his desk, at the conference table, or at the blackboard – or zoom back to cover most of the room.

The room monitor (7) displays diagrams, charts and prestored pictures, as well as previews the local cameras and views the remote participants in a teleconference.

The 3-Component System
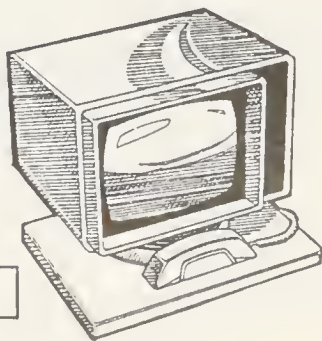
The Executive Console
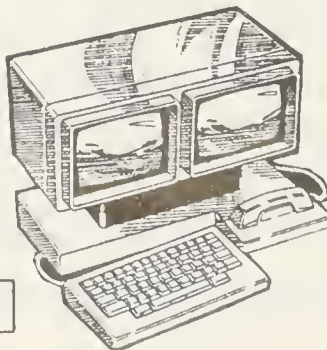
The Secretarial Console
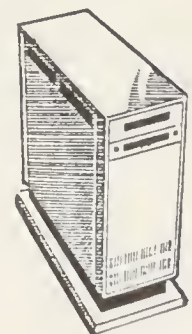
The Electronics Package for next-to-desk placement

EXHIBIT IV-4

EXECUTIVE WORKSTATION HARDWARE SUMMARY

PRODUCT CATEGORY	EXAMPLES	STRENGTH	WEAKNESS
Personal Computer	Apple: LISA, MacIntosh IBM: PC, XT/37 3270 PC	Local Control and Computing	Communications Slow Processing Speeds
Portable Computer	GRID: Compass Convergent Technologies: Workslate	Portable and Personalized	Limited Functions
Workstations	EXXON: 750 Datavox Communications: Executive Deskset	Communications	Local Processing
Intelligent Telephone	Northern Telecom: Dataphone Mitel: KONTACT	Voice Communications	Data Processing
Special Purpose	Santa Barbara Labs: Centerpoint 100 Sydis: Sydis Informtion Manager (SIM)	Customization	Cost

INPUT
UEEX

- The SBL system described above is a harbinger of the means for satisfying the executive's needs. The system is the solution. Although special-purpose executive systems will not be prevalent, the executive's needs will be incorporated into end-user computing needs.

- The executive workstation as a product will merge into the professional and management workstations, forming a generic, multifunctional workstation. But executives will receive systems that satisfy their unique needs. These systems will be customized, but the customization will be done via software. The following section will examine the software currently being used by the executive and will forecast future products.

B.   SOFTWARE

- Software used by the executive can be categorized by the type of computer on which it operates.

    - Personal computers.

    - Mini/mainframe computers.

I.   PERSONAL COMPUTER EXECUTIVE SOFTWARE

- The primary needs that an executive has are for information review and decision support. In the personal computer environment, information review and decision support are performed by spreadsheet, data base, and graphics programs.

- The obvious limitation of personal computers is the problem of entering information that resides outside the particular personal computer's environ-

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INP

ment. Thus there is a need for communication software that allows access to data residing on other computers.

- The graphics, spreadsheet, data base, and communications functions should also be integrated so data can be transferred among them easily.

- Finally, and most importantly, the programs must be very easy to use. Executives are usually very intelligent, but they don't want to take the time to learn complex systems.

- The above program requirements are not unique to the executive. They are true of most personal computer users. What is different for executives, is that they usually won't spend time learning syntax and programming rules. They will also spend relatively little time using the system. Thus the system's use should be intuitively obvious.

- The main software products being embraced by the executive are integrated systems, such as:

  - Visi series.

  - Lotus 1-2-3.

  - Contex MBA.

- These systems are not easy to use and are limited in the amount of data that can be analyzed; all require either manual data entry or complex file transfer programming.

  - Lotus has introduced the Symphony program that adds communications with mainframe files. This communication is limited to non-data-base (i.e., flat) files.

INPUT

- VisiOn has added both windowing and a mouse interface to improve the human-machine interface.

- Personal computer versions of fourth-generation languages have been introduced, greatly expanding the information access and decision support capabilities.

  - These products, although easier to use than conventional programming languages, are definitely not executive friendly.

  - Information Builders has introduced a new feature as part of its PC-Focus package, a feature called Tabletalk. Tabletalk is a syntaxless language for accessing and manipulating Focus-resident information.

- In most cases, executives used personal computer software either because that was all there was or because they enjoyed programming. In some cases, executives have become very high priced computer operators.

- Will the bridge to executive-friendly systems ever be built? The vendors are not to be expected to build systems customized to the individual needs of each executive. Vendors will merely lay the foundation; the budget must be completed by in-house personnel.

- The personal computer environment presents some problems.

  - There are few software products that will accept a frontend interface. An English language MACRO interface would be very challenging to write.

  - User friendliness is not free. It costs resources and can greatly slow the operation. Executives are very demanding and want easy-to-use systems that operate quickly. Executives can become very impatient if left waiting five minutes for information to be displayed on personal computers.

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- The means for customizing executive software is very limited in personal computer environments. The solution is to migrate upward to mainframe and minicomputer-based software. The problem with this migration is that the user transfers systems development responsibility to IS. One of the major reasons for using personal computers was to minimize dependence on IS.

2.   MINI/MAINFRAME SOFTWARE

- Integrated office systems are offered by major minicomputer manufacturers.

  - Data General: CEO.

  - DEC: All-in-One.

  - WANG: Alliance.

- These systems typically provide the following integrated features:

  - Electronic mail.

  - Text processing.

  - Calendaring.

  - Decision support.

  - Calculator functions.

  - Customized functions.

  - Communications.

INPUT

- The advantage of these systems is that they are menu-driven and functions can be customized by users. Some also have their own MACRO language generators that allow high-level programs to be executed using MACRO commands. Although the MACROs are cryptic, they can be developed by non-IS professionals and executed by the executive.

- IS must get involved in the information transfer aspects of these systems but, given a sufficient executive support staff, IS's role could be relatively limited. If there is an ongoing need for decision support programming, the executive staff may become de facto programmers. IS may be a better source of programmers to develop the initial MACROs, with the executive staff being responsible for modifying current MACROs.

- More complex decision support and information analysis may be housed on mainframe computers.

    - Large models require the processing power of a mainframe.

    - The English language interfaces to diverse information sources may require the storage and memory requirements of a mainframe computer.

    - Artificial intelligence systems are beginning to be applied to business planning. Executive users will need to access these systems either directly or indirectly through their staffs.

- Mainframe and minicomputers provide the environment for developing custom, easy-to-use executive user interface software. The resource constraints of the personal computer are no longer a problem but access to the system designing and programming resources may be a problem.

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3. HYBRID SYSTEMS

- The need for using both personal and mainframe computers has been answered
  by a rash of products. There are two basic product categories:

    - First of all, there are software packages that have versions that reside
      on both mainframe and personal computers. These systems are de-
      signed to allow remote processing of mainframe information locally,
      using a subset of the instructions available on the mainframe version of
      the system. These products have primarily been fourth-generation
      languages, such as:

        . Comshare's SYSTEM W.

        . Information Builders FOCUS.

    - Secondly, there are packages that are designed primarily to transfer
      data from the mainframe to the personal computer. Most or all the
      software for these packages resides on the personal computer.
      Examples of these packages include:

        . Executive Reachpak.

        . VisiAnswer.

- Two INPUT reports will analyze the personal-computer-to-mainframe
  phenomenon. They relate experiences and project future effects of this
  phenomenon. Included in these reports is a detailed analysis of personal
  computer, mainframe, and hybrid software packages whose purpose is to link
  personal and mainframe computers. These reports are:

    - Micro-to-Mainframe Systems Experiences, May 1984.

    - Micro-to-Mainframe Communications, May 1984.

INPUT

4.   FUTURE DIRECTIONS

- Exhibit IV-5 summarizes the current software sources available to the execu-
  tive. The future will provide more transparency of operations, such as in data
  transfer. Products will be bundled with hardware, software, and services. A
  current example is Dunns Plus, a product of Dunn and Bradstreet. It includes
  the following:

  - IBM PC/XT with 10 M-byte hard disk.

  - Lotus 1-2-3.

  - Word processing software.

  - Communications software.

  - Modem.

  - One-year subscription to selected public data bases.

  - Hotline service.

  - Installation and training.

  - Service warranty.

- Vendor software will interface more easily with in-house and other vendor
  products. Executive interfaces will be more easy to develop.

  - More vendors will be developing their own English-like accesses to
    their systems.

INP

EXHIBIT IV-5

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EXECUTIVE SOFTWARE SUMMARY

PRODUCT CATEGORY	EXAMPLES	STRENGTHS	WEAKNESSES
Personal Computer	Lotus: 1-2-3 Visi Series: Context MBA	Local Flexibility Inexpensive	Limited Functions, Not Necessarily Easy to Use
Mainframe/Mini Computer	Data General: CEO DEC: All-in-One IBM: PROFS	Large Functional Capability	Usually Require More IS Support, Expensive, Shared System
Hybrid	FOCUS SYSTEM-W	Incorporate Local Processing With Mainframe-Based Information	Complex System, Currently Not Condusive For Executive Use

INPUT
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- Better communication software will make data access and transfer among many sources easier to accomplish.

- More integration and multiscreen presentations will improve data analysis.

● The executive's requirement for decision support software transcends the lowly spreadsheet. The spreadsheet has been an effective tool but decisions are made based upon information from various locations. Spreadsheets require the use of advanced statistical and mathematical functions and requires the consideration of many variables. These more complex decision support systems are sometimes called executive information systems because of the vast sources of information they must include.

C.   EXECUTIVE INFORMATION SYSTEMS

● Executives want simple answers to simple questions.

- Unfortunately simple questions like "How long can the company suffer a major strike and still remain profitable?" require thousands of data points generated from hundreds of location sources and backed by many assumptions. A simple answer may require many days of analysis.

- Executive information systems are capable of extracting information from many sources and applying it against models developed by the executive staff to derive the simple answer.

● The executive information system requires a rich support group, especially:

- Expertise in the functional groups of the company.

INPU

- This information is normally coordinated by staff members. This group includes the strategic planning organization.

- The functional groups of marketing, sales, operations, manufacturing, and finance will send summary, strategic information either via report or, more efficiently, via the transfer of computer-based information.

- The IS organization must provide the software and hardware environment condusive to executive information systems. Specifically, it must:

  - Provide the software and procedures necessary to transfer strategic information from multiple data bases.

  - Permit the compilation of an executive base from multiple sources in the timeframe required.

  - Provide consulting assistance to the executive staff to help them incorporate new data sources. Programming assistance to the staff will also be required. Although the software used by executive information systems is user friendly and uses languages that are mathematically oriented, programming assistance is still required.

- The executive will require the use of a system chauffeur.

  - Since users of executive information systems are usually senior management, they will have very little hands-on contact with the system.

  - The chauffeur provides a one-to-one interface between the executive and the system.

INPUT

- The chauffeur can be part of the executive's staff or can be the decision support manager from the IS organization.

- The chauffeur should be knowledgeable in computer systems; in modeling techniques; and in strategic, financial, and marketing planning methods.

● Executive information systems are costly.

- The nature of the processing required by these systems is not conducive to sharing with other data processing applications.

- Most are based on matrix manipulation. This heavy calculation environment can severely affect the response times of other applications.

- An executive data base may need to be relational in structure. This requires large storage and processing resources.

- Relatively fast turnaround requirements will require these systems to be processed on a high-priority basis.

● Software products used for these systems include Management Decision Systems (MDS) Express and Comshare's SYSTEM W.

- These systems are either mainframe or minicomputer oriented.

- Express runs on both IBM Mainframes and Prime minicomputers. MDS is bundling Express with a Prime minicomputer as an integrated decision support system.

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- Comshare has signed a joint marketing agreement with IBM for SYSTEM W mainframe decision support and information center applications.

- The cost of executive information systems includes:

  - Software that costs over $100,000.

  - A processor that must either be dedicated for decision support applications or shared as part of the information center.

  - A rich support staff that covers all functional areas of the organization.

  - The resource requirements of execution information systems, summarized in Exhibit IV-6.

- The vendors of executive information systems (EIS) don't anticipate that executives will get more directly involved with computers in the next three years. The possible exception hinges on the availability of modeling results in graphic and data formats on an executive's workstation. But, for the most part, the executive will be paper driven. Executives will become more aware of the power of the computer and will utilize EIS increasingly, but primarily through their support staffs.

  - In the next three years, EIS will increase in breadth and in the number of executive users, while the depth, the amount of functions included in these systems, will not change.

  - English-like interface languages will be developed to allow executives to interface with the system by requesting different views of the model results. There may even be executive interfaces that allow the user to change input and execute these models. These interfaces, however, are more likely to be developed by in-house personnel.

INPUT

EXHIBIT IV-6

EXECUTIVE SUPPORT NETWORK
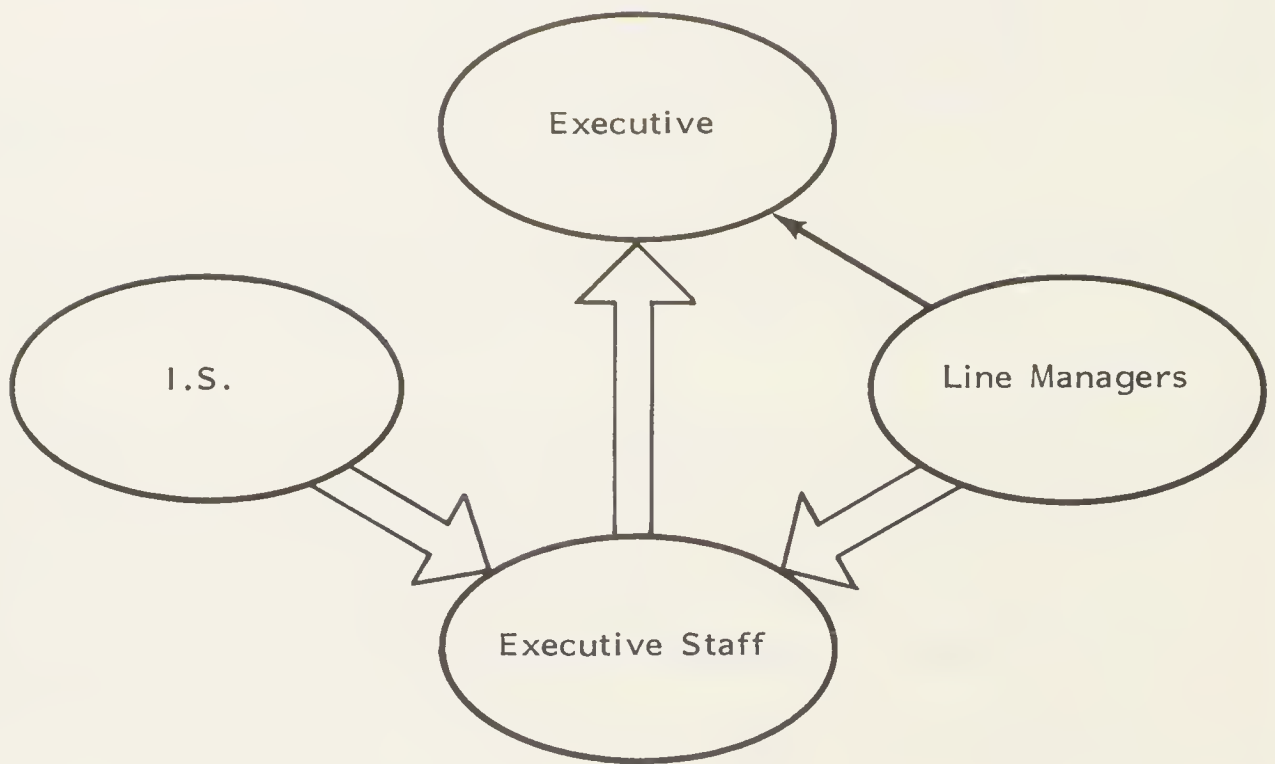
Primary, frequently provided information

Summary, infrequently provided status information

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D.   THE FUTURE OF EXECUTIVE WORKSTATIONS

- Vendors see the distinction between professional and executive workstations as disappearing. What will emerge is a multipurpose workstation that can be customized.

    - Keyboards will exist in various configurations, from numeric key pads to over a hundred keys, many with specialized functions.

    - Keyboards will be either replaced or augmented by touch screen, mouse, or voice.

    - Bit-mapped displays will be commonplace and color monitors will also be included in an extensive option list that would be the envy of General Motors.

    - The telephone will be incorporated into most in-office executive workstations. Telephone management features such as a personal directory will be also included.

    - The distinction between personal computers and workstations will also disappear.

        . Workstations will include personal computing features, for example a memory and storage capacity that rivals that of many personal computers. Personal computer operating systems will reside on PROMs (firmware). Even some applications such as word processing and spreadsheet may reside on firmware.

        . Personal computers that are targeted for the business market will have greatly improved communications. The IBM 3270 PC is one example of a product that can be correctly labeled either a personal computer or a workstation.
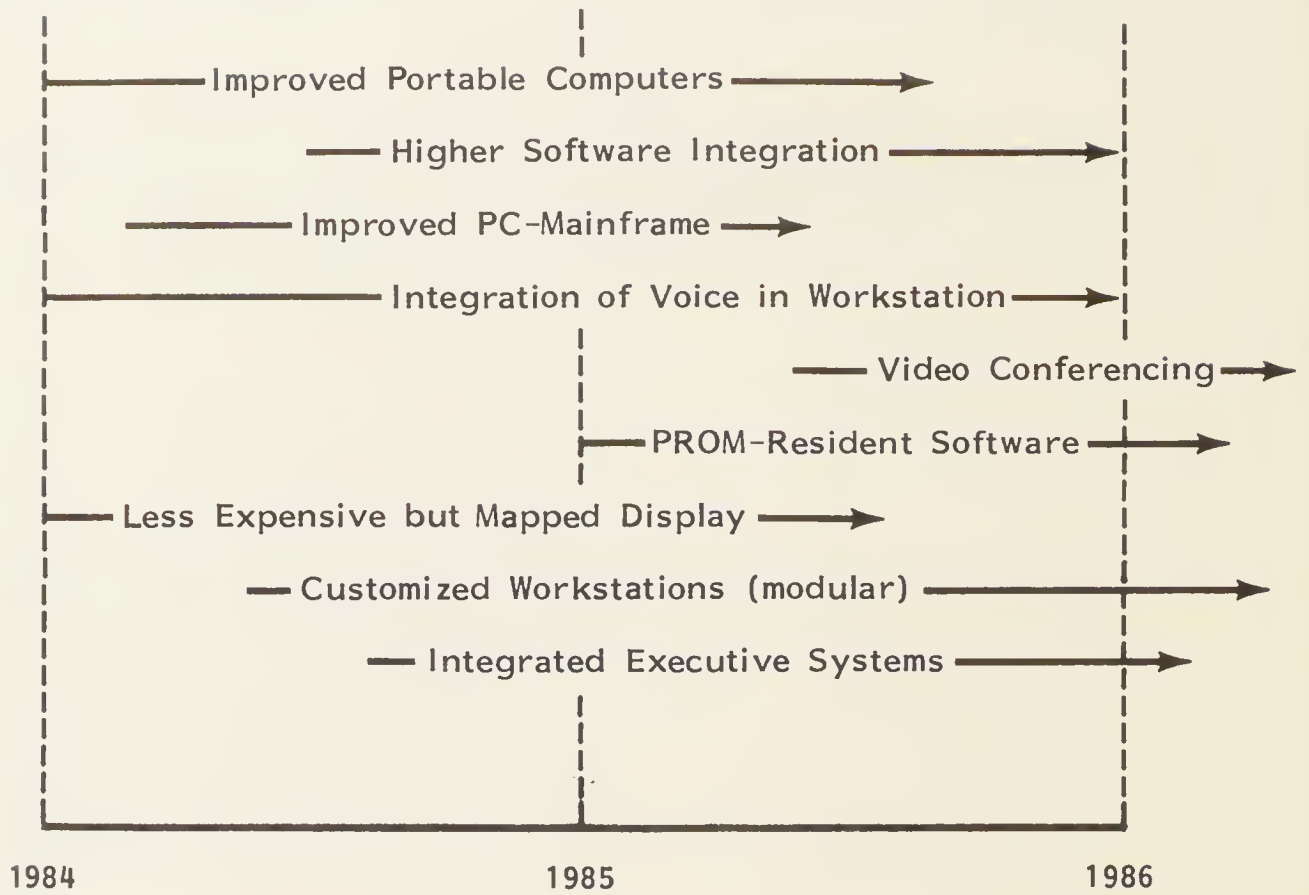
INPUT

- The executive workstation is only as good as its software. The key trend in software to support the executive is integrated software. The integration, however, is more complicated than that among personal-computer-based spreadsheet, data base, and graphics programs. The integration required for the executive must transcend not only programs but computers.

    - Multiple-data-base access and manipulation will be required. These data bases may reside on personal, departmental, and corporate computers.

    - If the executive is to review information from diverse locations, the commands must be very simple. The underlying software, however, may be very complex.

    - The solution to this problem will not be provided by vendors. The solution must be provided by customization done jointly by IS and the executive's staff. Vendors will provide building block systems that will aid in accomplishing this goal, for example:

        - English-like interface languages.

        - File transfer programs.

        - Graphics systems.

        - Executive information systems.

- Vendors' software will become more intuitive. They will have more tutorial and computer-aided training. The executive will not tolerate a long training time to learn systems. Vendors (and IS) will realize this and design systems that mimic the way executives normally operate. There is a danger that some vendors will design systems that are demeaning and slow. They must realize

INP

that an effective system for a novice becomes an intolerably cumbersome system to a knowledgeable user, especially a senior-level user.

- The executive's work unit will not be ignored by vendors. Local-area-networked, integrated systems will be marketed to the executive as well as to other office groups. The diversity of the executive's informational needs lends itself to interconnected local, remote, and public networks. Communications hardware and software will be the cornerstone of executive computing.

- The vendors' role in the executive market will be more than sales. They will provide consultative support but usually not to the executive. The support will be to the executives' in-house support networks, i.e.:

  - Executive staff.

  - IS.

- Vendors view the executive market no differently from the way they do other office systems applications. A few vendors will try to find a niche in this very small but influential market. Most vendors believe that software tools coupled with a variety of hardware options will allow the executive's support network to provide the high-quality information the executive requires. How this information is delivered, whether by paper or electronically, is at the option of the executive.

- Exhibit IV-7 summarizes the major projected trends in executive computing in the next three years.

INPUT

EXHIBIT IV-7

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TRENDS IN EXECUTIVE COMPUTING

Improved Portable Computers ————→

———— Higher Software Integration ————→

———— Improved PC-Mainframe ——→

Integration of Voice in Workstation ——→

———— Video Conferencing ——→

PROM-Resident Software ——→

Less Expensive but Mapped Display ——→

Customized Workstations (modular) ————→

Integrated Executive Systems ————→

1984   1985   1986

INP
UEEX

V IMPLEMENTATION EXPERIENCES

V   IMPLEMENTATION EXPERIENCES

- Over 25 information executives participated in an INPUT survey on executive workstations. As shown in Exhibit V-I, 84% of the respondents either have installed or plan to install executive workstations within two years.

- These installations range in number from I to 275 units, with most respondent companies having from 10-20 executive workstations, as shown in Exhibit V-2. Most workstations reside on middle managers' desks, as shown in Exhibit V-3.

- This chapter will examine the experiences of these companies, their success and their dissappointments. The chapter will conclude with an analysis of the executive computing environment.

A.   "A ROSE BY ANY OTHER NAME . . ."

- In the previous two chapters the executive workstation was defined as a concept instead of a product. This definition is reinforced by the experiences of companies using executive workstations.

    - In most cases, any device that resides on any level of management's desk was viewed by IS as an executive workstation.

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EXHIBIT V-1

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EXECUTIVE WORKSTATION INSTALLATIONS

Percent of Respondent Companies

INPU
UEEX

EXHIBIT V-2

- 95 -
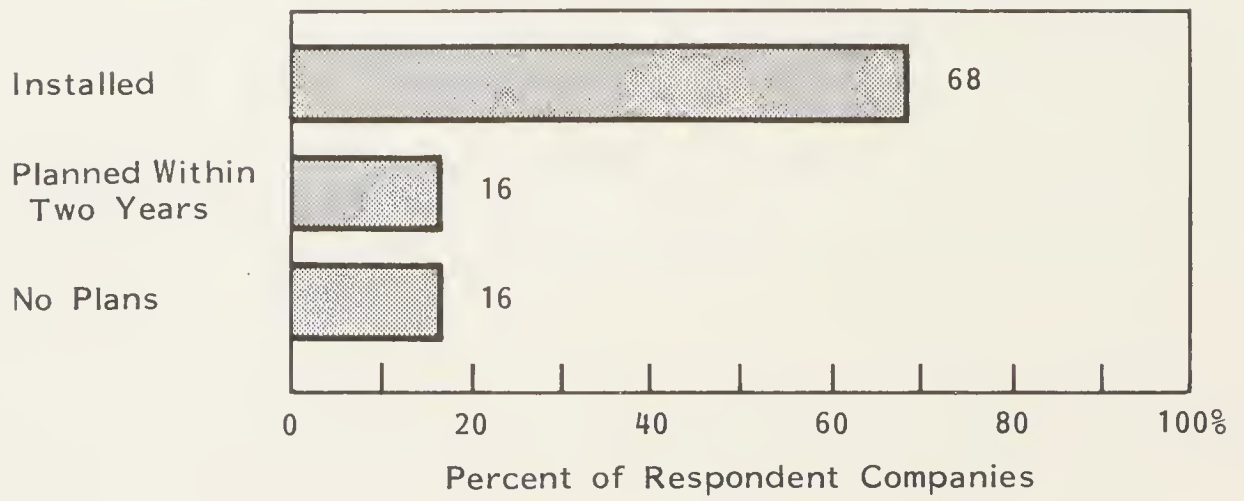
NUMBER OF EXECUTIVE WORKSTATIONS (EWS)
INSTALLED OR PLANNED

Average Number of Executive Workstations
Planned or Installed

INPUT
UEEX

EXHIBIT V-3

DISTRIBUTION OF EXECUTIVE WORKSTATION USERS

Executive   5

Senior
Management   20

Middle
Management   45

First-Level
Management   30

```
    0        10        20        30        40      50%
```

Percent of Respondents Who Are Planning or
Have Already Installed Executive Workstations

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UEEX

-   The most often cited device used as an executive workstation was the IBM PC family (PC, PC/XT, 3270 PC, and XT/370).

-   One respondent said that Apple's LISA and MacIntosh are not even considerations as executive workstations. Yet the LISA and MacIntosh were the second most frequently mentioned executive workstations, behind IBM PCs.
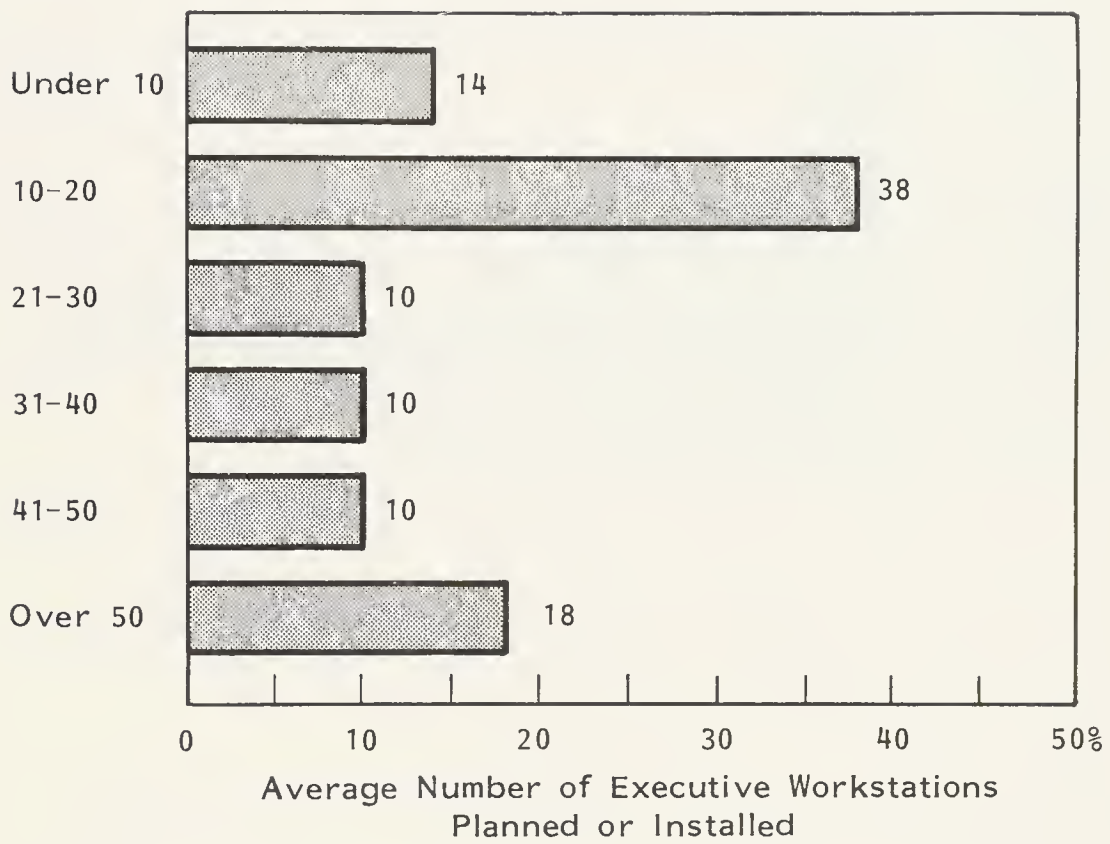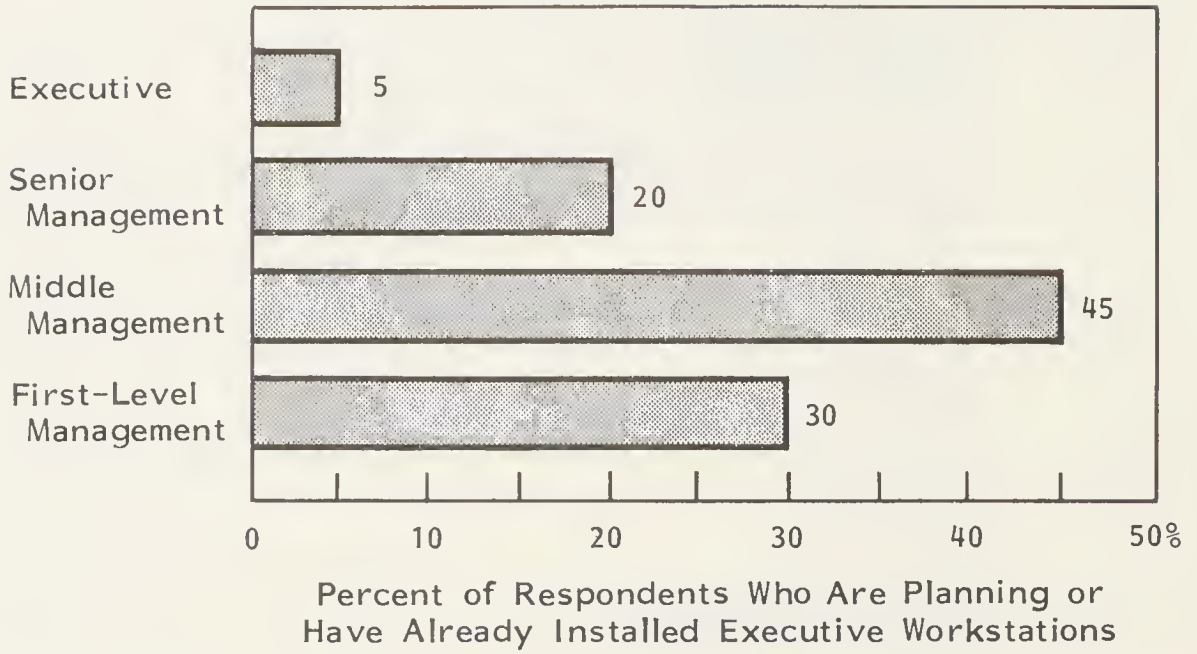
- The software used by the respondents for personal-computer-based executive workstations included:

    -   Word processing.

    -   Spreadsheets.

    -   Integrated software packages such as:

        .   Lotus 1-2-3.

        .   VisiOn.

    -   Data base.

    -   Communications.

- Mainframe and minicomputer-based software accessed by either standard terminal or terminal emulation software on a personal computer included:

    -   Integrated office systems such as:

        .   IBM's PROFS (IBM 43XX or 30XX under VM).

        .   FRV All-in-One (VAX series).

        .   Data General CEO (MV series).

INPUT

- Decision support and fourth-generation languages:

    . Information Builders FOCUS.

    . MDS' Express.

    . Comshare's SYSTEM W.

- Basically, the respondents did not view the executive user any differently than they did other end users. Unfortunately IS has had a reactive strategy to this influential user community.

    - Providing executives with personal computers that have slightly more individual features than do the PCs of other end users seems to be the standard response to executives' computing demands.

    - Executive computing appears to be in its infancy in most companies. The executive is at the same stage that functional managers were in, one to two years ago. They are using personal computers as an alternative to going through the standard IS channels for computerized information. Even though executives can exert their authority to elevate the priority of their computing needs, they are reluctant to do so. They don't want to impact IS priorities because that may affect the company's operation. Many executives still view computing as an operational resource, not a strategic one.

- Some organizations, such as brokerage firms, have had terminals on executives' desks for many years. The executives used their terminals to access real-time financial information. In fact, many executives had multiple terminals on their desks, one from each information source.

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- New systems are being developed to combine information sources and include office automation functions.

- These executives demonstrated reluctance in using new systems. They did not see enough benefits in electronic mail and decision support to change the multiple-terminal configurations on their desks. Even in more technologically advanced industries where computer-based information was critical to the fiber of the operation, changes to the executive job functions had to demonstrate a very visible, immediate benefit.

- Support to the executive user has usually been provided by the information systems organization. In organizations with an information center, that group provided the support to the executive, as to other end users.

  - This group operates as liaison between users and the rest of IS. It:

    - Coordinated data extracts and performed download of this information to the executives' local processors.

    - Created user friendly interfaces to the systems that the executive needed to access.

    - Coordinated hardware support and consulting. These are the contact points for executives and their staffs.

  - Training may not be performed by this group. The executive will usually receive one-on-one training. This training is performed by either the head of the group or by one of the trainers.

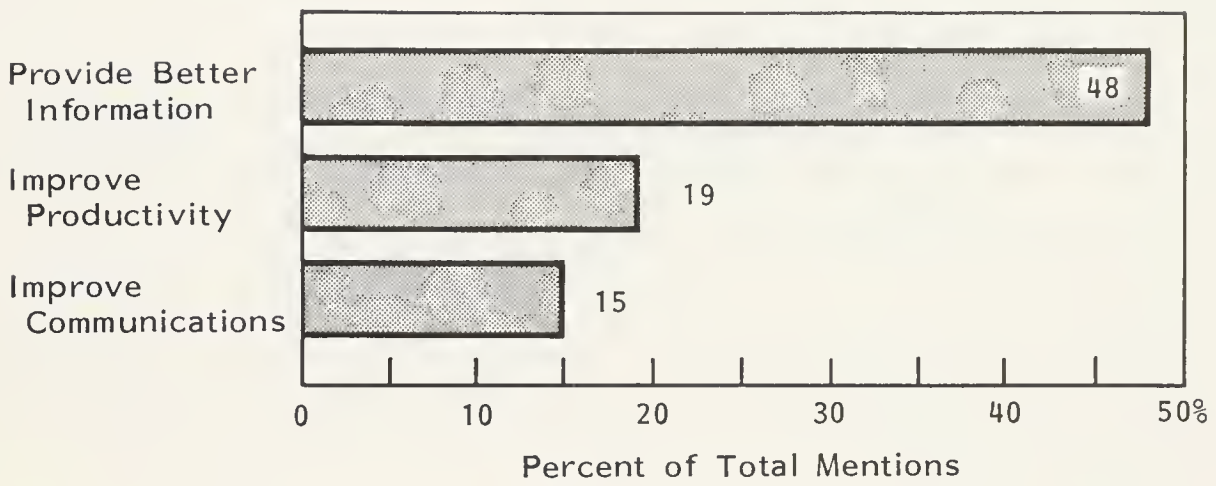   - All the respondents indicated that executives would not attend group classes.

INPUT

- Individual training met with mixed results - some executives worked very effectively with the trainer. Others did not work well because the executive did not want to use the trainer, either due to the time required or because the executive did not want to appear incompetent in front of a subordinate.

B.   GOOD NEWS, BAD NEWS

- Most respondents had their executive workstations installed for under two years but still some benefits have been realized.

  - Exhibit V-4 shows the top three benefits realized by the respondents.

  - The biggest benefit expressed by respondents was better information.

    - The ability to access diverse information quickly was a key reason for giving the executive a workstation. In many cases this potential benefit was actually realized.

    - The respondents thought that access to information kept the executive better informed.

  - Other benefits were improved communications and productivity. The ability to get the information the executive required was the under-pinning of all other benefits.

    - Some executives used query languages and report generators.

    - Others had their staffs use decision support languages to provide planning information that the executives could access.

INP

EXHIBIT V-4

BIGGEST BENEFIT OF EXECUTIVE WORKSTATIONS*

Provide Better Information — 48

Improve Productivity — 19

Improve Communications — 15

0   10   20   30   40   50%

Percent of Total Mentions

* Three Most Frequently Mentioned Benefits

INPUT
UEEX

- The biggest dissappointments experienced with executive workstations were equipment related, as shown in Exhibit V-5.

    - Deficiencies in communications hardware and software.

    - Slow processing speeds.

    - Equipment that is not easy to use.

- User-related disappointments ranged from the executive not using the workstation enough to using it too often.

    - Users became easily frustrated - they didn't want to spend the time to learn how to use the system. They also didn't use the workstations enough to retain the knowledge they did acquire.

    - Some executives used the workstations as toys. They spent time tinkering with the system. The workstation had become counterproductive.

- The vendor has also been a source of dissappointment.

    - Some respondents said that vendors did not deliver what they promised. The primary disappointment was that the systems were not easy to use.

    - A major weakness of some vendors was that they didn't have an understanding of application development and training requirements. They specialized only on one facet of executive systems. Since the vendor only understood the one market segment, it understated the complexity of installing an effective executive system.

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EXHIBIT V-5

BIGGEST DISAPPOINTMENT WITH EXECUTIVE WORKSTATIONS*

Percent of Total Mentions
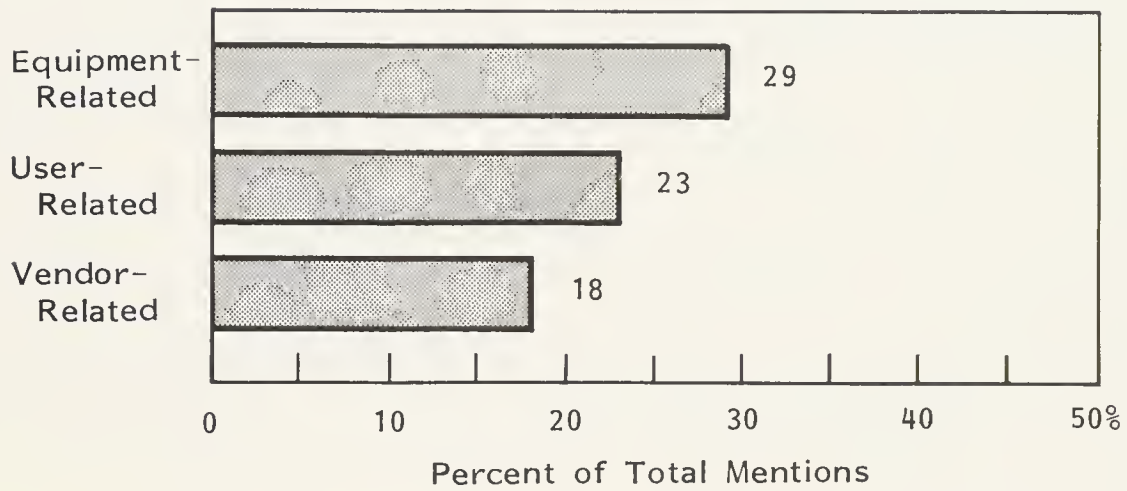
* Three Most Frequently Mentioned Disappointments

C.   THEY'VE ONLY JUST BEGUN

•   The respondents have been using the same workstations for executives as for other end users. Executive computing is in its infancy and most respondents have provided solutions to only those executives that demanded it.

    -    Most of the executive users were in functional areas that were analytically oriented:

        .   Finance.

        .   Sales.

        .   Marketing.

        .   Information systems.

    -    Many were already users of computer information through reports or terminals. The executive workstation added flexibility in the form of a personal computer.

    -    These executive users were more technically oriented than most other executives. Some could even be classified as hobbyists. The higher level executives were not usually using executive workstations.

•   Executives have received systems on an individual need basis. A top-down, systematic approach was not used.

    -    Individual needs were satisfied. The system was an extension of functional systems in finance, marketing, and operations.

INP

- Other than electronic mail, few systems were installed that crossed functional barriers.

- Very little effort has been expended in customizing user interfaces. Basically, the executive was provided with packaged software, training, and consulting support. Only the more complex decision support systems received other than token programming assistance.

- Executive computing is currently a low-priority item for IS. The types of solutions presented to the executives - personal computers with standard spreadsheet and data base software - were the same ones that other end users embraced one to two years ago. IS is still concentrating on operational and management control systems. Planning and decision-based systems have just begun to be supported by IS.

INPUT

VI CONCLUSIONS AND RECOMMENDATIONS

VI CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

- An executive workstation is not a product, but a concept. The products that sit on executives' desks are merely windows to their information requirements. The diversity of information, situated at many locations, adds complexity to the job of creating an executive computing system.

- Exhibit VI-1 lists the executive's needs, the satisfaction of these needs by means of executive workstations, and the primary management level that directly uses these products.

  - The executive only directly uses products that enhance communication and information retrieval.

  - Decision support is important to the executive. The complexities of these systems usually require direct interface by the executive's staff.

- The workstation options range from standard terminals to wood-paneled terminals without keyboards that execute systems based upon touch or voice recognition. The amenities of the workstation will vary but will not differentiate between standard and executive workstations. The executives' personal preferences will dictate which features they require on their workstations. But it's the strategic information available upon demand that will be the main motivation for executives to place workstations on their desks.

**INPUT**

EXHIBIT VI-1

SATISFYING EXECUTIVE COMPUTING NEEDS

NEED	EXECUTIVE WORKSTATION SAMPLE APPLICATION	PRIMARY MANAGEMENT USER
Communication	Intelligent Telephone/ Telephone Management	All Levels of Management
Information Retrieval	Workstation and Personal Computer/Access to Voice, Data, Text, and Voice From Multiple Locations	Some Executives and Senior Managers; Middle Managers and Below
Decision Support	Personal Computer and Workstation/Spreadsheet and Modeling	Some Senior Managers, Middle Managers, and Executive Staff
Information Transfer	Personal Computer and Workstation/Electronic Mail, Data Transfer	Middle Management Lower Level Management
Personal Processing	Personal Computer/Word Processing, Calculation, and Interactive Graphics	Some Middle Managers and Lower Level Managers

INP
UEEX

- The software must have English-like interfaces so that executives can access information directly. Decision support systems will become more important. These systems will require programming assistance but not necessarily from IS.

    - Decision support systems have non-programming-language interfaces designed for specialists in functional areas. The languages are mathematically oriented, using statistical and financial functions.

    - The executive's staff will be doing most of the decision support programming. IS will be required to provide the interfaces to all the data sources.

- The executive usually will not use any system that requires extensive training. The systems must be intuitive, self-documenting, and require little training. Executives are casual users. Their infrequent use of these systems forces the systems to be very easy to operate, otherwise executives will not use them.

- Once executives feel comfortable with interfacing with computerized information, they may be attracted to briefcase-sized portable computers. These portables' usefulness will be as a combination electronic notebook and a link to mainframe-based executive systems. Most executives, however, still view these devices as expensive toys.

- Executive systems are in their infancy. Few IS organizations have spent much effort in planning these systems. They are lagging behind other end-user systems by at least one year in terms of acceptance in the corporate computing environment. Exhibit VI-2 shows the life cycle of corporate computing systems. Executive systems are young but their impact can be great. Their success is dependent upon on how well data sources can be integrated and how easily they can be accessed by an impatient user.

INPUT

EXHIBIT VI-2

- |10 -

CORPORATE COMPUTING LIFE CYCLE

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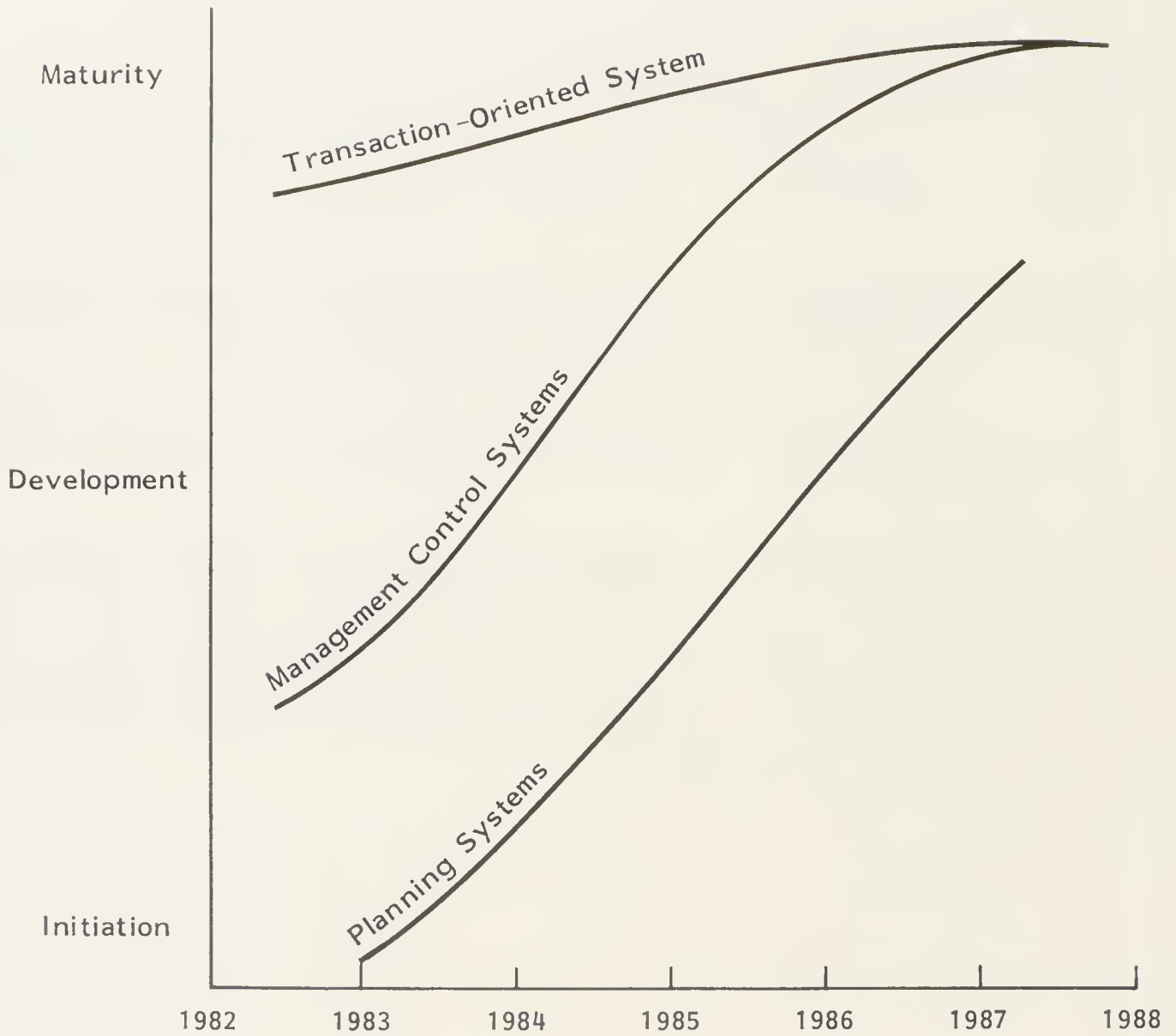
B.   RECOMMENDATIONS

- The IS response to the executive computing challenge must be well planned.

    - Satisfied executives can be allies. They can become more aware of the benefits of computing to the corporation, especially the use of integrated systems as aids to planning and decision support. Direct contact with IS personnel provides an excellent opportunity to promote IS expertise.

    - Dissatisfied executive users will reinforce their belief that computer systems are too expensive and in many cases not necessary.

    - Even a satisfied user may present problems. An initial system will only whet the executive's appetite. This is not unusual, but executives, by virtue of their higher status, can also demand more. This can disrupt IS plans and lead to dissatisfaction throughout the user community.

- The executive requires customized systems designed for specific requirements. The key ingredient is to provide information in the format that the executive uses easily.

    - All relevant data must be accessed either directly or through summaries of the information.

    - Software should be packaged with interfaces that the executive will use.

        . This interface may be as extremely simple as executing the system by pressing one key (or touching one area of the screen).

INPUT

- The executive who wants more flexibility and has a desire to learn syntax can use a system that has a high level of query languages.

- The key is to understand the executive users' needs and customize solutions to satisfy them. Because of the complex data access and interface requirements, the underlying solution may be very complex. That complexity must remain hidden from the executive.

- IS must be sure all the technological resources are in place before proposing the system to the executive. It could be very embarrassing to propose a system that will not deliver the expected results to the executive.

    - All data sources must be identified and a strategy instituted for accessing them.

    - All software must be in place and the interfaces developed.

    - A list of workstations (including personal computers) that are compatible with the company's telecommunication network must be developed. Although executives may exercise their prerogatives and select a special workstation, most will rely on IS expertise.

- The executive's staff plays an important role in the executive system. Members of the executive's staff should be included on the team developing systems. These people know what the executive is computing better than the executive does. The staff will have daily contact with the executive. It will reinforce training and in some cases operate and even program systems.

- Some executive systems are an extension of functional systems.

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- The financial executive's system is an extension of accounting and other financially based systems.

- Manufacturing executive systems extend from inventory, capacity planning, and other operational systems.

- Others cross functional boundaries and require more complex data administration and communication.

  - The marketing executive requires internal product cost inventory and sales information as well as an array of market research information that may be located outside the corporate computer environment.

  - The general manager requires information across all functional boundaries.

- The easiest needs to satisfy are those of functionally oriented executives.

  - The data they require are more easy to define and most reside on corporate data bases.

  - Many of these executives are using computer-based information. Their needs are more easily defined and their willingness to learn these systems will be greater than others'.

- The executive who has expressed a need for computerized information is the best candidate for an executive system. Need will improve the chances for a successful system. The key technological requirement is the ability to access all the information required and present it in a format executives will use. The term "transparent to the user" has new meaning. The complexity of accessing information and translating it must be totally invisible to the executive. This requires computing resources beyond the personal computer. Local computers should be utilized to improve response times and provide multi-functionality.

INPUT

- Don't rush into executive computing. Wait until the executive expresses a need for computing. The key issue is not whether the technology is available but whether the executive wants to use it.

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APPENDIX A: EXECUTIVE WORKSTATION QUESTIONNAIRE
FOR I.S. EXECUTIVES

APPENDIX A
EXECUTIVE WORKSTATION QUESTIONNAIRE
FOR I.S. EXECUTIVES

1. A. How would you define "Executive Workstation"? _____

    _____

    _____

    B. Which level of management should be included as users of executive workstations (1 = not included, 5 = must include)

        1) Senior Executives_____ (CEO, COO, G.M., Pres., etc.)

        2) Executive_____(Reports to Senior Executive)

        3) Senior Management _____ (Reports to Executive)

        4) Middle Management _____

        5) First Level Management _____

        6) Other _____

2. Which of the following components are required for a workstation to be classified as an executive workstation? (1 = not required, 5 = required)

    A. Keyboard substitutes:

	Without Keyboard	With Keyboard
Mouse	_____	_____
Touch Screen	_____	_____
Voice	_____	_____
Other		
_____	_____	_____

    B. Screen Size

Standard CRT Size (12")	_____
Smaller	_____
Larger	_____

    C. Furniture - Like Appearance _____

    D. High Resolution, Color Screen _____

    E. Graphics _____

    F. Other_____ _____

INPUT

3. What type of software must be included for the executive (1 = not required, 5 = required)

    A. Decision Support (What-if analysis) _____

    B. Conferencing _____   (telecommunication, "realtime" systems e.g. telephone & video conferencing)

    C. Information Transfer _____ (store and forward electronic mail including voice and facsimile processing)

    D. Information Retrieval _____ (including data exchange from local to remote systems)

    E. Personal Processing _____ (interactive writing, editing, calculating and graphics)

    F. Activity Management _____ (calendar and project management)

    G. Other_____ _____

4. Which hardware products do you consider to be either executive workstations or applicable to the executive user.

Vendor	Model	Reason

5. Which software packages would you consider to be best suited to the executive user?

Vendor	Package	Mainframe/Mini/ PC Resident	Reason

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6. Have you installed executive workstations in your organization?

    ☐ Yes   ☐ No, go to question 15.

7. How many units have you installed? _____

8. Which hardware?

Number	Vendor	Model	Reason for Selection
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

9. Which software packages?

Vendor	Package	Mainframe Mini/PC	Reason for Selection
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

10. Which level of management are users of executive workstations?

Level	Number of Users	Date of First Installation	Comments
Senior Executive	_____	_____	_____
Executive	_____	_____	_____
Senior Management	_____	_____	_____
Middle Management	_____	_____	_____
First Level Management	_____	_____	_____
Other	_____	_____	_____

INPUT

11. What type of support has been provided by IS?

Comments

☐ Training _____

☐ Programming _____

☐ Other _____

12. What has been the biggest benefit of executive workstations?

_____

_____

13. What has been the biggest disappointment or unanticipated problem with the installation of executive workstations?

_____

14. Are there executive workstation users in your organization that we can interview?

☐ Yes ☐ No If yes, who are they? Go to question 16.

Name	Title	Dept.	Phone
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

15. Are you planning to install executive workstations in the next 2 years?

☐ Yes, answer questions 7-11 (Using future tense, e.g., how many units will you install)

☐ No, Go to question 17.

16. Would you be willing to spend more time discussing this topic with an INPUT Senior Consultant?

☐ Yes When would be a convenient time?

☐ No

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17. What other organizations do you believe are particularly advanced in executive workstation implementation?

Company	Contact	Phone #
_____	_____	_____
_____	_____	_____
_____	_____	_____

18. Do you have any other comments on executive workstations?

_____

_____

_____

_____

_____

_____

_____

THANK YOU.

COLD CALLS
WOULD YOU BE WILLING TO PARTICIPATE AS A MEMBER OF OUR 1984
EXECUTIVE PANEL FOR OUR USER ANNUAL REPORT ?
⬜ YES ⬜ NO ⬜ MAYBE _____

_____

INPUT

APPENDIX B: EXECUTIVE WORKSTATION USER
QUESTIONNAIRE

APPENDIX B

EXECUTIVE WORKSTATION USER QUESTIONNAIRE

1. When was your "Executive Workstation" installed? _____

    _____

2. What product is it?

    Hardware: _____

    Features: _____

    Software: _____

    Communications: _____

3. Who decided to install these systems? _____

    _____

4. How much did it cost? _____

5. a. What benefit have you received? _____

        _____

    b. What benefit did you anticipate? _____

        _____

6. a. What is the most positive aspect of EWS? _____

        _____

    b. What is the most negative aspect? _____

        _____

INPUT

7. a. How many units (EWS) are currently installed? _____

   b. How many will be in three years? _____

8. a. What level of management is using EWS? _____

   b. What level will be using EWS in three years? _____
   _____

   c. What level should be/should not be using EWS? Why? _____
   _____

9. a. What type of training and support have you secured? _____
   _____

   b. Who provides this support? _____
   _____

   c. How effective has it been? _____
   _____

   d. How can it be improved? _____
   _____

10. What other features/applications would you want included in EWS? Why?
   _____
   _____

11. Other Comments: _____
   _____
   _____

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APPENDIX C: EXECUTIVE WORKSTATION VENDOR
QUESTIONNAIRE

APPENDIX C

EXECUTIVE WORKSTATION VENDOR QUESTIONNAIRE

1. How do you define "Executive Workstation"? _____

    _____

2. What products do you include, exclude in this product category? Why?

    _____

    _____

3. a. What features should be included in EWS? _____

        _____

    b. How does this differ from professional WS? _____

        _____

    c. Conventional Terminals? _____

    d. PC's? _____

4. What software must be included in EWS? _____

    _____

5. a. What is the market size for EWS now? _____

        _____

    b. Now? _____

    c. In three years? _____

INPUT

6. a. Who is the user (level of management) purchasor for Executive Workstations?

    _____

    b. Decision Maker? _____

7. a. What role should I.S. play in EWS selection and installation?

    _____

    b. What role do they play? _____

8. a. What support does the executive require? _____

    _____

    b. How is this different from other users? _____

    _____

    c. Who should provide this training? _____

    _____

9. What new products do you see being offered in:

    1984: _____

    1985: _____

    1986: _____

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10. a. How important is Executive Information Systems? _____

_____

b. How would you define them? _____

_____

c. What makes them successful? _____

_____

d. Unsuccessful? _____

_____

e. What products are examples of EIS? _____

_____

11. Other Comments: _____

_____

_____

_____

INPUT