# 1985 INFORMATION SYSTEMS PLANNING REPORT

INPUT

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## ABSTRACT

Information systems (IS) issues focus on cost and applying technology to solve business problems. Although there is considerable publicity about IS being the basis for new products and services, cost is the top strategic issue being addressed by IS organizations. This is due to management's perception that IS' major role is to improve productivity and reduce the cost of products and services. The age of IS contributing to corporate revenue has yet to dawn.

This report was produced as part of INPUT's Corporate Systems Planning Program. It identifies driving forces, issues, and objectives of major IS organizations. It identifies the impact of technology, describes IS budget and organizational trends, and analyzes IS' changing role in the corporation. All analysis is also presented for nine industry sector.

This report contains 261 pages, including 144 exhibits.

# 1985 INFORMATION SYSTEMS PLANNING REPORT

## CONTENTS

## EXHIBITS

# 1 INTRODUCTION

# I INTRODUCTION

- This report is part of INPUT's Information Systems Planning Services Corporate Systems Planning Program. It identifies strategic planning issues and trends for information systems. The object is to help information systems (IS) management make effective decisons regarding organization, hardware, software, systems, and procedures.

## A. SCOPE AND METHODOLOGY

- The research of this report focuses on information system plans for companies in the following industries:

  - Banking and finance.
  - Discrete manufacturing.
  - Process manufacturing.
  - Insurance.
  - Distribution (retail and wholesale).
  - Transportation.

- Services.

- Medical and health care.

- Education.

- The research was based on 150 interviews with IS executives from companies whose annual revenue exceeded $500 million. Fifty of these interviews were in-depth discussions of IS plans, measurement techniques, role in corporate planning, and direction over the next five years. Exhibit I-1 shows the distribution of these organizations by industry sector.

- Major vendors were also interviewed to determine product and service trends as well as their perspective on the computer industry in the next five years. INPUT's extensive research base for its Information Systems, Market Analysis, and Customer Service programs was also used in this report's analysis.

## B. REPORT ORGANIZATION

- This report is organized as follows:

  - Chapter I is an introduction.

  - Chapter II is an executive summary formatted as a presentation for group discussions.

  - Chapter III is a summary of the annual survey findings on the following topics:

EXHIBIT I-1

## INTERVIEW PROFILE

| INDUSTRY | NUMBER OF INTERVIEWS |
|---|---|
| Banking and Finance | 26 |
| Discrete Manufacturing | 23 |
| Process Manufacturing | 18 |
| Insurance | 15 |
| Distribution | 18 |
| Utilities | 11 |
| Transportation | 8 |
| Services | 12 |
| Medical and Health Care | 9 |
| Education | 10 |
| Total | 150 |

- Information Systems Directions. This section identifies major IS issues. Exhibit I-2 shows how the issues are categorized, their focus, and the planning horizon.

- Management Perception and Organization. This section identifies ways IS communicates with management, IS' role in the corporate planning process, and how IS' role is changing in the corporation. This section also discusses the changes in IS organization and the distribution of corporate computing expenditures within the corporation.

- Impact of Technology. This section discusses the impact on IS of end-user computing, departmental processing, distributed systems development, relational data bases, merging voice and data communications, and local area networks.

- End-User Computing. This section expands the discussion on end-user computing's impact on IS with special emphasis on training and microcomputer support.

- New Applications. This section looks at the major new applications being developed and the resources used to develop these systems.

- Budget Analysis. This section analyses IS budget distribution and growth, and factors that affect the budgetary process.

- Chapter IV is a summary of the annual survey findings for each industry sector (see Section IA). The breakdowns used in Chapter III are evaluated for each industry.

- The Appendices contain copies of the financial and issue questionnaires.

EXHIBIT I-2

## ISSUE HIERARCHY

| MAJOR ISSUE SECTION | FOCUS | TIMEFRAME |
|---|---|---|
| Driving Forces | Strategic | Over 3 Years |
| Issues | Tactical | 2 to 3 Years |
| Objectives | Operational | 0 to 2 Years |

## C. RELATED INPUT REPORTS

- Industrial readers are referred to the following INPUT reports:

  - The Changing Dynamics of IS Organization.

    . This report forcasts IS organizations' trends and recommends strategies that will improve IS responsiveness to the corporation's competitive needs.

  - Micro-Mainframe: Corporate Impact.

    . This report examines the organizational and technological effects of microcomputers in the corporation.

  - Update on the Information Center.

    . This report examines and analyzes current product offerings, significant developments, emerging technologies, and important issues and trends.

  - The Destiny of the Information Center.

    . This report provides an analysis of the information center evolution and examines the factors that will change the IC charter over the next 10 years.

  - Micro-Mainframe: Connectivity.

    . This report examines the complex communications considerations affecting micro-mainframe links and analyzes the impact on corporate networks.

- Micro-Mainframe: Market Analysis (1985).

  . This report segments the market, provides projections for terminal emulation and intelligent packages, and analyzes issues, events, and trends in the marketplace.

- Other relevant studies are:

  - Micro-Mainframe: Telecommunications.

    . Analyzes 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.

  - Local Area Networks: Directions and Opportunities.

    . Focuses on the realities of LAN technology and implementation. Actual experience is emphasized and vendor claims are critiqued.

  - LAN/CBX Trends: Decision Processes for Users.

    . Provides a definite planning document which explores technological capabilities, planning issues, and economic considerations associated with LAN/CBX selection.

  - Telecommunications Annual Planning Report.

    . Defines and analyzes the entire spectrum of telecommunications technology and evaluates the requirements and planning issues for selecting the correct technical solutions.

- Integrated Voice/Data Communications.

  . Analyzes the requirements and possibilities for integrating both voice and data and identifies specific obstructions that have delayed or withheld such integrations from the marketplace.

- Office Videotex (1985).

  . Examines corporate, in-house applications for this user-friendly technology which has so far failed to make an impact as a new consumer-oriented media.

- Annual Information Systems Planning Report 1984.

  . Describes major events and project trends in the hardware, software, and communications industries.

- LAN/CBX: Planning for Change.

  . This report relates current experiences with these data and data/voice communications technologies and looks at the future of office-oriented communications devices.

# II EXECUTIVE SUMMARY

## II EXECUTIVE SUMMARY

- This Executive Summary is designed in a presentation format in order to:
  - Help the busy reader quickly review key research findings.
  - Provide a ready-to-go executive presentation, complete with a script, to facilitate group communication.
- Key points of the report are summarized in Exhibits II-1 through II-6. On the left-hand page facing each exhibit is a script explaining the contents of the exhibit.

## A. MAJOR I.S. ISSUES

- Information systems (IS) issues focus on cost and applying technology to solve business problems.

  - Although there is considerable publicity about IS being the basis for new products and services, cost is the top strategic issue being addressed by IS. In fact, cost is either the top or second priority issue for all planning periods. This is due to management's perception that IS' major role is to improve productivity and reduce the cost of product and services. The age of IS contributing to revenue has yet to dawn in most industries.

  - IS is a technical resource. The challenge to the corporate business strategy is to apply this resource so that the organization will operate more effectively as well as more efficiently. In the next three years, two areas will be the center of this activity:

    . Information distribution both internally and to customers will provide the potential for product differentiation and exploiting market information.

    . The information structures in many industries are being redesigned to be customer oriented instead of product, application, and function oriented.

- The changing regulatory environment is having a profound effect on the competitive nature of many industries. Barriers of entry are being lowered, and a means for quick and profitable entry into these markets is flexible and responsive information systems. The success and survivial of many companies will depend on the effectiveness of IS.

# MAJOR I.S. ISSUES

| Strategic | Tactical | Operational |
|---|---|---|
| Cost Containment | Cost Containment | Improve Prod. |
| Govt. Deregulation | Info. Delivery | Contain Costs |
| Non-Traditional Competitors | Integrate IS & Corp. Planning | Improve Info. Delivery |

## B. I.S.' CHANGING ROLE

- In the past, management has viewed IS solely as an operational resource. IS had little input into the corporate planning process and systems were developed primarily to increase control and improve effeciency of back office activities. IS reported to the finance organization, which perpetuated IS' role as an extention of the accounting department.

- IS' role has changed. Management is realizing the advantage of using systems to aid decision making. The end-user revolution has spawned a new, large group of powerful users: middle management. The increased visibility of IS has moved it from a purely operational department to a support and service organization. IS usually reports to an administrative executive and is beginning to contribute to the corporate planning and product development process.

- In the next five years, IS will have a more strategic role. It will report to a senior executive and will become an integral part of the corporate planning process. IS will become more consultive, advising senior management on corporate direction based on information systems technologies. IS will become a service organization. This will require business as well as technical skills. IS will have a vital role in applying technology to corporate strategies to ensure the success of the organization in the 1990s and beyond.

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# I.S.' ROLE IS CHANGING

**View: Operational ⟶ Strategic**

**Reporting: Finance ⟶ COO**

**Planning: None ⟶ Peer Contributor**

**Function: Technician ⟶ Consultant**

## C. IMPACT OF TECHNOLOGY

- End-user computing is having a major impact in many firms. The explosive growth of microcomputers, the growing support and training needs, and the use of decision support systems have put resource demands on IS. In the near term, IS is establishing service-oriented, end-user support organizations. In the longer term, IS will define end-user needs and incorporate them in IS and corporate strategic plans.

- Part of the long-range end-user plans may include the use of departmental processors and distributed systems development. Many respondents believe that departmental processing will be the ultimate catalyst for moving end users from spreadsheets to integrated systems. In the near term, IS is looking toward micro-to-mainframe applications as a way of satisfying departmental processing demands. The micro portion of these systems (distributed systems development (DSD)) may be remotely developed by end users and business analysts in the near future.

- Relational data base management systems (RDBM) have been studied by many respondents but very few installations are currently planned. Major concerns about computer performance and the dearth of micro-mainframe applications have lowered the priority for these systems. Over half the respondents believe that future RDBMs will cause severe performance problems. So most respondents are only keeping abreast of RDBM technology and waiting for a clear need that justifies the performance cost.

- Merging voice and data communications holds great potential for containing the mushrooming communications cost. However, most respondents are skeptical about whether the technology will exist to make merging voice and data a reality. The respondents believe, however, that the support of both voice and data should be merged. Fifty-nine percent of the respondents have merged these organizations, usually as a part of the IS department.

# IMPACT OF TECHNOLOGY

| | Immediate | Near Term | Long Term |
|---|---|---|---|
| End-User Computing | High | Medium | Medium |
| Dept. Processing | Low | Low | High |
| DSD | Low | Medium | Medium |
| Relational DB | Low | Low | Low/Medium |
| Voice/Data Int. | Low | Low | Medium/High |

## D. I.S. BUDGET GROWTH WILL REMAIN THE SAME

- IS budget growth will remain at about 10% in 1986. The major growth areas will be processors, storage devices, and data communications. The smaller growth areas will be outside processing and professional services.

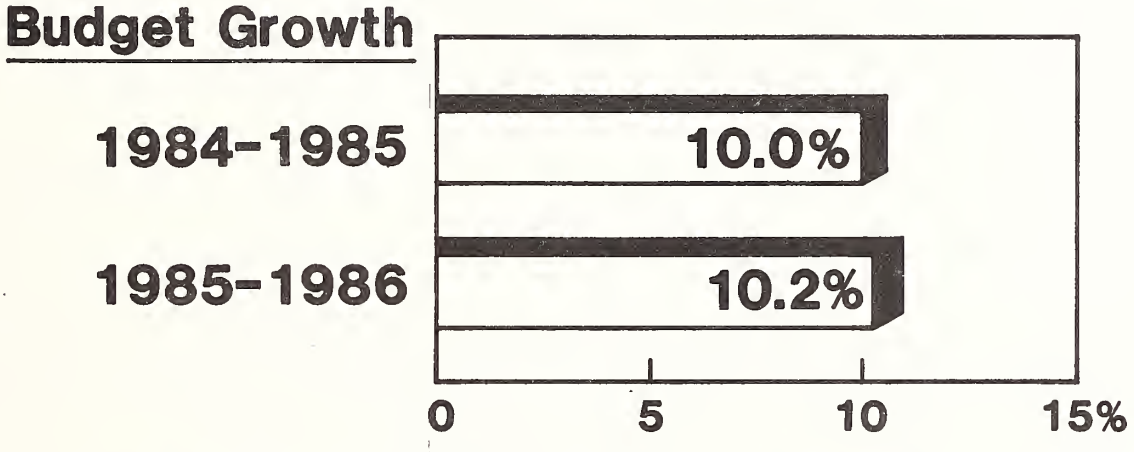
  - The demand to improve information delivery is fueling the demand for more processing power, better networks, and more accessable, better organized data bases.

  - The dampened demand for outside processing is reflective of management's desire to process information internally. Professional services are being used for specific problem resolution as opposed to general-purpose consulting. Professional services are viewed as a discretionary, deferable expenditure by many organizations.

- Eighty-four percent of the respondents are planning to increase their IS budgets in 1986, but 50% plan to increase their budgets at a lower rate than in 1985. Hardware, personnel expenses, and software acquisitions are the primary contributors to increasing IS budgets. Factors that are decreasing budgets include staff reductions, improved hardware efficiency, and improved productivity.

- IS budgets have the same dependence on corporate revenues and profit as other departments in the enterprise. The services sector's IS budget has the greatest dependence and the process manufacturing and transportation sectors' budgets have the least dependence on corporate revenues.

# I.S. BUDGET GROWTH WILL REMAIN THE SAME




| Factors Increasing Budget | Factors Decreasing Budget |
|---|---|
| Hardware | Staff Reduction |
| Personnel | Improved HW Efficiency |
| Software | Improved Productivity |

## E. I.S. BUDGET DISTRIBUTION

- The distribution of the 1985 IS expenditures remained essentially the same as 1984. Personnel and hardware expenses account for over three quarters of the IS budget. Data communications is planned to grow at 11% in 1986, and many respondents are focusing on controlling costs of this category. Sixty-six percent of major software development is planned to be done entirely by internal personnel. This has kept external software expenditures at 7% of budget, with a relatively low growth rate of 5% in 1986.

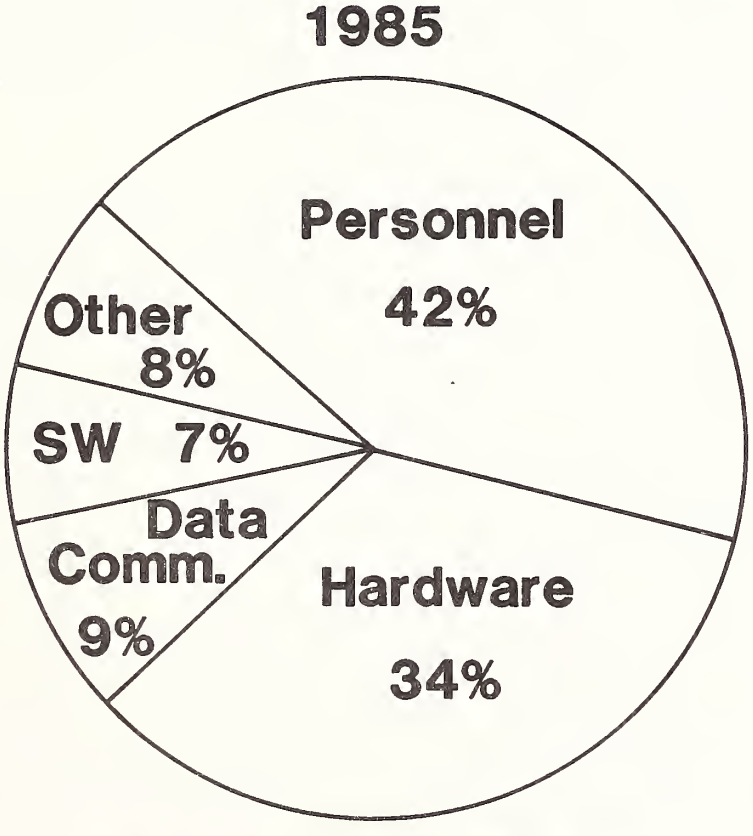
- Seventy-seven percent of corporate information systems spending is controlled by IS.

  - Seventy-one percent of corporate and 92% of IS budgets are spent on centralized computing. In 1986, this is projected to become 68% corporate-wide and 90% for IS.

  - Twenty percent of corporate computing expenditures will be for distributed processing. This will grow slightly to 21% in 1986. Distributed processing will decrease slightly in the IS budget, from 5% in 1985 to 4% in 1986.

  - End-user computing will grow in 1986. Corporate wide, it will grow from 9% in 1985 to 11% in 1986. For IS, it will double, growing from 3% of the IS budget in 1985 to 6% in 1986. Most of this growth will come from central IS resources.

# I.S. BUDGET DISTRIBUTION



## F. I.S. IMPACT ON COMPETITIVE POSITION

- IS budgets are only moderately dependent on revenues. Although management is concerned with costs, they are also aware that information systems may enhance the firm's competitive advantage.

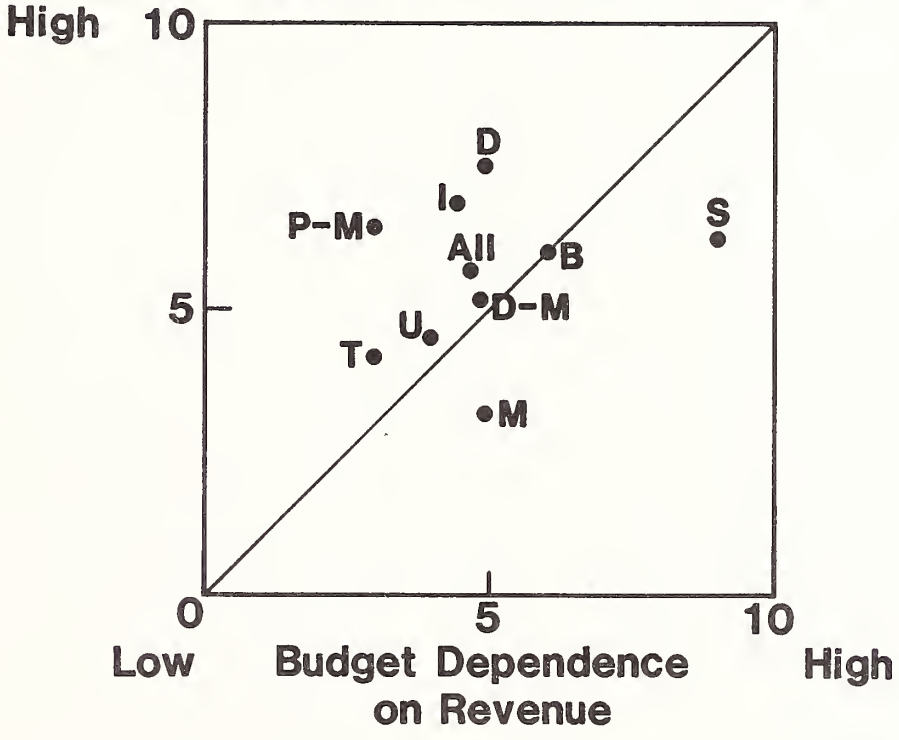
- The respondents were asked to rate the dependence of their IS budget on revenues, and only the services sector rated their budget as being highly dependent upon corporate revenues. No sector's IS budget had a high dependence on corporate profit.

- The respondents were also asked to rate management's perception of the relationship between investing in IS and the company's competitive position.

  - Distribution and insurance sector respondents indicated there is a high relationship between the investment in IS and the company's competitive position. No sector's respondents indicated there was a low relationship.

  - Only the medical and services industries rated the expected effect of IS on competitive position as lower than the dependence of IS budgets on corporate revenues. This indicates that most respondents' management believe that IS has the potential for enhancing the company's competitive position and that the investment on IS should be more dependent on strategic need than current revenues. However, many companies still are limiting IS investments due to corporate cost constraints. When, or if, these constraints are lifted, IS should see its budgets increase at a faster rate.

# I.S. IMPACT ON COMPETITIVE POSITION




All - All Industries
B - Banking & Finance
D-M - Discrete Manufacturing
P-M - Process Manufacturing
I - Insurance
D - Distribution
U - Utilities
T - Transportation
S - Services
M - Medical & Health Care

# III MAJOR CROSS-INDUSTRY ISSUES

# III MAJOR CROSS-INDUSTRY ISSUES

## A. INFORMATION SYSTEMS DIRECTIONS

### 1. DRIVING FORCES

- Despite publicity to the contrary, information systems still focus on cost versus product, revenue, and profit improvements. The most prominent strategic issue indentifed by respondents is to contain costs.

  - Top priority is given to systems that reduce a firm's cost of doing business. Systems are still viewed as a vehicle for improving corporate efficiency. Corporate effectiveness is rarely identified as a goal for implementing information systems.

  - Cost containment is also the strategic charter for information systems (IS) departments. Although demands for IS resources continue to grow, few industries are making major new investments in IS. Hardware and software upgrades being reluctantly accepted with major new projects being examined under closer scrutiny by senior management. IS is still being perceived as a back office activity. The migration of IS from an operation to strategic asset is still at least five years away for many institutions.

- The regulatory environment is changing for many industry sectors. Deregulation has lowered the barriers to entry in the banking, finance, and insurance sectors. Electronic information delivery and electronic funds transfer is changing the way many firms are conducting business.

  - Governmental compliance reporting is still an onerous activity in many sectors. Increased reporting requirements will transcend all aspects of the business. IS is required to meet the new requirements within the stricter timeframe that governmental agencies are imposing.

  - The medical and health care sector is developing new payment systems to conform to the governmentally imposed payment and reporting structures. As government takes a more active role in consumer pricing, the demands for new payment and reporting systems will increase and encompass other industries such as insurance.

- Government deregulation and the application of new technology has opened opportunity for nontraditional competitors to enter the marketplace.

  - Major retail organizations are directly competing with banks in the credit and debit card arena. ATM and POS networks are being marketed by third-party organizations as well as banks and retailers. These companies are looking for new service offerings that can be leveraged on these intelligent networks. Insurance companies are also actively pursuing a strategy of utilizing these networks to reach the consumer directly.

  - Many companies are investigating ways of marketing their internal computer systems and data bases. This heralds the entry of manufacturing, insurance, and banking companies into the information services industry.

- Information delivery within and outside the enterprise will place increasing demands on communication networks. The complexity and uncertain costs associated with deregulation will place increasing pressure on IS organizations. This environment is accelerating the merger of voice and data communications support functions under one organizational entity, typically IS.

- Exhibit III-1 lists the driving forces that will affect IS organizations in the next three to five years.

2. ISSUES

- The tactical issues being addressed by respondent IS organizations focus on:

  - Containing costs.

  - Elevating IS' corporate status.

  - Applying technology.

- Cost containment is paramount to IS' success in many respondent companies. Improving programmers' productivity and upgrading hardware and software systems are all high priority issues. The growth of end-user computing has heightened management awareness of the need for control of computing cost, and IS is becoming the controller of these expenditures.

- The respondents are frustrated by management's continuing view of IS as an operations entity. A major goal is to elevate IS to a strategic corporate resource. IS must integrate its plans with corporate business plans and ultimately become a vital part of the corporate planning process. The opportunities for information systems to become a major contributor to revenues and profits are growing. Technology can be used as a competitive advantage by providing:

EXHIBIT III-1

## I.S. DRIVING FORCES

- Cost Containment
- Government Regulations/Deregulation
- Nontraditional Competition
- Applied New Technology
- Network Demands

- Products (e.g., ATM, POS, and software packages).

- Services (e.g., customer order entry and document distribution).

- Product differentiation (e.g., decision support and expert systems).

- Information delivery is a key means for increasing IS visibility to management and for expanding the scope of the corporation's product and service mix. The means for providing timely information in a usable format to management and customers is by applying technology to solve business problems. But technology presents its own array of problems.

  - Integration. Information systems are disjointed and were developed with little thought of the need to interface with other systems. In addition, the information requirements of the users transcend mere data communications. Voice, text, and image as well as data ultimately must be integrated to totally satisfy the information needs of the organization.

  - System Architecture. Very few organizations have an information architecture. Most systems are product, function, or application specific, which creates separate, disjointed data bases. IS must design a corporate information architecture that is customer oriented and transcends all products, services, and applications in which customers participate.

- Exhibit III-2 lists the tactical issues that must be addressed by IS within the next two to three years.

EXHIBIT III-2

## I.S. ISSUES

- Cost Containment
- Low-Cost Electronic Delivery System
- Integrate IS Planning With Corporate Strategic Plan
- Develop a Corporate Information System Architecture
- Improve Management's Perception of IS
- Integrate Voice, Data, Text, and Images
- Apply EUC and Expert Systems to Improve Corporate Productivity
- Reduced Systems Life Cycles
- Use Technology As a Competitive Advantage

## 3. OBJECTIVES

- The operational issues identified by respondents conform to the tactical issues discussed above.

  - Cost containment and improving productivity were the highest priority objectives identified.

  - Using technology to solve business problems is the general heading for the remaining priority objectives.

    . The expanded use of microcomputers in organizations has created a demand for micro-mainframe (M-M) applications. This demand, however, is symptomatic of the true demand: dissemination of mainframe-based data to the end users. This information delivery demand has spurred the growth of M-M applications and end-user support groups.

    . There is a need to consolidate all customer-specific information. Many respondents have started to design a corporate information structure that is customer related versus product, application, or function related. This is an evolutionary process that most respondents have begun to plan for. Some responents are also developing temporary systems, providing consolidated customer information to bridge the information gap between current systems and systems developed under this new architecture.

- Exhibit III-3 lists the operations issues that will affect IS in the next year.

EXHIBIT III-3

## I.S. OBJECTIVES

- Improve Productivity
- Contain Costs
- Improve Information Delivery
- Establish Customer-Oriented Data Base
- Expand Use of New Technology

## B. MANAGEMENT PERCEPTION AND ORGANIZATIONAL ISSUES

### 1. MANAGEMENT PERCEPTION

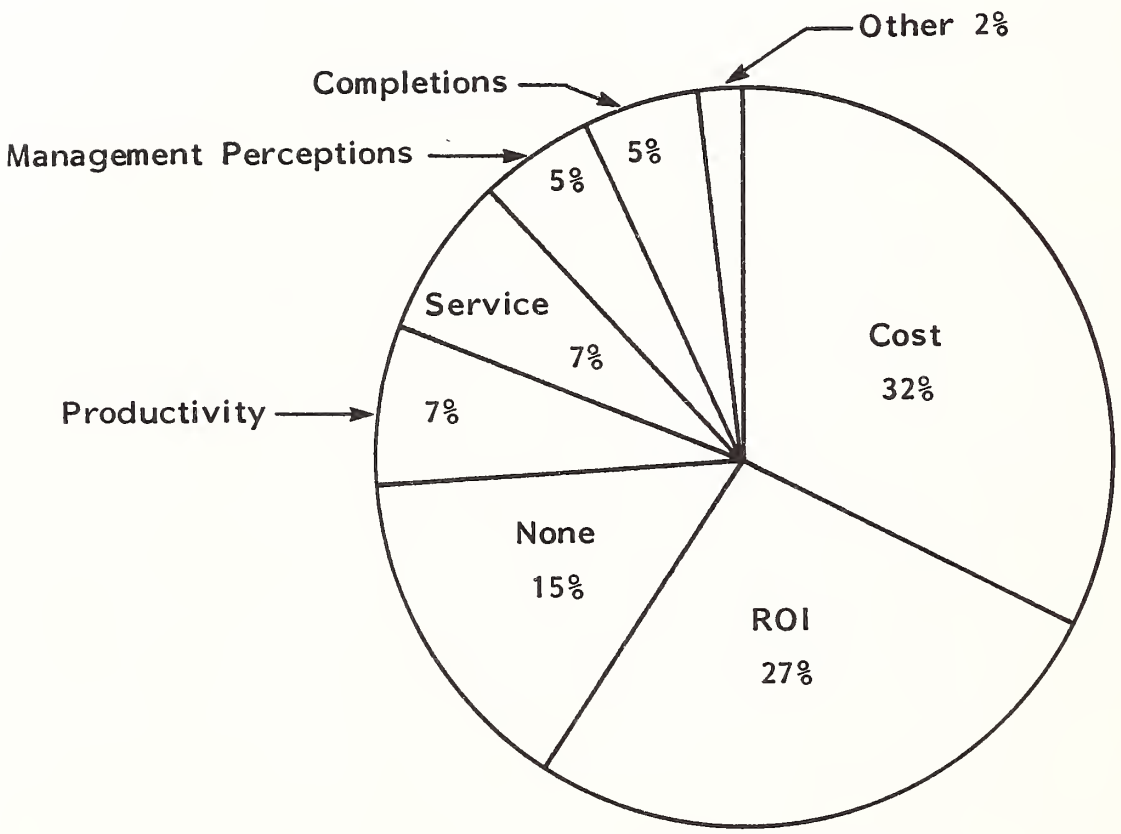
- Management in the respondent companies believes that IS has some impact on the performance and competitive position of the company. The greatest role IS has, however, is to reduce the cost of the product and service. Seventy-two percent of the respondents view IS as a corporate asset, but primarily as an operational asset versus a strategic one.

- Cost is the key communications topic between IS and management. Almost 60% of the measurements IS departments use to communicate their success to management were cost or return on investment (ROI) oriented. IS departments' budgets are still compared to budgets in similar organizations. Major projects are required to undergo ritualistic cost benefit analysis before they receive management approval; however, very few institutions perform post implementation audits to see if the project benefits are ever realized. As one respondent commented, "Once a system is implemented, it becomes a 'fact of life'." Most respondents believe their measurement techniques are effective. In other words, they are providing the information that management wants to see: costs. These measurement techniques are perpetuating IS' role as a cost reducer instead of an improvement provider. IS must identify the opportunity costs associated with addressing operational versus strategic issues. Exhibit III-4 identifies the measurement techniques used by respondents.

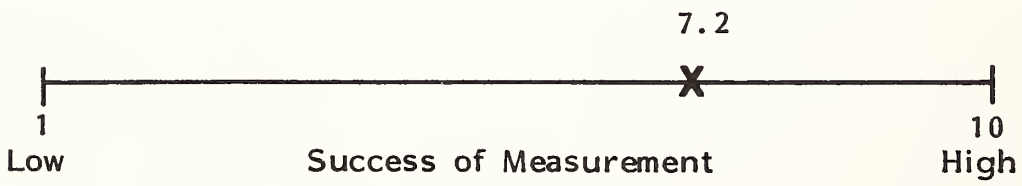
- The respondents have found their corporate visibility greatly improved in the last two years. End-user computing has expanded IS' user base throughout the organization, and IS has supported these users very well. The proliferation of microcomputers has caused management to want to control this growing cost. IS has been the logical control point for these expenditures. Additional responsibilities have been given to IS due to the complexity of data and voice communications. Over 50% of the respondents have both voice and data communications reporting to IS.

EXHIBIT III-4

I.S. MEASUREMENT TO MANAGEMENT




Percent of Responses



- The respondents see IS' role becoming more consultive in the next two years. The success of end-user computing support is elevating the status of IS professionals from being purely technicians to business consultants. This trend should continue and IS will begin being viewed as a strategic resource to the corporation.

- IS' role in the corporate planning processes is increasing. Currently 54% of the respondents take an active role in this process. In some organizations IS is the driving force for developing corporate strategic plans. In the next two years it is expected that IS will take a more active role in the corporate planning process. Exhibit III-5 illustrates the current roles the respondents take in the corporate planning process.

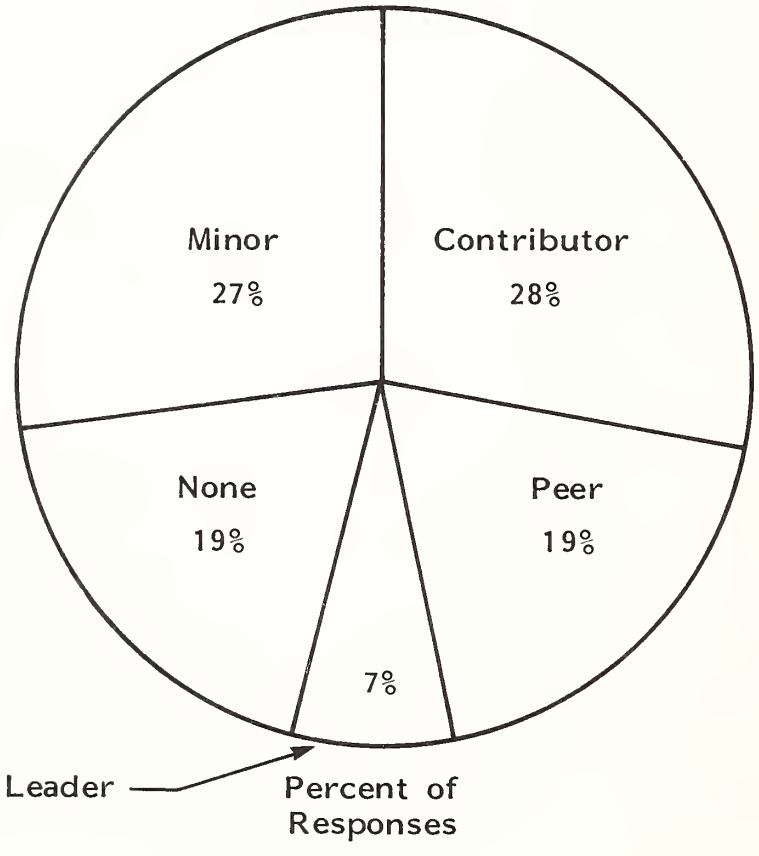
- The respondents strongly believe that IS can be used as a competitive weapon in their industry. The most common method is reducing the costs of products and services. There are innovative uses of technology that are producing other IS opportunities to improve the competitive position of an enterprise.

  - Information Networks. ATMs are the obvious example of the use of intelligent networks to reach customers. ATM networks are being leveraged with additional services to expand the customer base. Networks are also being used for customer originated order entry and order tracking activities as well as intercompany electronic document interchange.

  - Better Information. There are major planning efforts being started to develop customer oriented data bases. This need has arisen from the difficulty in receiving customer information across product lines. This problem is due to systems and resultant data bases being constructed on a functional/product versus customer basis. Due to this deficiency, companies are missing cross-selling opportunities among their own customer base. Decison support systems are being developed in

EXHIBIT III-5

I.S.' ROLE IN CORPORATE PLANNING



conjunction with customer and other market data to help construct more effective marketing and sales programs.

- Improved Productivity. The rapidly changing market conditions present in most industries require much shorter product development cycles. IS is beginning to be included at the beginning of this cycle so that products are not waiting for support systems. IS is also looking more toward software packages, fourth generation languages, and other productivity aids to shorten the system's development cycle.

- IS as a Product. Many companies are considering marketing internal systems. They are also using IS personnel in sales and marketing support and as consultants to customers on an hourly fee basis. Microcomputers are being used as the vehicle for many of these systems.

## 2. ORGANIZATION

- Despite the growth of end-user computing, the respondents indicated that the distribution of IS staff among organizational groups will remain the same. Exhibit III-6 shows the distribution of IS staff. This distribution did not change since 1984 and is not planned to change in 1986.

  - Many users indicated that end-user support organizations have been in place for over two years, usually called the information center (IC).

  - The technical support organization may grow in the next two years as IS assumes more of the communications support responsibility for the organization.

- IS budgets will grow at about the same rate in 1986 as in 1985. Approximately three quarters of the corporate IS expenditures will be controlled by the corporate IS organization. Exhibit III-7 shows the distribution of the corporation's IS spending in 1985 and projected for 1986.

EXHIBIT III-6

## TRADITIONAL I.S. ORGANIZATION STRUCTURES ARE REMAINING THE SAME

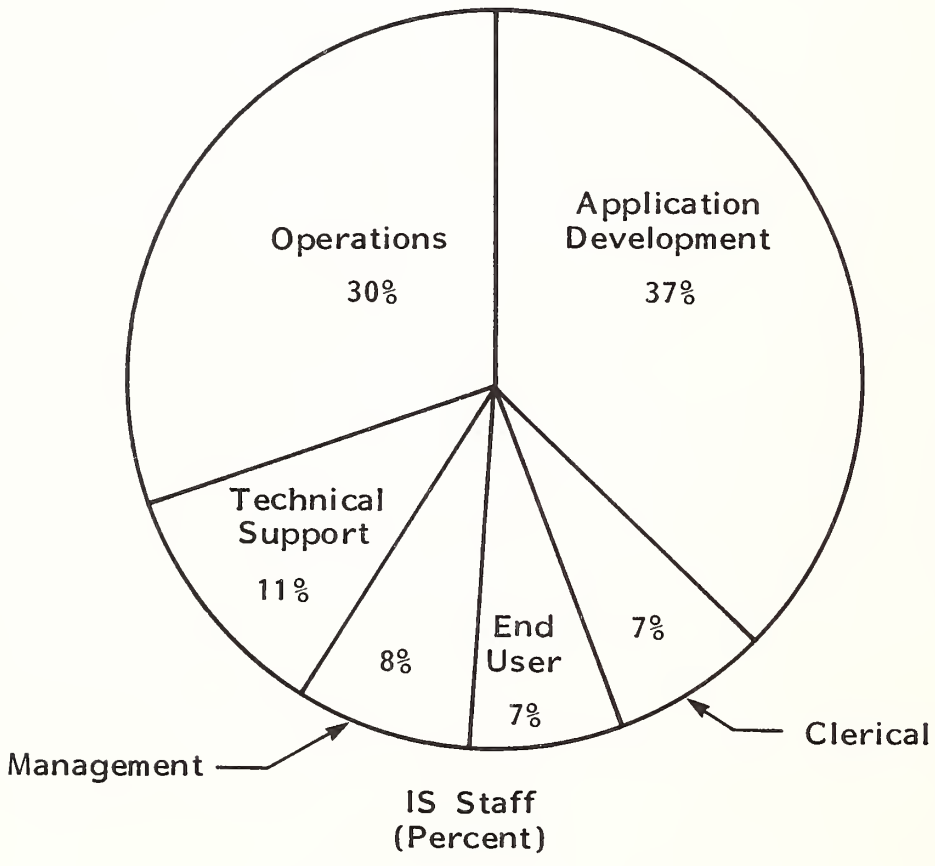
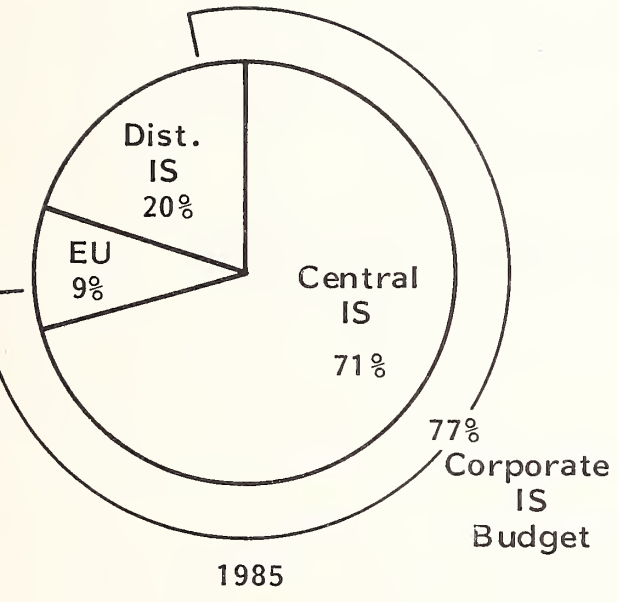
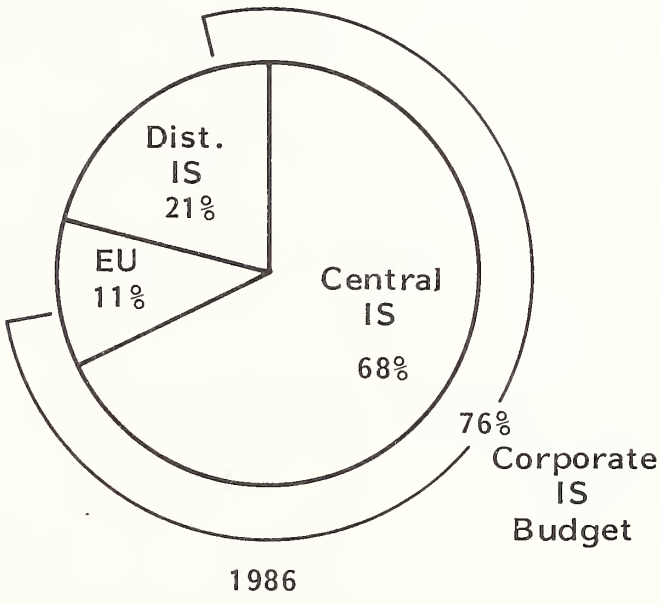
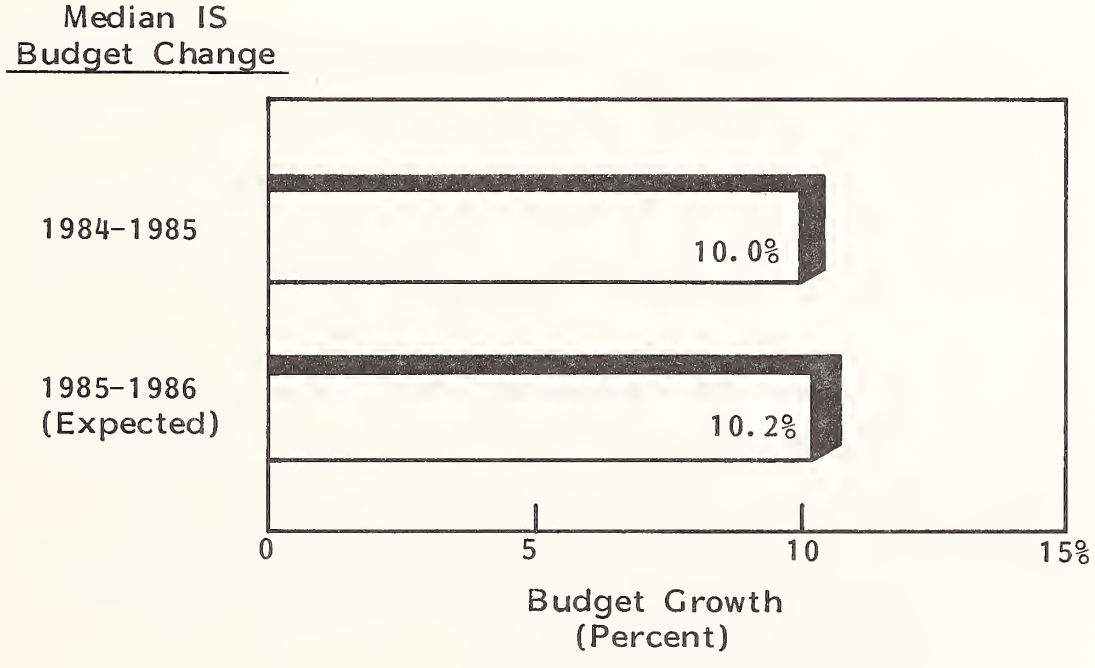


EXHIBIT III-7

## DISTRIBUTION OF ORGANIZATIONS' I.S. EXPENSES



- Central IS expenditures will reduce slightly in favor of end-user computing.

- The corporate IS department will control about the same portion of IS expenditures. In 1985, 5% of corporate IS budget will be allocated to distributed computing and 3% to end-user computing. In 1986 it is projected that 4% of the corporate IS budget will be allocated to distributed computing and 6% to end-user computing.

- Section F of this chapter will discuss IS budgets in more detail.

## C. IMPACT OF TECHNOLOGY

- End-user computing has had a major impact on the respondents. It hase made IS more service oriented and given it more visibility within the corporation. End-user computing has also demanded new skills be added to IS: business knowledge, communications, and training. These new skills are the foundation of IS evolution toward becoming more consultive.

- Departmental processors are being studied by many respondents, but most are not planning any installations during the next two years. Micro-to-mainframe applications are being used to satisfy the demands for departmental processing. Those respondents that are the most positive about departmental processors see their use solely for office systems.

- The only activities using distributed systems development are the development of micro applications by end users and some use of fourth generation languages for decision support applications. The use of distributed systems development techniques for production applications is just beginning to be planned in a few companies. Most respondents are not currently planning to use these development techniques.

- Mainframe relational data bases are being piloted by a few companies. There is still a large concern about computer performance using these data bases and that has deterred most companies from making a major commitment to this data base organization. Most respondents use fourth generation languages that have imbedded relational data bases (e.g., Focus, RAMIS). These products are primarily used for ad hoc reporting and decision support applications.

- Voice/data integration has piqued the interest of all respondents. The need to control communications costs is a high priority in most industries. However, most respondents are skeptical about whether the technology is available (or will be available) to merge voice and data economically. The increasing demands for IS to provide communications support has relegated any action on merging voice and data to merely data gathering. Most respondents do not believe it will become a viable alternative until the 1990s.

- The respondents have very few LAN installations. The lack of standards and need has caused LANs to still be viewed as experimental. Most respondents believe they will eventually use LANs in their organization, but only after IBM delivers a viable LAN product.

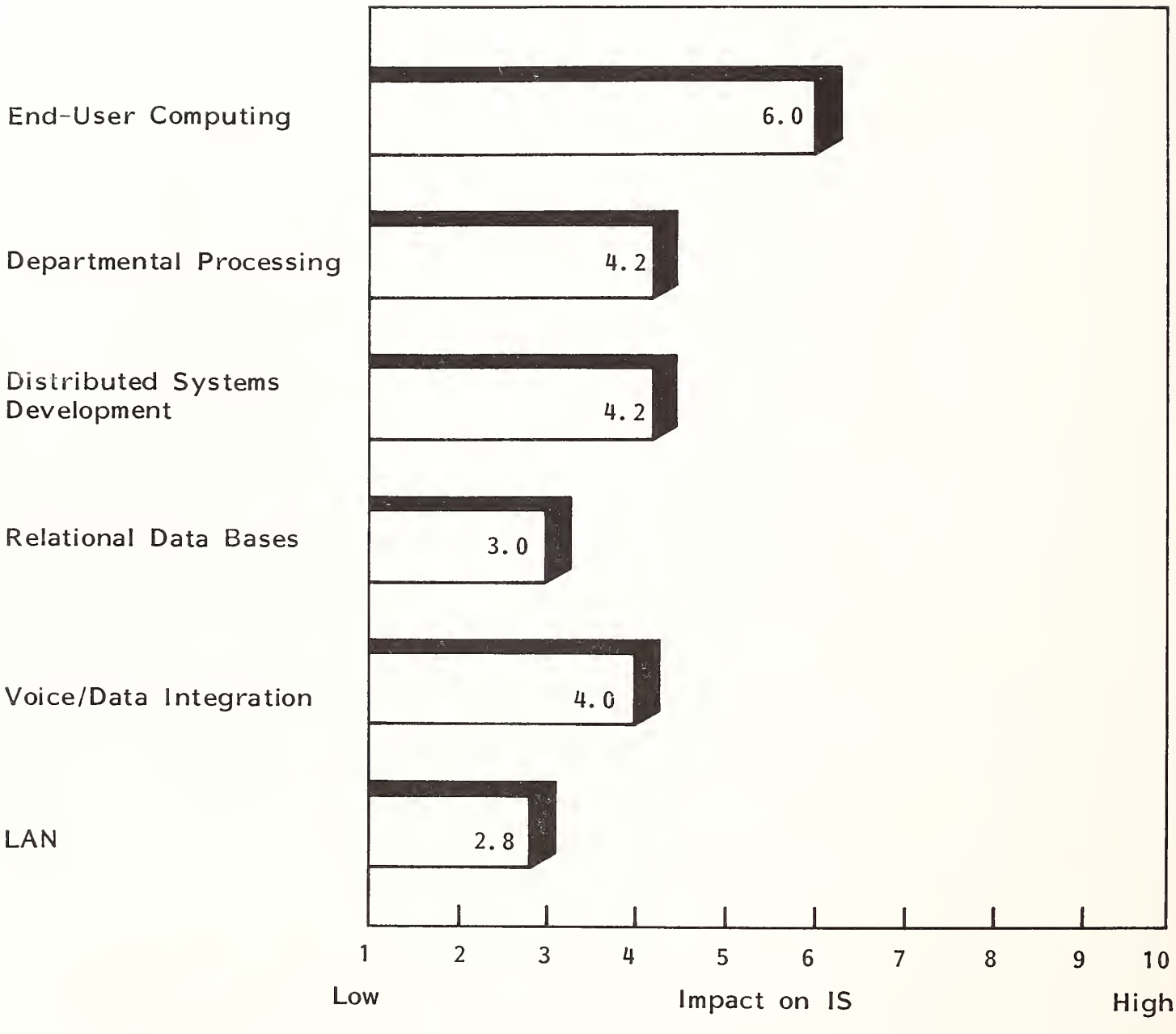
- Exhibit III-8 summarizes the respondents' ratings of the impact on their IS organizations of the above technologies.

## D. END-USER COMPUTING

- End-user computing support has been primarily assigned to the information center (IC). The IC was IS' first attempt at helping end users help themselves. The ICs average three years in existence, and most have full-time consultants, trainers, product specialists, and clerical support. The scope of

EXHIBIT III-8

IMPACT OF TECHNOLOGY
(All Companies)



the IC has been expanded beyond mainframe based systems to micro and office systems support.

- IS has taken a major role in all aspects of end-user training. Some respondents have developed or acquired computer based training (CBT) programs to augment classroom training. IS typically coordinates vendor training and works with end-user organizations to enable them to train themselves on elementary systems. The biggest problems facing IS in the area of training are keeping up with end-user demand and distinguishing among IS end-users and corporate human resources department training responsibilities.

- Exhibit III-9 summarizes IS' role in microcomputer support.

  - Most IS organizations provide lists of recommended microcomputers. The user organizations are responsible for justification. There is a trend toward IS being the authorizer for all microcomputer purchase requests.

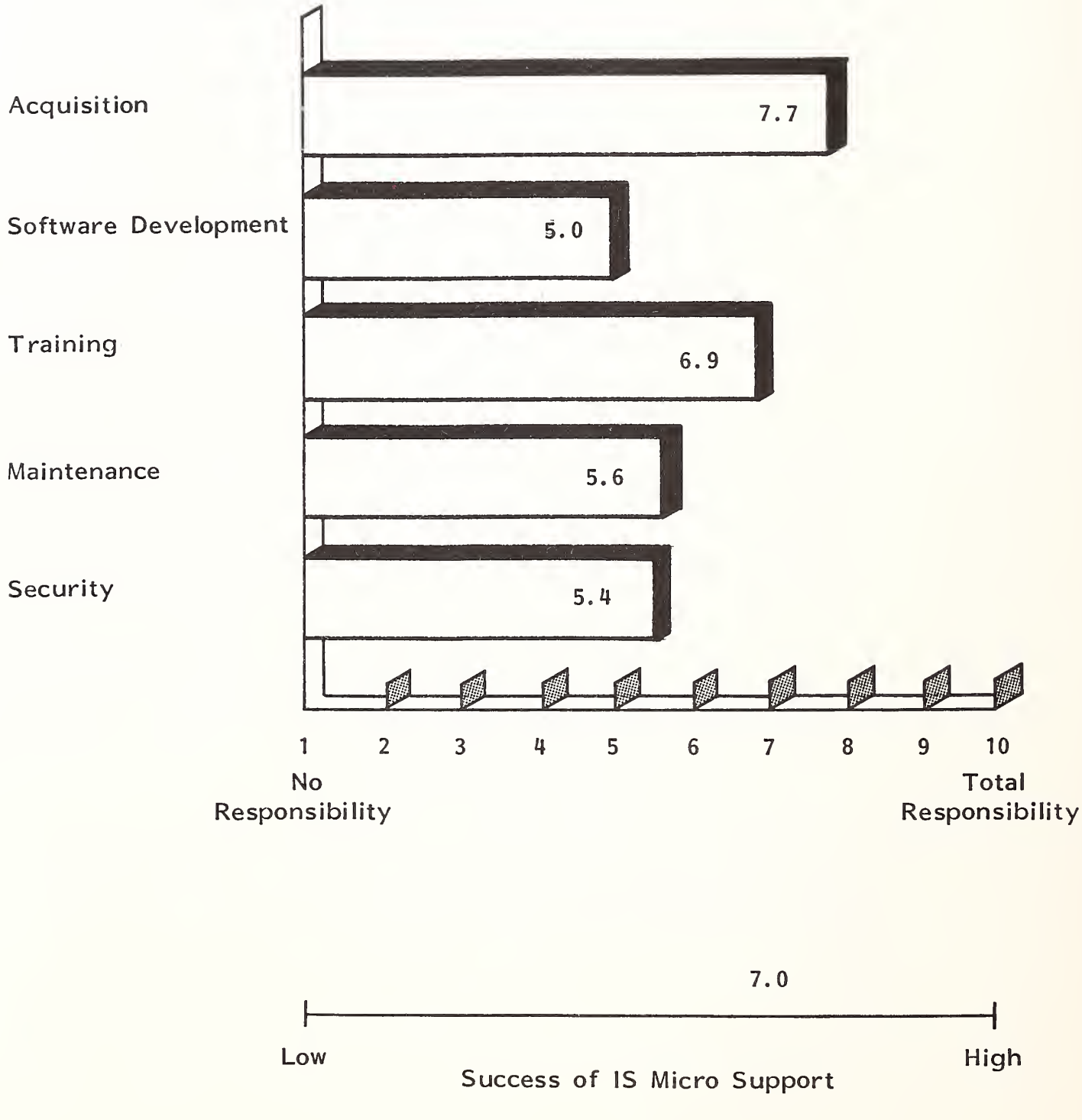
  - Software development is primarily the end-user's responsibility. IS provides a list of recommended software packages and plays an advisory role on software selection. In some cases IS will assist in software development if the programs have potential for use by multiple micro users.

  - IS takes a leadership role in micro training. It holds classes and trains end users to train themselves on many standard systems. Use of training vendors is usually controlled by IS.

  - IS coordinates micro maintenance. It usually negotiates a master maintenance contract for the company and the end user is then responsible for dealing with this vendor for support.

EXHIBIT III-9

I.S. ROLE IN MICROCOMPUTER SUPPORT
ALL COMPANIES



- Micro security is the end-user's responsibility. IS develops procedures but compliance is not enforced.

- The respondents believe their micro support is very successful. The measurement used is informal feedback from users. A few respondents have formalized the satisfaction measurement by distributing questionnaires semi-annually. One respondent had the company's auditors assess user satisfaction. The respondents believe that the largest impediment to success is keeping up with the demand for support. The remedy is to make the users more self sufficient, with IS only getting involved with more complex problems.

## E. NEW APPLICATIONS

- Approximately two-thirds of major new applications are being developed by internal resources. Many of these applications involve upgrading systems that have become obsolete due to technology and the company's competitive environment.

- About one-fourth of the applications are being externally developed, primarily as software packages. In many industries software packages are growing in importance because of the need to implement new systems more quickly. New product introduction may be delayed by the lack of information systems, a cost many companies cannot afford. A major concern is expressed by respondents about whether software companies can keep up with the changing competitive environment in many industries. This concern has dampened the demand for software packages in some volatile industries (e.g., banking and finance).

- Joint development between vendors and IS organizations will only be used for 10% of the applications. Many vendors are now providing parameter-driven

systems, reducing the need for program customization. IS has also had many bad experiences with joint development and heavy modification of software packages. Most IS organizations are avoiding this development methodology whenever possible.

- The median cost (both internal and external) of these new applications is $350,000. Exhibit III-10 shows the respondents' sources of development for major new applications.

- Exhibit III-11 shows there is a trend toward more industry-specific applications. Although these applications are only 46% of the new applications activity, this has grown 38% from 1984. This trend should continue as IS becomes more involved in helping companies develop products and services using information systems technology. Exhibit III-11 also lists the most frequently mentioned cross industry applications being developed.

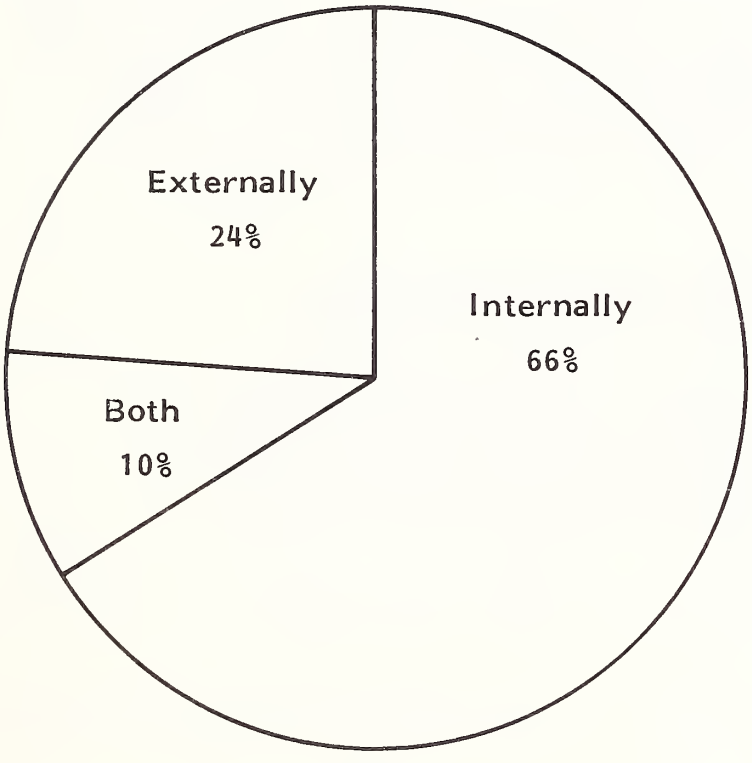
## F. BUDGET ANALYSIS

- IS budget growth rates will continue to grow at 10% (see Exhibit III-7). The distribution among budget categories has not changed markedly over the past five years. Exhibit III-12 shows the 1985 budget distribution and projects the growth of budget categories for 1986.

  - The largest projected growth areas are processors, storage devices (i.e., DASD), and telecommunications. The need to improve information delivery internally and to customers is fueling the demand for these budget categories. The restructuring of data bases to become more customer oriented and integrated among function, products, and applications is increasing the demand for more mainframe storage.

EXHIBIT III-10

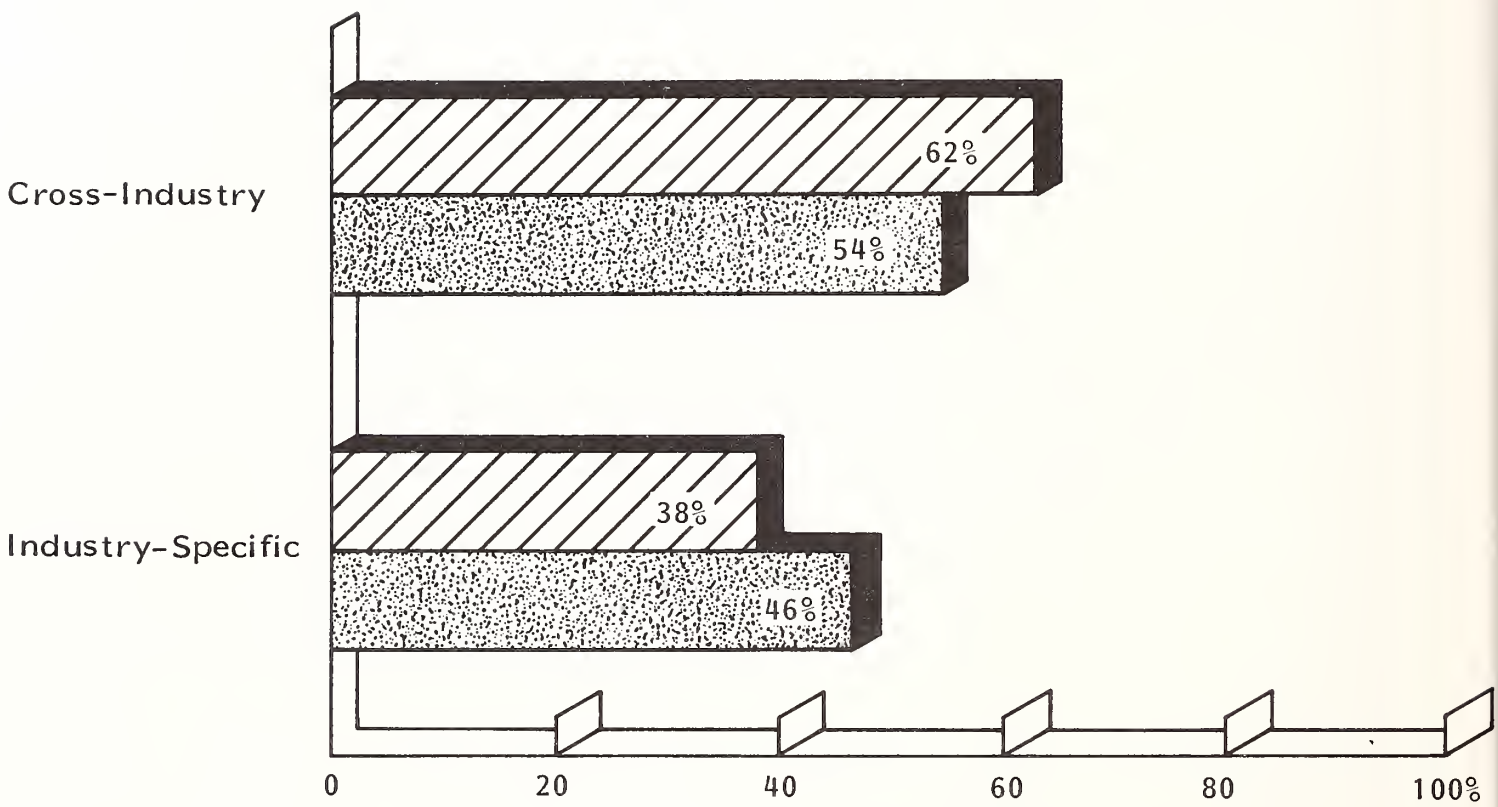
MAJOR NEW APPLICATIONS
STILL BEING INTERNALLY DEVELOPED




Percent of Responses
Median Cost = $350,000

EXHIBIT III-11

MAJOR APPLICATIONS DISTRIBUTION
(All Companies)




Cost Range: $1.5K - $16M

1984

1985

Most Common New Cross-Industry Applications

Finance and Accounting

Office Systems

Billing

Human Resources

Decision Support

EXHIBIT III-12

## 1985 BUDGET DISTRIBUTION AND 1985/1986 CHANGES

| BUDGET CATEGORY | 1985 PERCENT OF I.S. BUDGET | 1985-1986 EXPECTED BUDGET GROWTH |
|---|---|---|
| Personnel Salaries and Fringes | 41.6% | 7.4% |
| Mainframe Processors | 10.9 | 10.0 |
| Minicomputers | 2.7 | 11.5 |
| Microcomputers | 2.1 | 10.0 |
| Mass Storage Devices | 5.8 | 10.5 |
| Other Hardware | 7.2 | 6.9 |
| Total Hardware | 28.7% | 9.5% |
| Data Communications | 9.3% | 11.0% |
| External Software | 4.5 | 5.0 |
| Professional Services | 2.6 | 0.9 |
| Turnkey Systems | 0.8 | 2.6 |
| Software Maintenance | 1.2 | 5.0 |
| Hardware Maintenance | 5.8 | 5.1 |
| Outside Processing Services | 1.4 | 0.0 |
| Other | 4.1 | 3.0 |
| Total | 100.0% | 10.2% |

- The smallest growth areas are outside processing and professional services. There is a continuing trend to reduce outside processing whenever possible. The only growth area is the use of public data bases by end users. Professional services is primarily viewed as a discretionary item. The use of professional services is being limited to assistance on specific problem areas.

- Eighty-four percent of the respondent IS organizations are planning to increase their budget in 1986 but half of these institutions are planning for lower growth rates than 1985 (see Exhibit III-13).

  - Factors contributing to increasing the IS budget include (in order of most frequently mentioned factors):

    . Hardware.

    . Personnel expense.

    . Software.

    . Inflation.

    . Office systems.

    . Data communications.

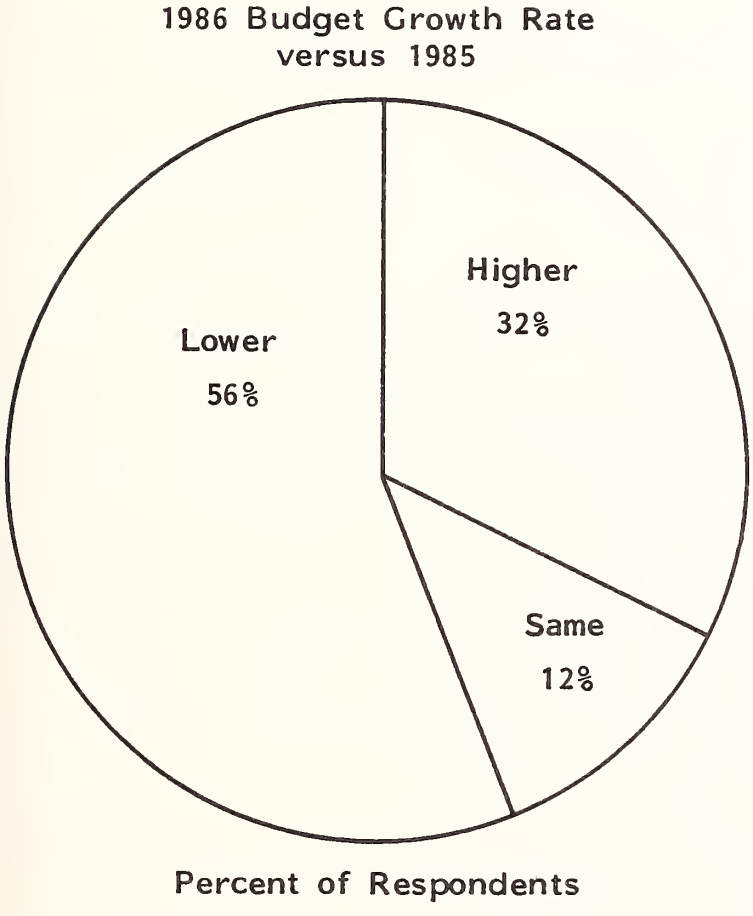
  - Factors contributing to decreasing the IS budget include (in order of most frequently mentioned factors):

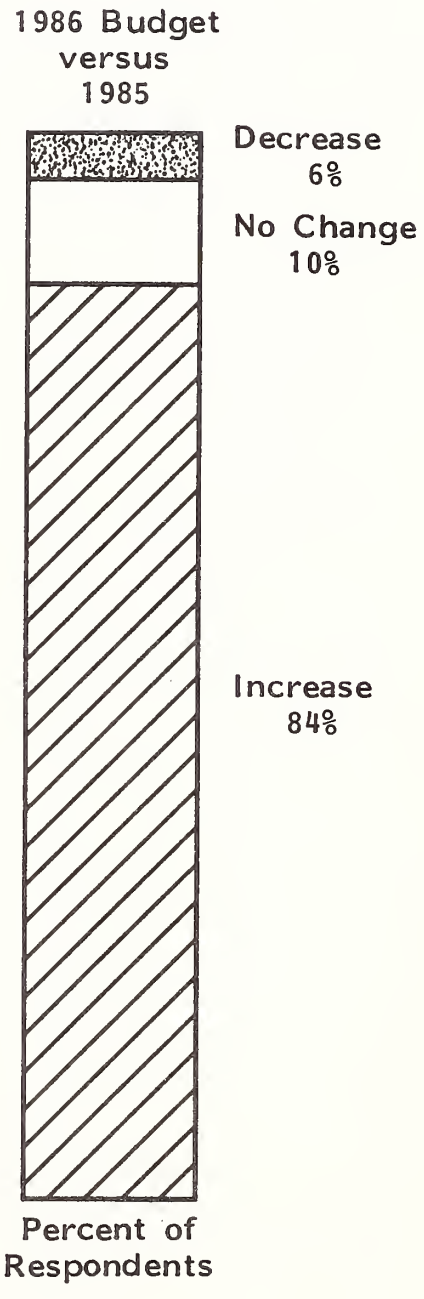
    . Staff reductions.

    . Improved hardware efficiency.

EXHIBIT III-13

## MOST BUDGETS WILL INCREASE BUT AT A LOWER RATE THAN 1985



. Improved productivity.

. Improved software.

- IS budgets are moderately dependent on corporate revenue and profit. Exhibit III-14 shows that only the service industry has a high dependence between IS budgets and corporate revenue. This is because many of the service companies market IS as a product. The highest dependence on profit is in the medical and health care industry. This industry looks for discretionary funds to invest in IS.

## G. IS' CORPORATE CONTRIBUTION

- Most respondents view cost containment and control (i.e., accounting and measurement systems) as the main need information systems satisfy. The major emphasis is the status quo versus how new systems may change the way a company competes. There are some companies that are using information systems to enhance strategic advantages.

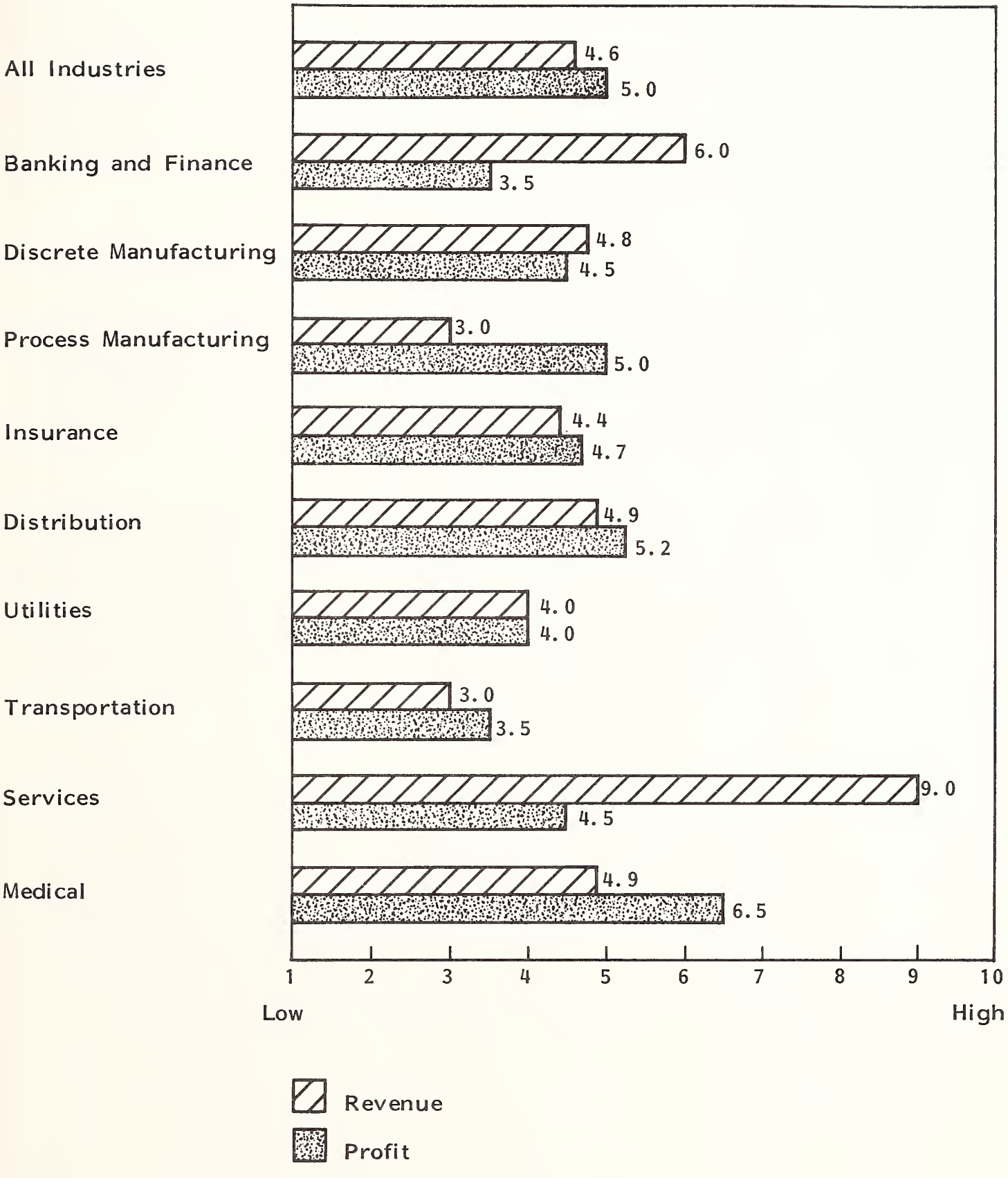
  - "Piggyback" services can be provided, such as expanding on-line order entry systems for customers to provide status information on order delivery and broadcast information to the customer base.

  - Expert systems for disciplines as diverse as network planning and financial analysis can be sold directly to customers or packaged as part of the company's product.

  - Market information can be shared with clients to provide product differentiation (e.g., magazine distributor packages market information for each neighborhood the customer services).

EXHIBIT III-14

## I.S. BUDGET DEPENDENCE ON REVENUE AND PROFIT



- IS is beginning to be thought of as a corporate asset instead of an unavoidable cost. The next step is for IS to be viewed as a strategic versus an operational asset.

- Exhibit III-15 shows the evolution of IS' contribution to the corporation. It compares the IS budget's dependence on corporate profits to management's perception of IS' contribution to corporate profitability. By comparing budget dependence to perceived contribution, IS' importance to the corporation can be mapped through four stages of development.

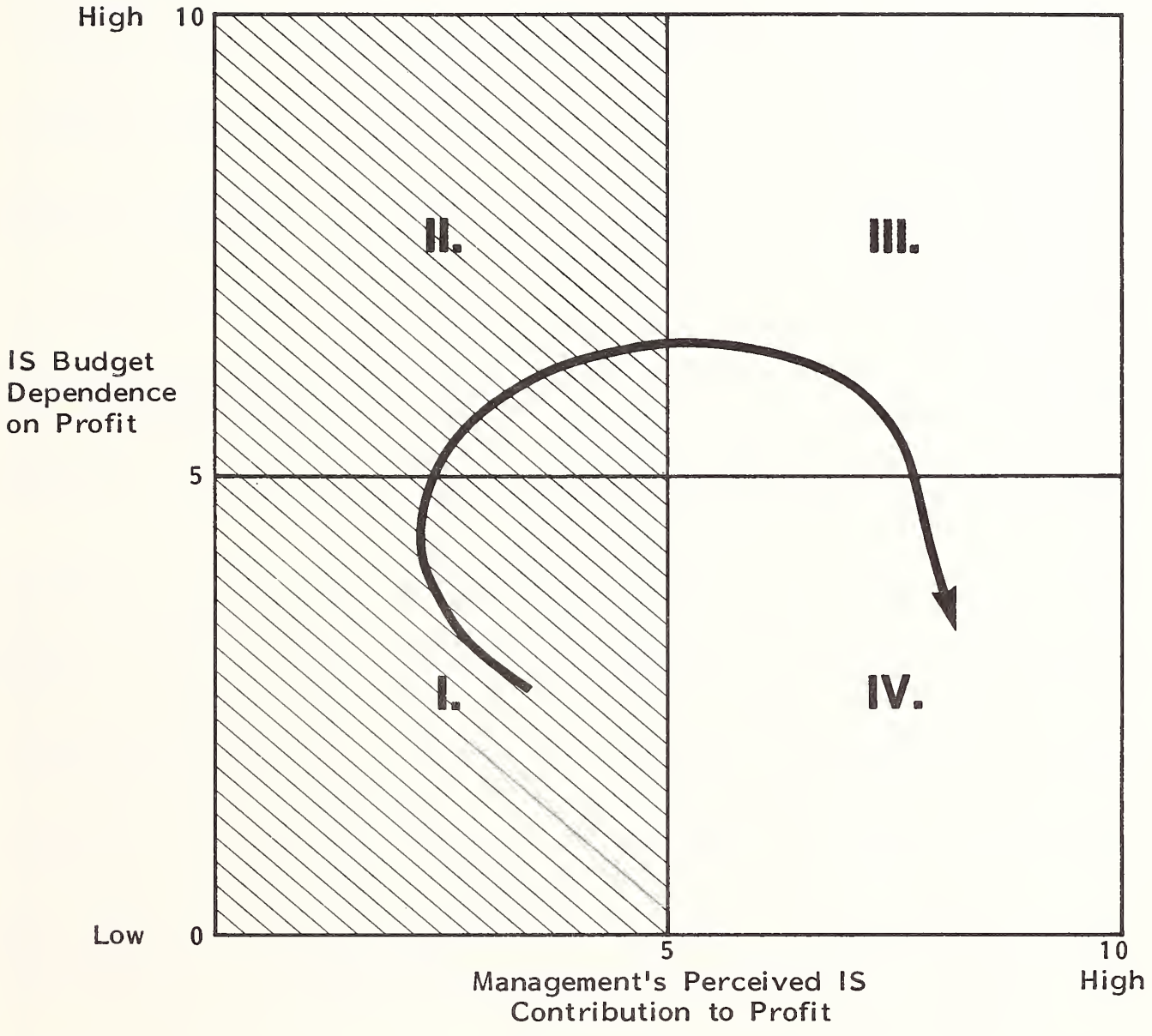
  - Stage I. This stage is indicative of companies that are either initiating IS organizations or upgrading their systems and equipment. There is low dependence on corporate performance for IS budgets and management sees little contribution by IS to corporate performance. These companies lag in technology and usually perceive IS expenses as an unavoidable cost.

  - Stage II. These companies also view IS as an unavoidable cost. The main purpose of IS is to automate the operational and administrative functions. IS budgets are highly dependent on corporate performance but there is minimal return expected from IS expenditures. Technology expenditures are limited to the degree required to maintain the status quo.

  - Stage III. These companies perceive IS as an operational asset. IS budgets are dependent on corporate performance but management views IS as a vehicle for improving profitability. However, management views IS' contribution as primarily in cost reduction. These companies tend to invest in technology to reduce costs. The IS departments in this stage tend to report to general managers and administration as opposed to the finance department.

EXHIBIT III-15

## I.S.' CORPORATE CONTRIBUTION




| Stage | Technology Strategy |
|---|---|
| I. Initiation and Catch-up | Follower |
| II. Maintenance | ↓ |
| III. Operational Asset | |
| IV. Strategic Asset | Leader |

IS Unavoidable Cost

IS Corporate Asset

- Stage IV. These companies view IS as a strategic asset. They are experimenting with technology and view IS as a means to not only reduce costs but also to increase revenues. IS is an investment. IS budgets are determined by the corporate strategic business plans. IS expenditures are planned over a two to five year planning horizon as opposed to the one year budget cycle encountered in previous stages.

- Exhibit III-16 summarized the IS budget dependence and impact by industry.

  - The services sector has the highest dependence on corporate performance on IS budget dependence.

  - Process manufacturing, insurance, distribution, and services sectors have the highest impact on corporate performance. These sectors are using information systems as products or a means to differentiate their services from competitors.

- Exhibit III-17 shows the respondent profile on the IS corporate contribution chart. Overall, the respondents are on the boundary between operational and strategic asset stages. Many companies are realizing the impact IS can have on corporate profitability and are beginning to translate the theory of IS impact into corporate spending programs to upgrade their IS departments and exploit the opportunities IS represents. The first phase is to break with the traditonal spending patterns of targetting IS expenditures to a percent of revenue. The true test is whether these companies can translate these expenditures into bottom line results. Measurable results of these investments are probably still five years away.

- The next chapter discusses IS planning and budget issues for the following industry sectors:

  - Banking and finance.

  - Discrete manufacturing.

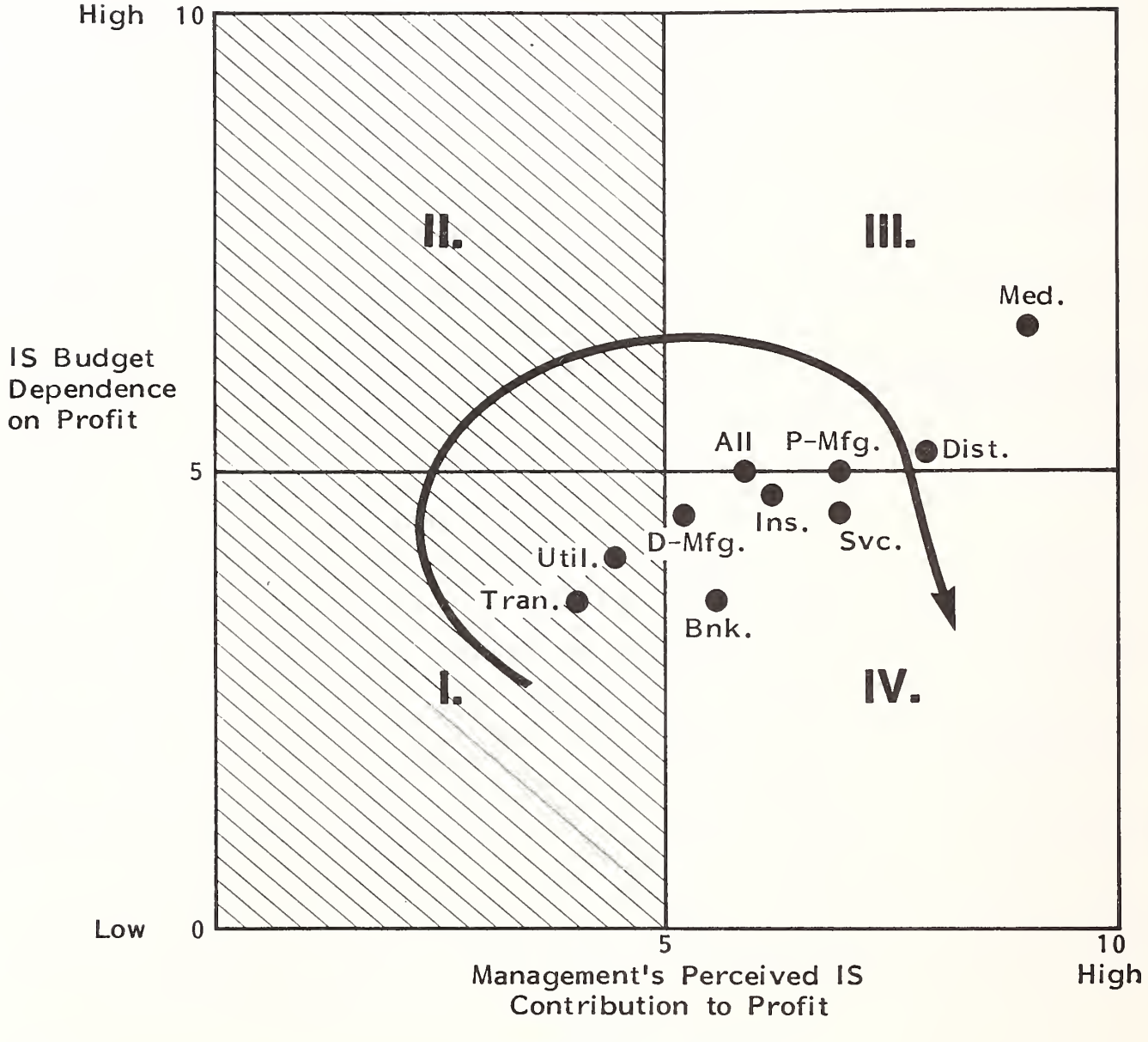
EXHIBIT III-16

## I.S. COST VERSUS CONTRIBUTION

| INDUSTRY | BUDGET DEPENDENCE | | IMPACT | |
|---|---|---|---|---|
| | REVENUE | PROFIT | PROFIT | COMPETITION |
| Banking and Finance | Medium | Medium | Medium | Medium |
| Discrete Manufacturing | Medium | Medium | Medium | Medium |
| Process Manufacturing | Low | Medium | High | Medium |
| Insurance | Medium | Medium | Medium | High |
| Distribution | Medium | Medium | High | High |
| Utilities | Medium | Medium | Medium | Medium |
| Transportation | Low | Medium | Medium | Medium |
| Services | High | Medium | High | Medium |
| Medical | Medium | Medium | Medium | Low |

EXHIBIT III-17

## I.S.' CORPORATE CONTRIBUTION INDUSTRY ANALYSIS




Stage

I. Initiation and Catch-up
II. Maintenance
III. Operational Asset
IV. Strategic Asset

Technology Strategy

Follower

Leader

IS Unavoidable Cost

IS Corporate Asset

- Process manufacturing.
- Insurance.
- Distribution (wholesale and retail).
- Utilities.
- Transportation.
- Services.
- Medical and health care.
- Education.

# IV INDUSTRY ANALYSIS

# IV INDUSTRY ANALYSIS

## A. BANKING AND FINANCE

### 1. MAJOR ISSUES

#### a. Driving Forces

- The changing regulations of federal and state governments in the banking and finance sector are dramatically affecting this sector's competitive environment.

  - The barriers to interstate banking are crumbling. Loopholes in the current laws are reducing the number of single unit regional banks.

    - Money center banks are establishing regional offices that technically are not banks. They either are loan offices or purely depositories.

    - To counter the encroachment by the money center banks, regional banks are forming interstate holding companies that typically consolidate operations and information systems organizations.

- New technology, primarily in the form of intelligent network (ATMs) and ancillary services, has provided new expanded distribution channels for banking and financial services. This has also provided the opportunity for nontraditional competitors such as retail organizations to enter the financial services industry. The primary vehicles for entry are the POS and intelligent networks.

- Banks are likewise expanding services to include insurance and are leveraging their investment in networks and support software. As one of the respondents to the annual survey stated, "Banks are in the financial information business." This volatile sector is experience an extreme shakeout and consolidation by participants. This shakeout is effecting all sizes of institutions. The survivors will be the institutions that can leverage technology to provide product differentiation. Banking and finance sectors must change from a staid, highly regulated environment to one of wide open competition, similar to the retail sector, yet maintain prudence and the confidence of their customers. Currently, too many are not successful and public confidence in banking is lowest since the Great Depression. Exhibit IV-1 summarizes the major driving forces affecting the banking and finance sector.

b. Issues and Objectives

- Software is becoming obsolete faster due to competition and deregulation. There is a need for shorter development cycles and more flexible software.

  - Bank services are proliferating so fast that most systems development staff cannot keep pace.

  - Many bank systems are over ten years old and do not account for the need for customer versus function oriented data bases.

EXHIBIT IV-1

BANKING AND FINANCE
DRIVING FORCES

- Deregulation
- New Applied Technology
- Nontraditional Competitors
- Consolidation

- The advent of ATMs and the interbank EFT systems has made communications one of the key areas of change affecting this sector's IS departments.

  - The growing demand for electronic information delivery is also affecting the internal organization.

    . Customers having multiple accounts and numerous services are becoming more common.

    . The increased competition from within and outside the sector requires timely account information to be delivered throughout the organization.

  - Major banks are planning to develop information architectures that are customer oriented.

    . Systems development has been on an application (i.e., product) basis. Because of this structure, banks have a difficult time associating a customer with the services the banks perform. Banks are also having difficulty developing prospects for services from their current customer base.

    . Developing this architecture is a major undertaking. The key will be creating a network of information from compatible data bases. This task will involve restructuring most systems in the organization. Those institutions that are undertaking this task are planning for up to five years to achieve their goal, with expenditures that may exceed $1 billion.

    . The need for this new acceptance is amplified by the growing use of ATMs. Max Hopper, Executive Vice President of Bank of America, estimates that the ATM environment will drive the transaction volume in major banks to 1,000 per second by 1990.

- Deregulation and the eroding barriers of interstate banking are accelerating the rate of bank mergers and acquisitions. This leads to consolidation of IS departments into information service companies in multibank holding companies.

  - Systems compatibility becomes a major issue. As different banks begin using a single source for information services, the migration to a compatible system becomes paramount if the efficiencies inherent in this consolidation are to be realized.

  - Most consolidations are only occurring at the data center. Systems development and maintenance still remain in the individual banks. Ultimately, the respondents that are consolidating are planning to consolidate the systems development group also, but this is a longer term and more complex goal.

- Even though the banking and finance sector is experiencing the most technological opportunity (and disruption) of any sector, the top IS objective is still cost containment.

  - Increased competitive pressures have translated into cost containment strategies for administrative systems.

  - Until recently, bank profitability has been under severe pressure due to poor loan performance. Management is trying to reduce costs to keep its equity position high enough to prevent regulatory intervention.

- Banking management is in a dilemma regarding information systems.

  - It must invest heavily in new systems and technologies to meet the competitive threat of other financial institutions, insurance companies, and nontraditional competitors such as retailers.

- Yet poor loan performance means that costs must be controlled to maintain acceptable profitability.

- The financial institutions that can overcome this dilemma can reap the rich potential that the electronic banking age will hold.

- Exhibits IV-2 and IV-3 summarize the top issues and objectives in priority order for this sector.

c. Management Perception and Organizational Issues

- Most of the respondents believe their management views IS as a corporate asset. However, the middle management in this sector still views IS as an unavoidable cost.

  - This is due to senior management's strategic view. They see IS as key competitive tool and a major component of new services.

  - Middle management still sees IS as an expense that they cannot control. Most areas have not realized increased revenue from IS based services. Until this occurs, the middle managers' attitudes will not change.

- IS measurements to management has centered on two major factors.

  - Cost. Meeting budget constraints and having spending levels comparable with key competitors.

  - Return on Investment and Cost Benefit Analysis. Although this analysis has accrued in the past, more emphasis is being placed on revenue producing versus cost reduction tasks. The use of past implementation analysis is still rare. It appears that once a project is

EXHIBIT IV-2

BANKING AND FINANCE
ISSUES

- Software Obsolescence
- Growing Demand for Electronic Information Delivery Systems
- Need for an Integrated Information Architecture - Shift from Functional to Customer Orientation
- New Services Are Being Developed Faster Than IS Can Provide Support
- Mergers and Acquisition Activity Is Requiring Consolidation of Data Center, Software, and Staff within the Affected Institutions

EXHIBIT IV-3

BANKING AND FINANCE
OBJECTIVES

- Cost Containment
- Shorten Software Development Cycle
- Improve Information Delivery within the Company
- Respond to Regulatory Requirements

approved, it will be implemented and remain in operation until someone can convince management it should be replaced. This must change. The post implementation analysis is vital to the success of the project and the profitability of new services.

- Some institution's view IS as essential to their success, so essential that no measurement of success is required. This is a two-edge sword.

  . It alleviates the IS department from proving its worth to the organization.

  . It may minimize the benefit of IS to the organization. Management may perceive a value of IS that is less than its true potential. It is IS' responsibility to sell itself to management. Even if management does not require it, IS must initiate a sales campaign of its own.

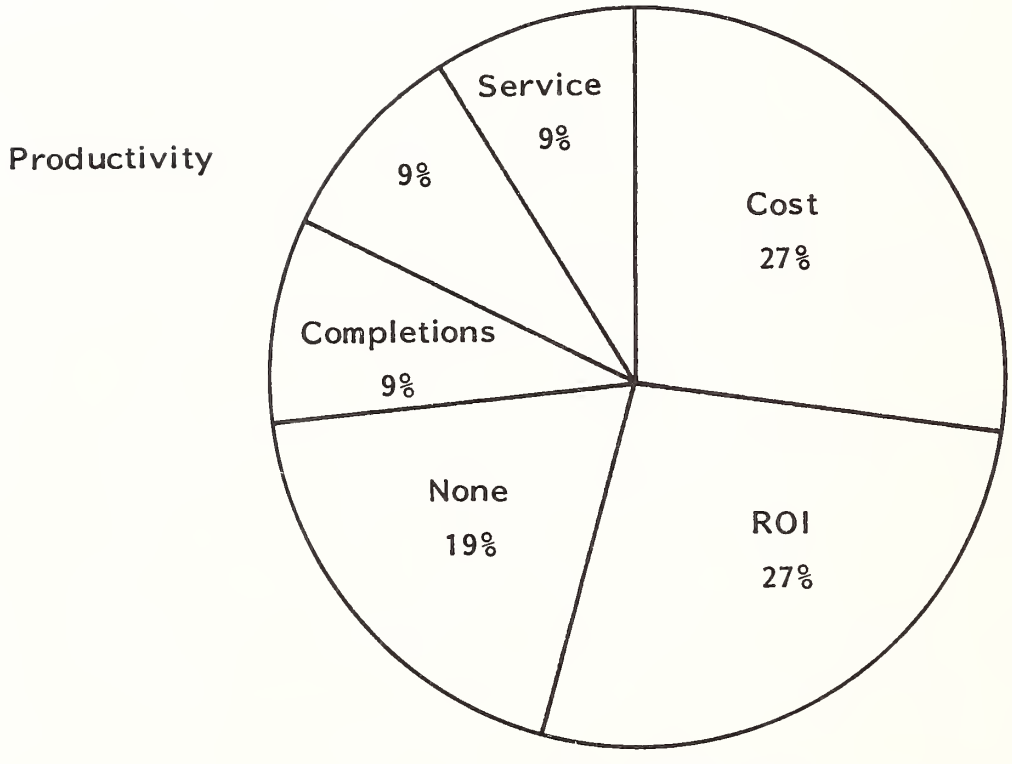
- Exhibit IV-4 shows the measurement techniques used by the respondents. The success of these techniques have been about average.

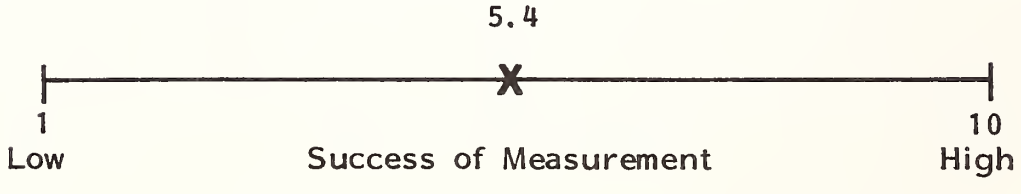
- IS' status has increased in the last two years in responding institutions. The head of IS reports to the president, vice chairperson, or executive vice president level. They are moving away from reporting to the financial segment of the organization and are being viewed as an operating and in some cases a profit center of the organization.

- IS is becoming an equal participant in the strategic planning process. In the next two years, IS will be taking a larger role in product development. Most of the respondents said their major role in this period will be to improve information delivery, with the head of IS becoming the chief information officer.

EXHIBIT IV-4

BANKING AND FINANCE
I.S. MEASUREMENT TO MANAGEMENT



- The respondents believe information systems can become a competitive weapon in this sector by:

  - Reaching customers by electronic delivery of information.

    . ATM.

    . Home banking.

    . EFT (electronic funds transfer).

  - Developing flexible systems that improve the institution's ability to react to outside influences (e.g., competition and deregulation).

- There is a slight movement toward more centralization of IS. This is consistent with the trend toward developing a compatible systems architecture to enhance the information delivery throughout the organization. In 1986, corporate IS will control approximately 79% corporate computing expenditures. Exhibit IV-5 summarizes the distribution of corporate computing expenses among central, distributed, and end-user computing in 1985 and projected for 1986.

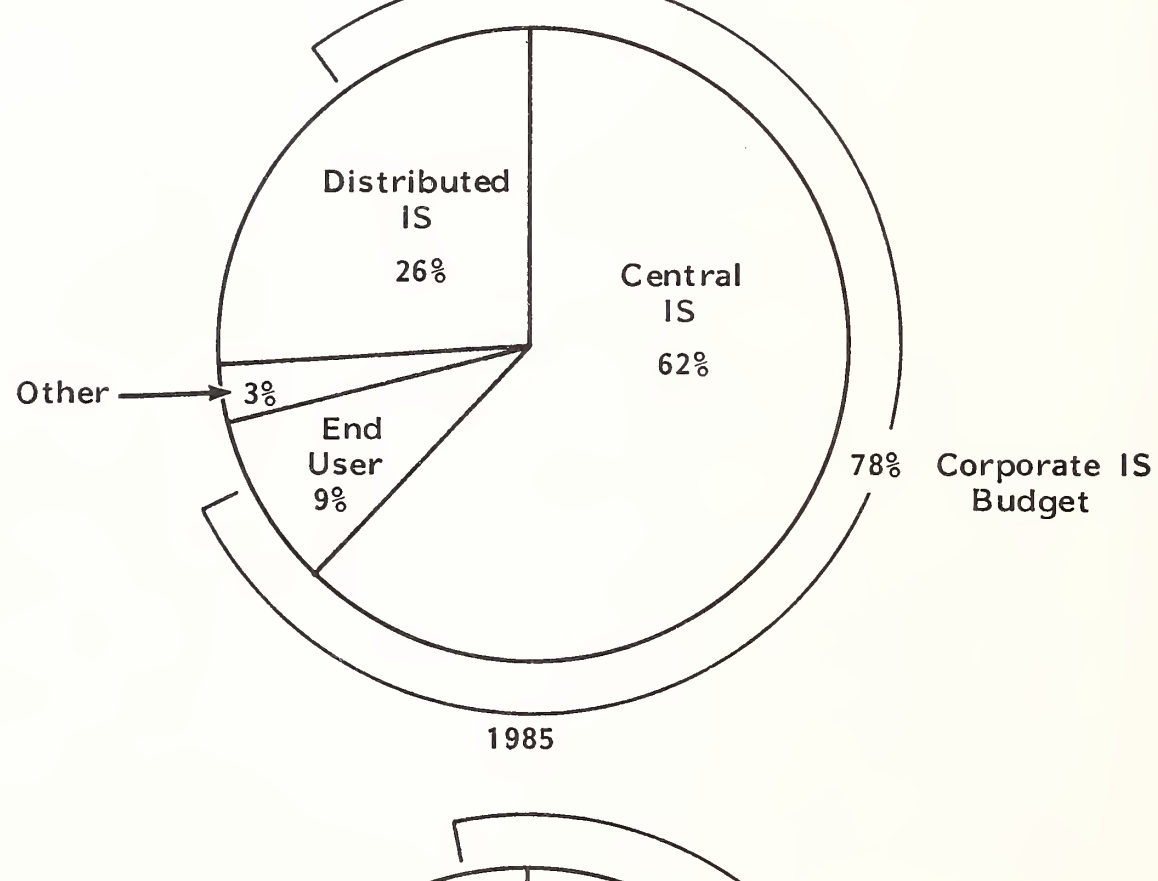
d. Impact of Technology

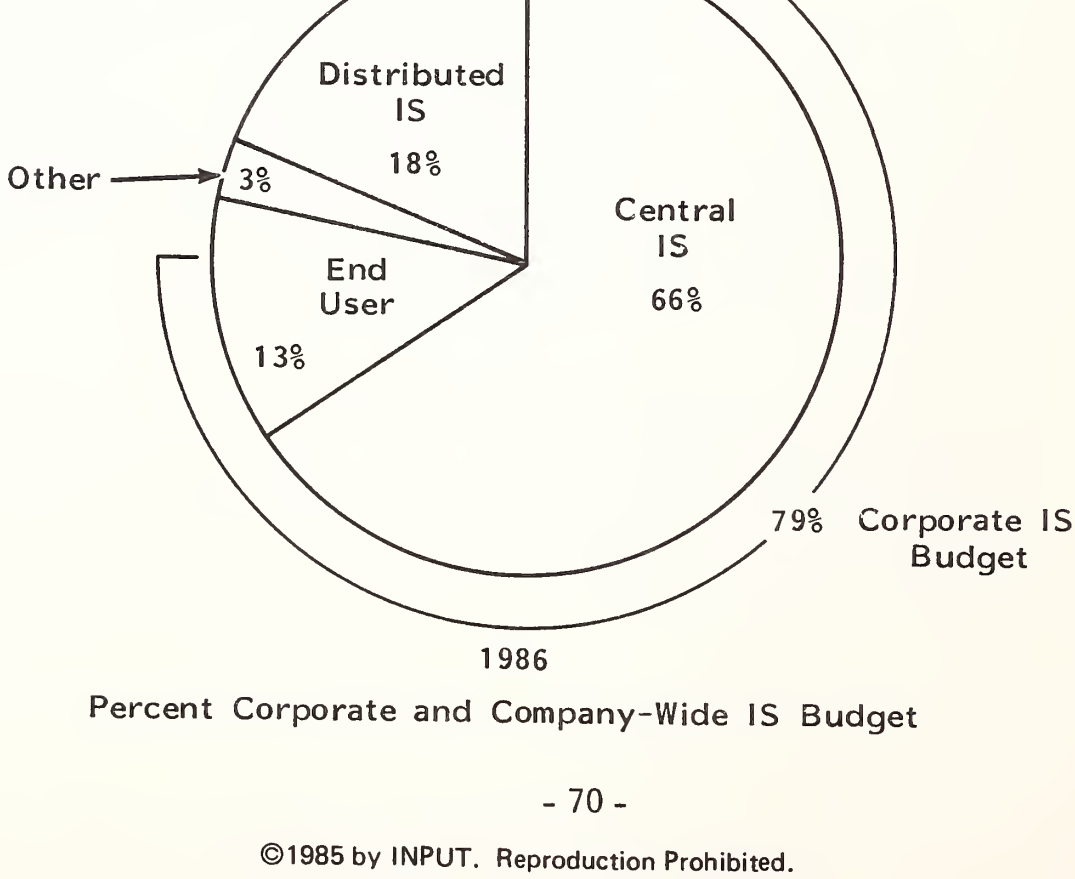
- End-user computing is having a moderate impact on this sector. Most respondents were marshalling resources to support personal computers, not end-user computing in general. They see their role as satisfying users' immediate needs and not anticipating future requirements (see next section).

- Departmental processing is viewed as having a low impact in this section. Ultimately, departmental processors will be part of an office automation strategy but the current centralized focus of developing a central systems architecture is deferring any action in this area.

EXHIBIT IV-5

BANKING AND FINANCE
DISTRIBUTION OF CORPORATE COMPUTING EXPENSES




Percent Corporate and Company-Wide IS Budget

- Distributed systems developoment has received little attention in this sector due to the current centralized focus.

- Relational data bases on mainframes have had little activity other than study and some pilot programs.

- Voice and data integration is believed to have high impact on this sector. Electronic information delivery is vital to the success to banks and financial institutions. Cost of networks is a key concern and respondents believe that merging voice and data networks is a means of reducing costs.

- LANs have had limited use in this sector. The lack of LAN standards has also delayed extensive use of this media.

- Exhibit IV-6 summarizes the impact of the above technologies to the banking and finance sector.

e. End-User Computing

- As discussed in the previous section, the respondents perceived end-user computing as having a moderate impact on the IS organization. However, end-user computing, including hardware and support, is projected to grow from 4% in 1985 to 7% of the IS budget in 1986. Most of this growth will be in training and microcomputer support.

- The information center (IC) has been the focal point for end-user training. The responsibilities of the IC has been expanded to include microcomputer support and most end-user training. Some of the respondents have begun using computer-based training as part of their training program, but most respondents are limiting microcomputer training to classroom training of selected software packages.

EXHIBIT IV-6

BANKING AND FINANCE
IMPACT OF TECHNOLOGY

| | IMPACT | COMMENTS |
|---|---|---|
| End-User Computing | Medium | Most using IC for support. See as future force but now in control phase. |
| Departmental Processing | Low | Unsure of application other than OA. |
| Distributed Systems Development | Low | Very little activity. |
| Relational Data Bases | Low | Most studying the issue, very little implementation activity. |
| Voice/Data Integration | High | All investigating - believe high potential for cost savings. Most plan to use voice/data CBX within next two years. |
| LANs | Low | Low usage, lack of LAN standards have inhibited corporate commitment. |

- Exhibit IV-7 summarizes IS' role in microcomputer support.

  - Most respondents take an active role in micro selection, primarily through identifying preferred equipment to ensure compatibility throughout the organization.

  - Micro software develoopment is performed by IS, but most software used are standard packages.

  - Most training is conducted by IS through the IC.

  - This sector takes a more active role in maintenance than other sectors, primarily by coordinating service agreements through vendors for the entire organization.

  - Security is a very controversial item. IS establishes standards that end users must follow. The EDP audit function is responsible for monitoring compliance. Most respondents, however, have just begun establishing these standards.

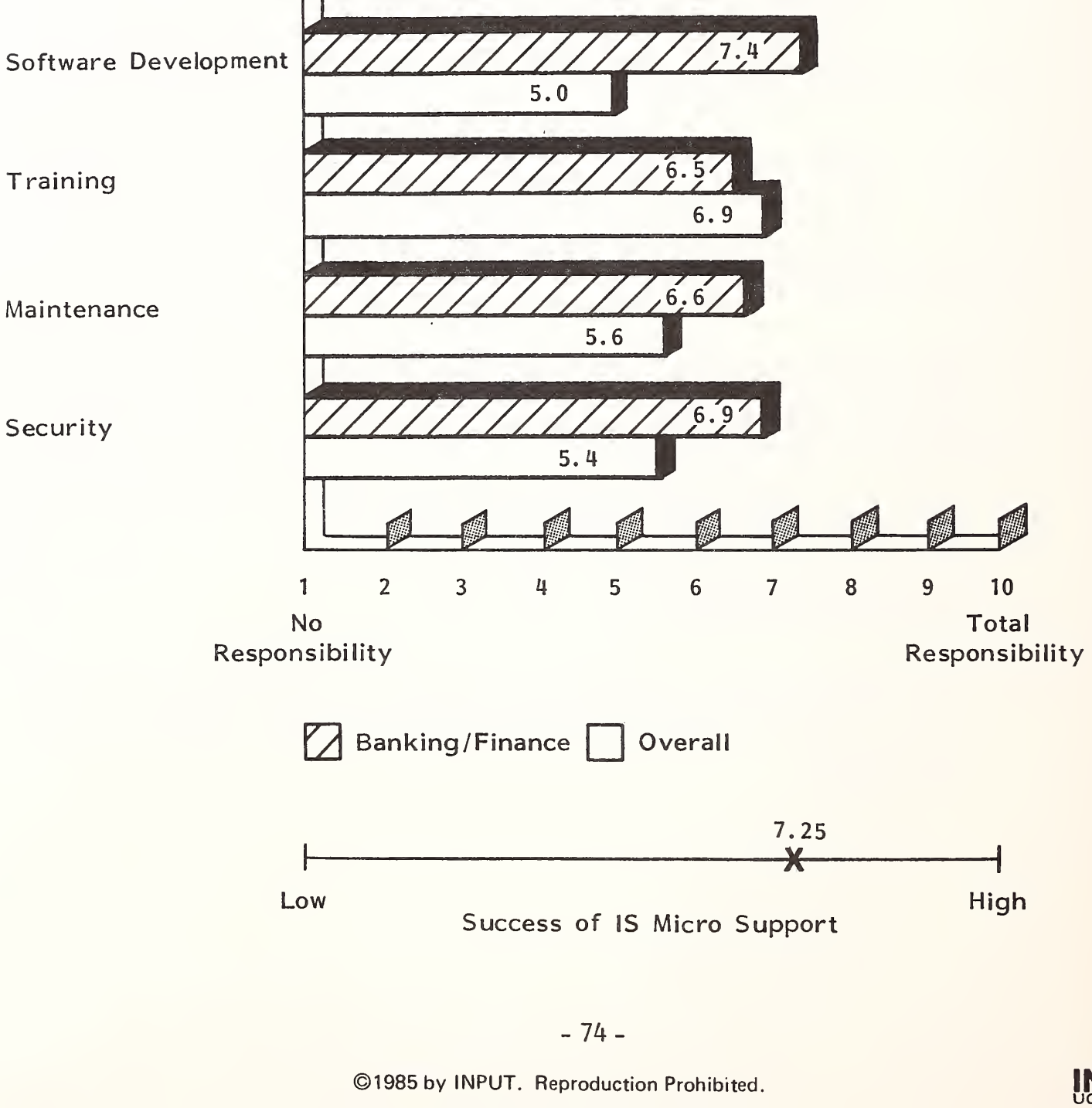
- Most respondents believe their microcomputer support is very good. IS has taken a leadership role in micro support due to the need for compatible systems, especially with the growing demand for micro-mainframe interfaces. The most successful institutions are ones that emphasize customer service versus authoritarian control.

2. NEW APPLICATIONS

- The most important new applications are actually new versions of fundamental banking applications--demand deposit accounting (DDA) and loan applications.

EXHIBIT IV-7

BANKING AND FINANCE
I.S. ROLE IN MICROCOMPUTER SUPPORT



- The changing economics of delivery services is rendering fundamental systems obsolete. Many of these systems are over 20 years old. They have been heavily modified and do not interface with other systems.

- The move toward developing a central architecture requires that these core systems conform to this central structure. Typically, these systems would be the first to be designed since they comprise the foundation of the banking business.

- Consolidation of multiple bank IS departments under a single holding company division is creating a need for either a single system or compatible systems that can service all banks within the holding company.

- Information delivery within the organization is creating a high demand for query and customer information systems. External delivery of information is being driven through the ATM/POS networks. These networks are providing a vehicle for customer information and services that can provide a competitive advantage to financial institutions.

- Forty-two percent of the major new systems are being developed by internal staff only, 32% are developed externally via packages and contract personnel, and 26% are developed by both internal and external resources. The shift from internal to external resources is caused by the rapidly changing competitive and regulatory environment.

- Exhibit IV-8 summarizes the major applications activity in the banking and finance sector.

## 3. BUDGET ANALYSIS

- Banking and financial institution IS budgets are growing at a slightly lower rate than IS budgets overall. This is due to a cost containment and consolidation objective stated by respondents.

EXHIBIT IV-8

BANKING AND FINANCE
NEW APPLICATIONS IN 1985

Most Important Applications

DDA

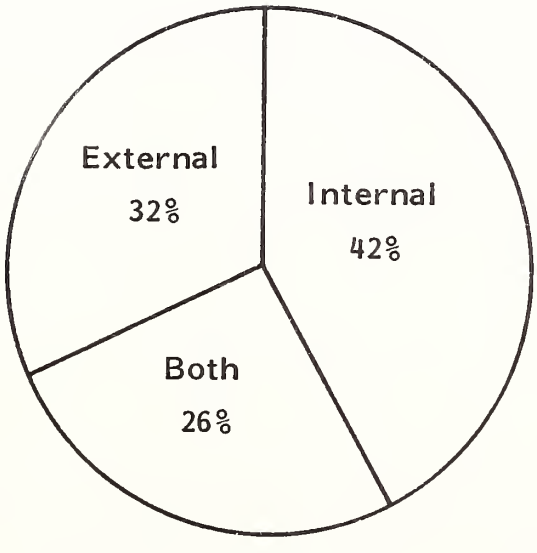
Loan Applications

Data Base Management and Query

ATM/POS

Customer Information

Source of Development (All New Major Applications)




Percent of Responses

Cost Range

$15K - $4.5M

- Exhibit IV-9 shows the 1985 budget distribution and projected growth of budget categories in 1986. Expenditures for external services (e.g., software and professional services) are the only budget categories projected to decrease.

- Hardware is the largest projected growth category at 10.5% in 1986.

- Exhibit IV-10 shows that this sector's IS budget growth lagged behind the IS budgets of all industries in 1985 period (9.3% versus 10%) as well as being projected to trail overall IS budgets in 1986 (8% versus 10.2%).

- Ninety-one percent of the respondents in this sector said their 1986 budgets will increase, but 58% stated this increase would be a lower growth rate than 1985 (see Exhibit IV-11).

  - Factors contributing to increasing the IS budget included (in order of most frequently mentioned factors):

    . Personnel expense.

    . Hardware.

    . Software.

    . Inflation.

  - Factors contribuing to decreasing the IS budget included:

    . Enhanced productivity.

    . Hardware depreciation.

EXHIBIT IV-9

## 1985 BUDGET DISTRIBUTION AND 1985/1986 CHANGES IN THE BANKING AND FINANCE SECTOR

| BUDGET CATEGORY | 1985 PERCENT OF I.S. BUDGET | 1985-1986 EXPECTED BUDGET GROWTH |
|---|---|---|
| Personnel Salaries and Fringes | 38.3% | 8.8% |
| Mainframe Processors | 7.7 | 12.0 |
| Minicomputers | 3.5 | 26.8 |
| Microcomputers | 2.6 | 0.0 |
| Mass Storage Devices | 2.7 | (7.5) |
| Other Hardware | 6.3 | 3.0 |
| Total Hardware | 22.8% | 10.5% |
| Data Communications | 13.0% | 8.2% |
| External Software | 3.4 | (5.0) |
| Professional Services | 1.2 | (5.4) |
| Turnkey Systems | 1.3 | 0.0 |
| Software Maintenance | 0.9 | 7.5 |
| Hardware Maintenance | 4.3 | 3.8 |
| Outside Processing Services | 2.3 | 1.8 |
| Other | 12.5 | 3.2 |
| Total | 100.0% | 8.0% |

EXHIBIT IV-10

BANKING AND FINANCE
I.S. BUDGETS ARE GROWING SLOWER THAN ALL I.S. BUDGETS

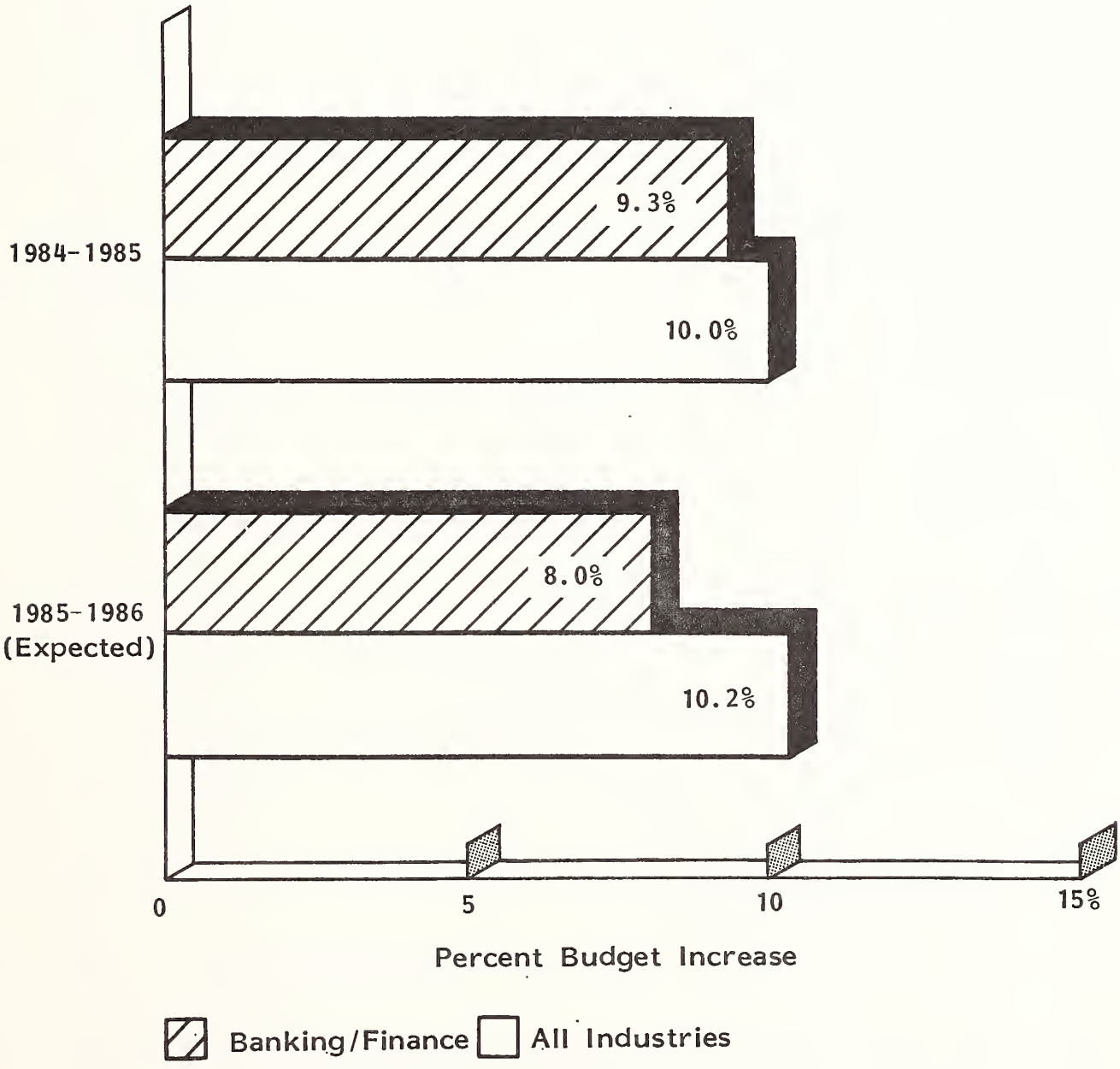
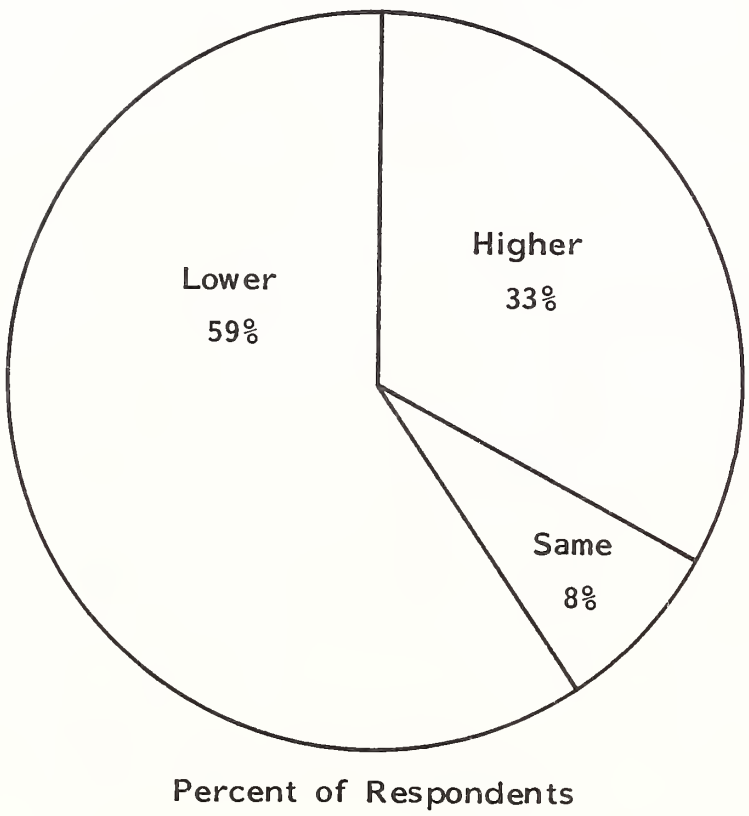
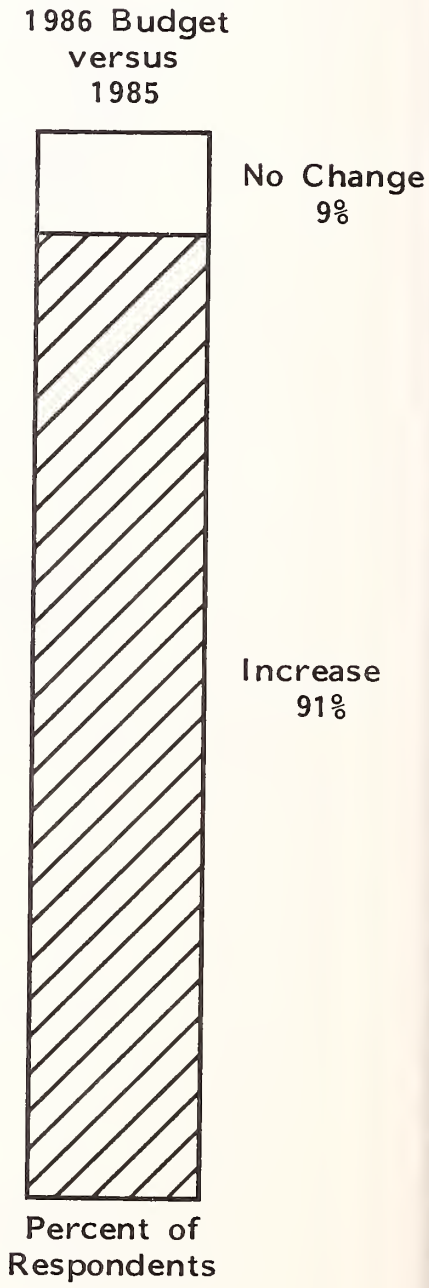


EXHIBIT IV-11

BANKING AND FINANCE

MOST BUDGETS WILL INCREASE BUT AT A LOWER RATE THAN 1985



- Expense control.

- Data center consolidation.

- The banking and finance sector's IS budget is more dependent on revenue and less dependent on profit than IS budgets overall (see Exhibit IV-12). Many respondents said they were in the information delivery business and management is beginning to realize the potential competitive advantage of information systems. However, severe cost containment pressures in many organizations are causing slower budget growth.

## B. DISCRETE MANUFACTURING

### 1. MAJOR ISSUES

#### a. Driving Forces

- Discrete manufacturers are facing a two pronged threat--increased competition from low-cost international competitors and mature markets for their products. The result of these threats is that discrete manufacturers are viewing technology as the major vehicle for reducing costs. Their survival depends upon it.

- Exhibit IV-13 summarizes the driving forces for this sector.

#### b. Issues and Objectives

- Productivity improvements are a major goal for manufacturers. One of the keys to achieving this goal is integrating computer-based information resident in the product design, factory floor, and back office areas. Each of these areas have key information systems demands.

EXHIBIT IV-12

BANKING AND FINANCE
I.S. BUDGET DEPENDENCE

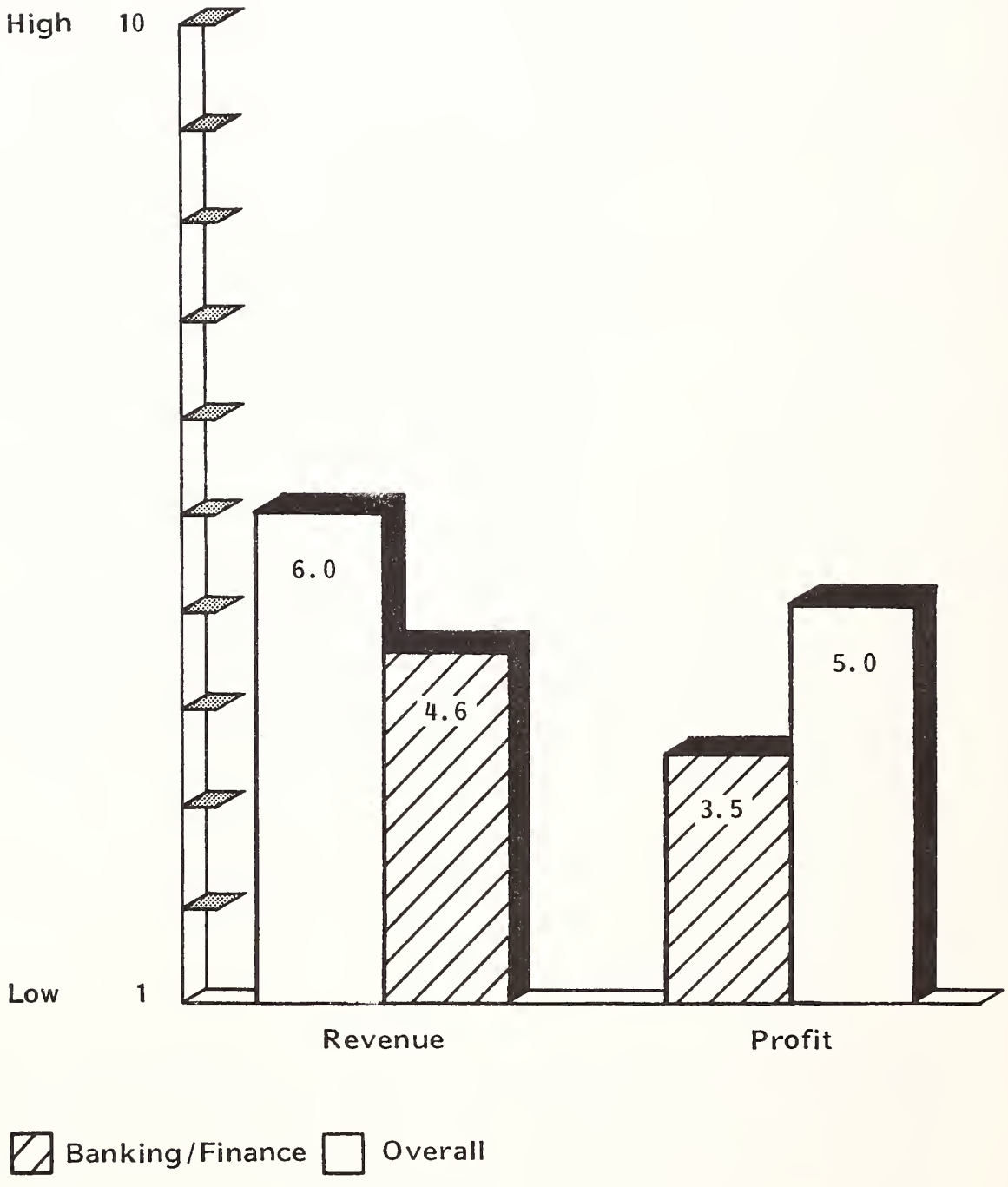


EXHIBIT IV-13

## DISCRETE MANUFACTURING
## DRIVING FORCES

- Import Competition
- Mature Markets
- Cost Reduction through Technology
- Survival

- Product Design. Shorter product life cycles versus longer product design time has resulted in a strong need to use computerized tools to shorten the product development time and make existing engineers more productive.

- Factory Floor. Key issues are improved flexibility, service, and quality. Automation is a key means of providing flexibility but manufacturers view automation as a risk in some areas due to complex labor and capital equipment issues and the lack of application expertise by users.

- Back Office. Trying to support the organization with antiquated and discrete systems has not been totally successful.

- Computer Integrated Manufacturing (CIM) is being promoted for integrating functional areas, but the current installed hardware and software present major obstacles to implementation.

  - Similar to the banking sector, information systems have been developed by function with little thought given to integration.

  - The major challenge to this sector's IS management is to determine how to integrate current systems with the CIM architecture.

- MRP comprise 60% of the manufacturers applications computer systems. Many of these systems need to be upgraded to include:

  - On-line operation.

  - Realtime capabilities.

- Integration with a standard data base management system and other functional areas within the organization.

- Micro-base module availability.

- Most manufacturers still perceive IS as an operational versus a strategic entity. A major challenge to IS managers is to become part of the corporate planning process. Information systems should be used as a means to achieving corporate goals instead of solely automating manual operations.

- Exhibits IV-14 and IV-15 summarize the key issues and objectives for the discrete manufacturing sector.

c. Management Perception and Organizational Issues

- Most manufacturers still view IS as a vehicle for cost containment. The respondent IS managers stated that most senior managers have not grasped the true potential impact that information systems can have on the organization's profitability. Management's focus is on cost savings although some senior managers perceive IS as a corporate asset.

- Half of the respondents indicated that they provide no formal measurement of IS' success to management. The remaining respondents report cost by comparing IS budgets to similar firms and/or through cost benefit analysis of individual projects.

  - The respondents view results solely as project completion. Most projects are still focused on improving company operations and programmer productivity.

  - More innovative projects center on direct customer order entry and integration of functional systems through a CIM systems architecture.

EXHIBIT IV-14

## DISCRETE MANUFACTURING ISSUES

- Improve Productivity
- Upgrade MRP and Back Office Systems
- Convert to CIM
- Increase Management Awareness of IS
- Reduce Costs

EXHIBIT IV-15

DISCRETE MANUFACTURING
OBJECTIVES

- Plan and Install CIM
- Improve IS Productivity
- Establish IS Plan That Is Linked to Business Plan
- Create Compatible Networks

- Exhibit IV-16 shows the measurement techniques used by IS in theis sector and respondents' views of the success of these techniques.

- In the past two years, IS has increased its corporate visibility. Many organizations now have the IS executive reporting to the general manager instead of the finance department. End-user computing has also increased the recognition of IS services throughout the organization.

- In the next two years, respondents see a transition from solely a data processing organization to a true information systems provider. Computing responsibilities will be moved more to the user organization with IS providing tools, consulting, and education. Also, the respondents believe IS will begin to take an active role in the corporate planning processes. Currently, IS' role is reacting to corporate plans with little or no participation in the corporate planning cycle.

- The respondents view information systems being used as a competitive weapon primarily by reducing costs, improving productivity, and providing tools for sales and marketing personnel.

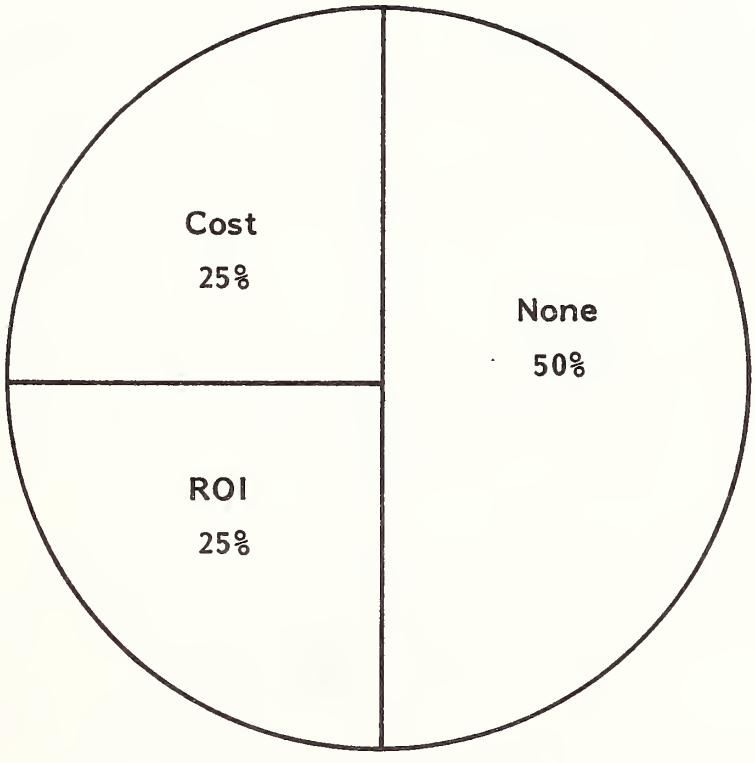
- Exhibit IV-17 shows that discrete manufacturers primarily have a distributed computing environment. Most of the computing is performed in the manufacturing plants with summary information transmitted either electronically or manually to corporate IS. This distribution will not change noticably in 1986, although more end-user computing activity is projected.

d. Impact of Technology

- End-user computing is having a large impact on many respondents. It has broadened the scope of IS' responsibilities and thus increased the resource requirements. It has improved users' perception of IS and has increased the number of people seeking IS support. Micro-mainframe demands have also increased as well, creating a need for establishing a formal training organization within IS to satisfy users' microcomputer needs.

EXHIBIT IV-16

DISCRETE MANUFACTURING
I.S. MEASUREMENT TO MANAGEMENT




Percent of Responses

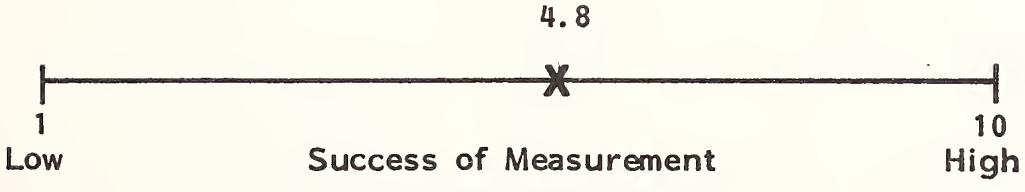
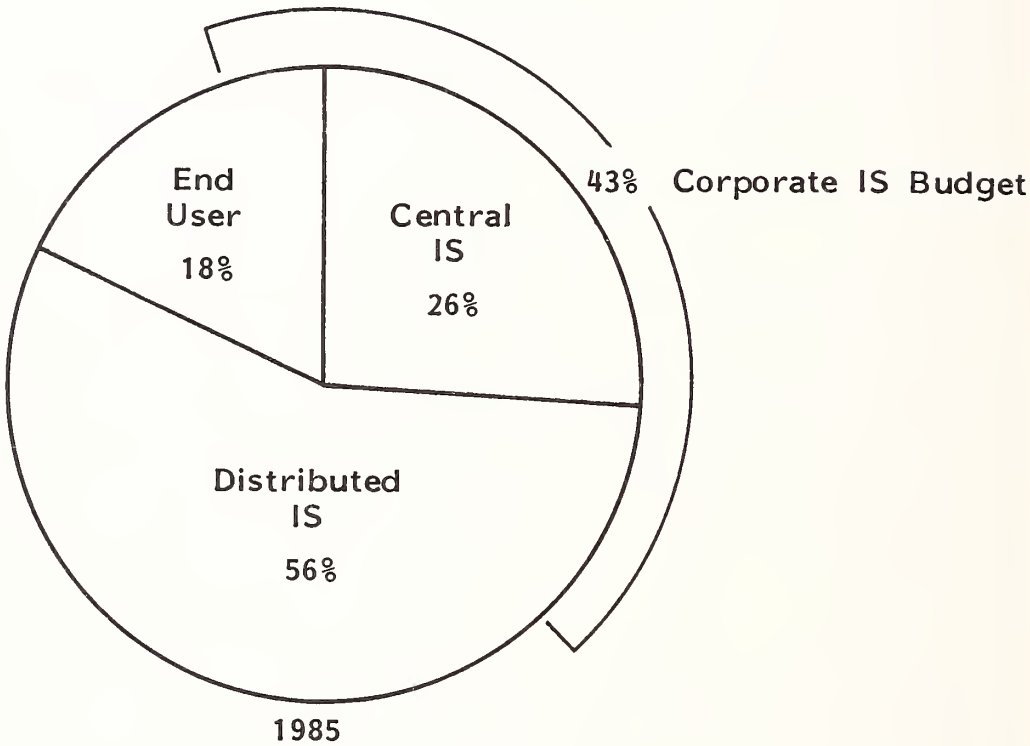


EXHIBIT IV-17

DISCRETE MANUFACTURING
DISTRIBUTION OF CORPORATE COMPUTING EXPENSES




Percent of Corporate and Company-wide IS Budgets

- Departmental processing is having a high impact on discrete manufacturing IS departments. The distributed computing nature of this sector ties directly to a departmental processing strategy. Respondents believe that departmental processing can improve IS' responsiveness to the user community. It can also solve some of the communication problems inherent in a distributed environment. Some respondents are investigating micro-to-mainframe applications as an alternative to departmental processing.

- Distributed systems development is having a moderate impact in this sector. Although this sector has the highest incidence of distributed processing, most development is performed centrally. Many respondents are currently studying distributed development and believe it will ultimately have a major impact on IS' development strategy.

- Relational data bases are only being used in conjunction with fourth generation languages. Most respondents see relational data bases as not being used extensively for at least five years.

- Voice/data integration is being studied by many respondents because of the vendor stated potential for significant cost savings. Most do not believe this integration will be viable until the 1990s.

- LANs are being used on an experimental basis. The lack of standards has greatly reduced the priority of installing LANs on a wide scale basis.

- Exhibit IV-18 summarizes the impact of the above technology issues on IS in the discrete manufacturing sector.

e. End-User Computing

- End-user computing has broadened the scope of IS' responsibilities but also increased its resource requirements.

EXHIBIT IV-18

DISCRETE MANUFACTURING
IMPACT OF TECHNOLOGY

| | IMPACT | COMMENTS |
|---|---|---|
| End-User Computing | Medium/High | Improve IS relationship with user. Increased IS workload. |
| Departmental Processing | High | Improves service and response time. Unique department data should be supported locally. |
| Distributed Systems Development | Medium | Major direction, usually only in planning stage. |
| Relational Data Bases | Low | Very little activity except in in conjunction with fourth-generation languages. |
| Voice/Data Integration | Medium | Potential for voice paying for data; many companies waiting at least five years. |
| LANs | Low/Medium | Primarily experimental; standards are needed before corporate-wide implementation can occur. |

- IS is taking a leadership position in microcomputer utilization.

- IS is becoming more service oriented. There is a higher demand for IS services and IS finds itself filling the void in end-user training caused by increasing use of micros and other end-user tools.

- In this sector IS is beginning to establish formal training programs, primarily on subjects related to microcomputer use. IS is facilitating the use of micros in the organization by rating micro software and recommending hardware products.

- Exhibit IV-19 summarizes IS' role in microcomputer support.

  - IS provides direction in microcomputer acquisition. Most respondents also were responsible for controlling the proliferation of micros by reviewing all requests for acquisition.

  - IS does very little micro software development. Their primary role is advising users on the advantages/disadvantages of software products.

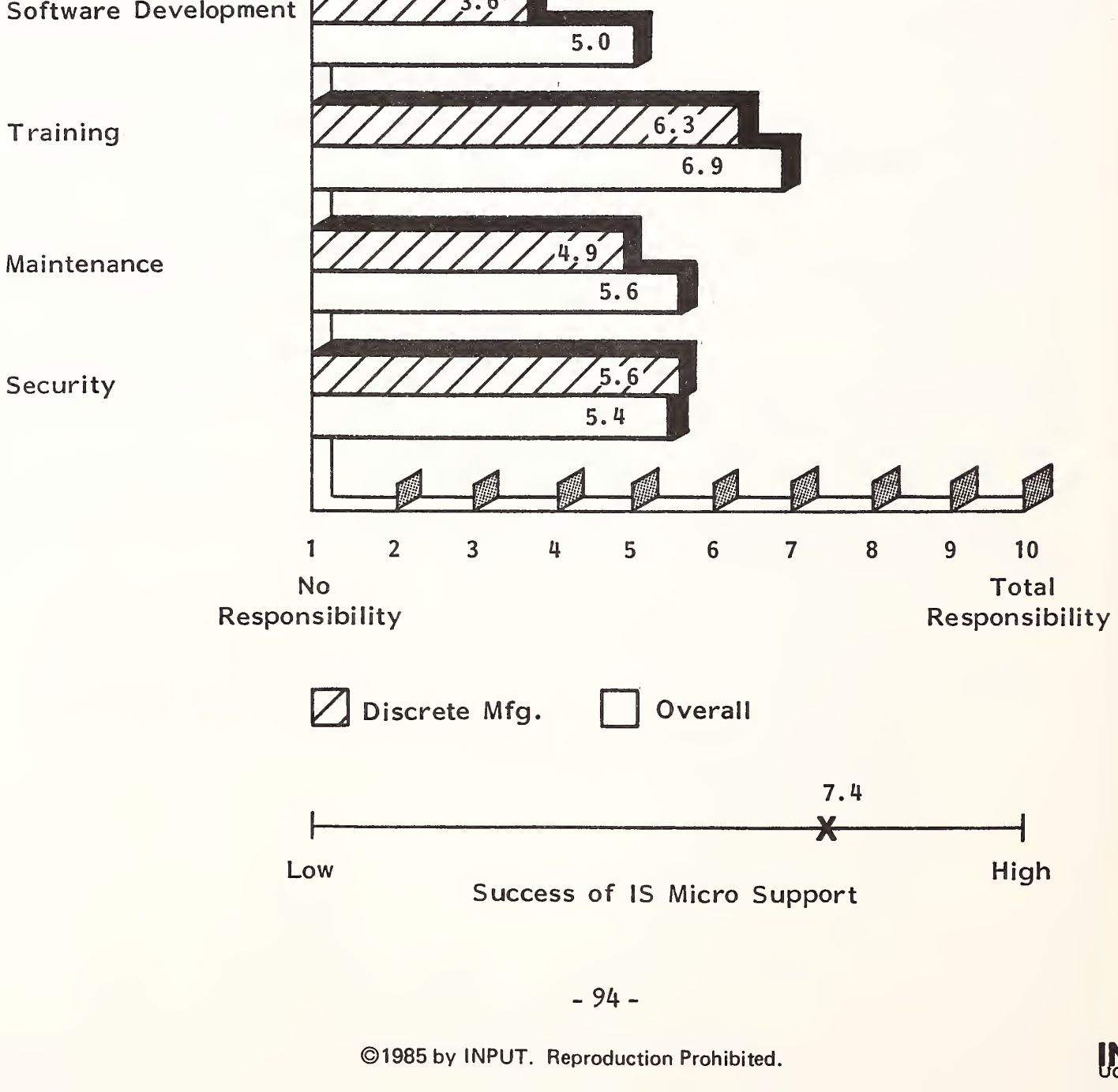
  - IS provides training support for end users, but most respondents are just beginning to establish formal programs.

  - Maintenance is provided by outside organizations. IS advises and, in some cases, coordinates the use of these organizations.

  - IS provides procedures and corporate guidelines for micro security. The main role is to make the users aware of the need for complying with security procedures. There appear to be few firms that audit compliance with security procedures.

EXHIBIT IV-19

DISCRETE MANUFACTURING
I.S. ROLE IN MICROCOMPUTER SUPPORT



- Most respondents believe their microcomputer support has been successful. They seem to meet user needs and are not aware of major deficiencies. However, none have surveyed the users for their feelings.

## 2. NEW APPLICATIONS

- Most of the respondents' new applications activity has been either upgrading existing systems or implementing new versions of these systems. The driving force behind this trend is the obsolescence of old systems and the need for having systems that can be integrated under a CIM architecture.

- Office systems also rank high in importance, reflecting the growing importance of end-user computing to the discrete manufacturing sector.

- Discrete manufacturing IS departments are still doing most of their new development themselves (72%). Software packages are only making inroads for complete replacement CIM or MRP systems. This is primarily due to the large, complex systems in large IS organizations. These systems have been heavily modified to reflect the unique needs of these organizations. Replacements for these systems are perceived as being difficult to find in standard software packages.

- Exhibit IV-20 summarizes the major new applications activity in the discrete manufacturing sector.

## 3. BUDGET ANALYSIS

- Discrete manufacturers' IS budgets are growing at a significantly lower rate than overall IS budgets. This is due to the cost containment strategy of this sector's IS departments. Senior management in this sector still perceives IS as an unavoidable cost whose mission is to reduce corporate cost and improve productivity. IS costs for this sector is heavily scrutinized and compared to IS budgets of similar companies.

EXHIBIT IV-20

DISCRETE MANUFACTURING
NEW APPLICATIONS IN 1985

Most Important Applications

Finance (e.g. G/L, A/R, Cash Management)

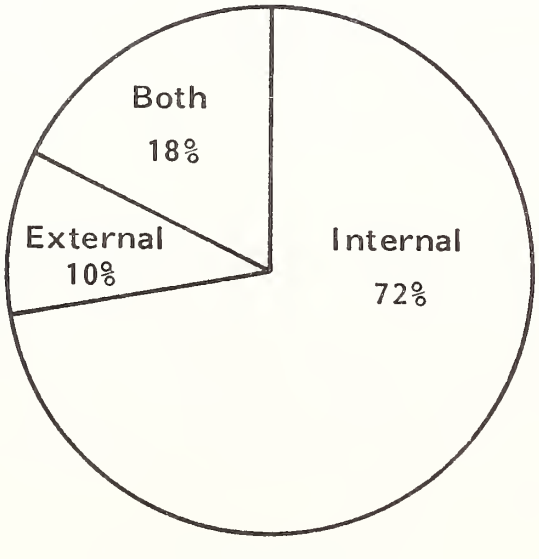
Shop Floor and Production Control

Human Resources and Payroll

Office Systems

MRP

Source of Development (All New Applications)




Percent of Responses

Cost Range

$2.5K - $16M

- Exhibit IV-21 shows the 1985 budget distribution and projects the growth of budget categories for 1986.

  . The largest project growth areas are mini and microcomputers as well as communication. This reflects the distributed computing strategy of this sector.

  . Outside processing services is expected to decline. Also, very little growth is expected in professional services and turnkey systems, reflecting this sector's emphasis on using internal resources to develop systems.

- Exhibit IV-22 shows that this sector's IS budget growth in 1985 was slightly more than half of the overall IS budget growth (5.6% versus 10%). Discrete manufacturers' IS department budgets are still expected to trail overall IS budgets (8.8% versus 10.2%).

• In 1986, 80% of the respondents believe their IS budgets will increase. Forty-three percent of the respondents believe their budget growth will be higher, 43% will be lower, and the remainder will stay the same (see Exhibit IV-23).

- Factors contribuing to increasing the IS budget include (in order of most frequently mentioned factors):

  . Personnel expense.

  . Hardware.

  . Software.

  . Data communications.

  . Inflation.

EXHIBIT IV-21

## 1985 BUDGET DISTRIBUTION AND 1985/1986 CHANGES IN THE DISCRETE MANUFACTURING SECTOR

| BUDGET CATEGORY | 1985 PERCENT OF I.S. BUDGET | 1985-1986 EXPECTED BUDGET GROWTH |
|---|---|---|
| Personnel Salaries and Fringes | 41.1% | 7.2% |
| Mainframe Processors | 12.0 | 7.0 |
| Minicomputers | 3.7 | 9.4 |
| Microcomputers | 0.8 | 10.5 |
| Mass Storage Devices | 3.5 | 7.5 |
| Other Hardware | 7.1 | 5.0 |
| Total Hardware | 27.1% | 8.6% |
| Data Communications | 6.9% | 9.4% |
| External Software | 4.3 | 6.3 |
| Professional Services | 3.9 | 2.0 |
| Turnkey Systems | 1.7 | 0.0 |
| Software Maintenance | 0.8 | 6.4 |
| Hardware Maintenance | 5.1 | 5.6 |
| Outside Processing Services | 5.8 | (2.5) |
| Other | 3.3 | 1.9 |
| Total | 100.0% | 8.8% |

EXHIBIT IV-22

DISCRETE MANUFACTURING
I.S. BUDGET GROWING SLOWER THAN ALL I.S. BUDGETS

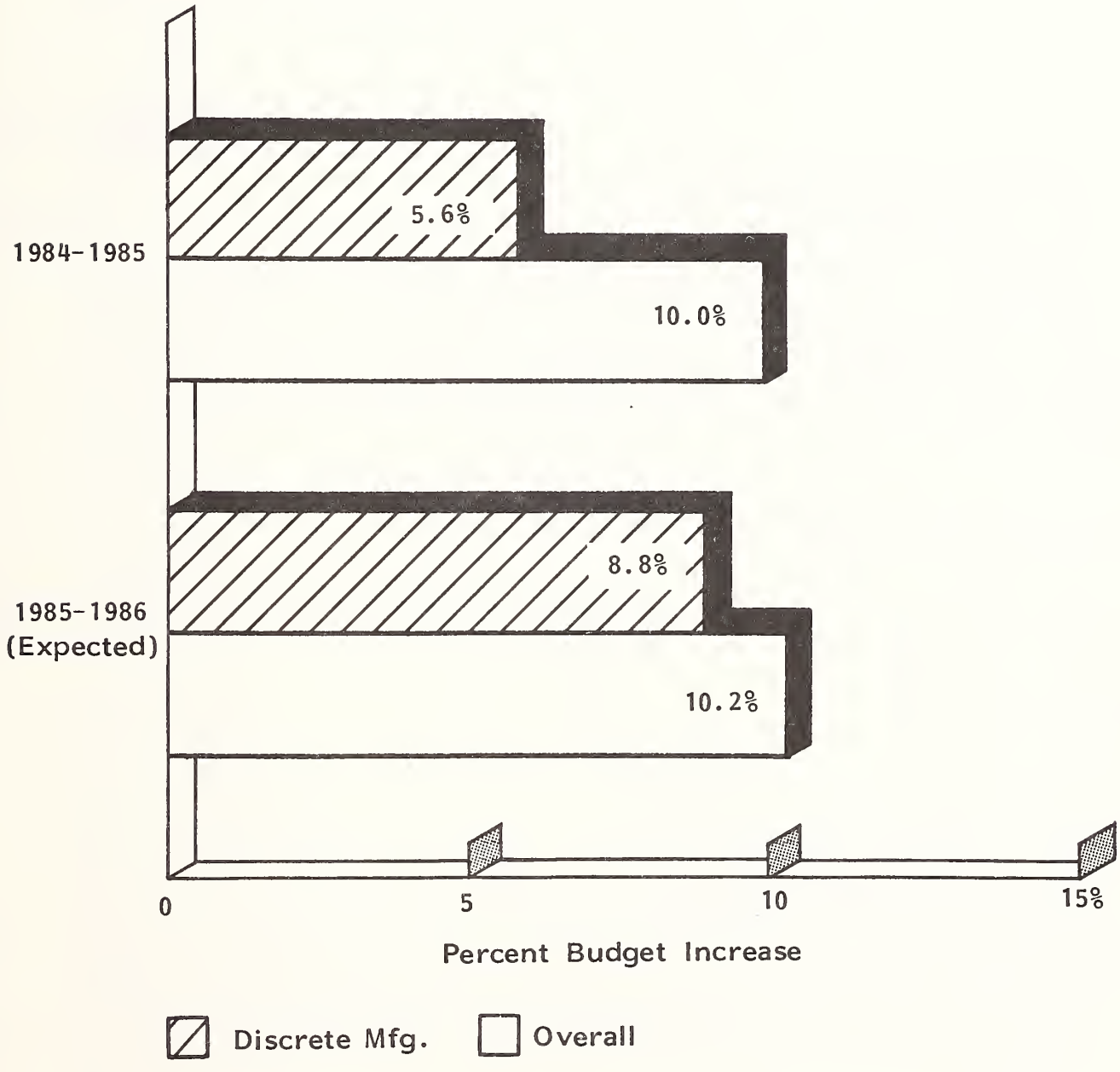
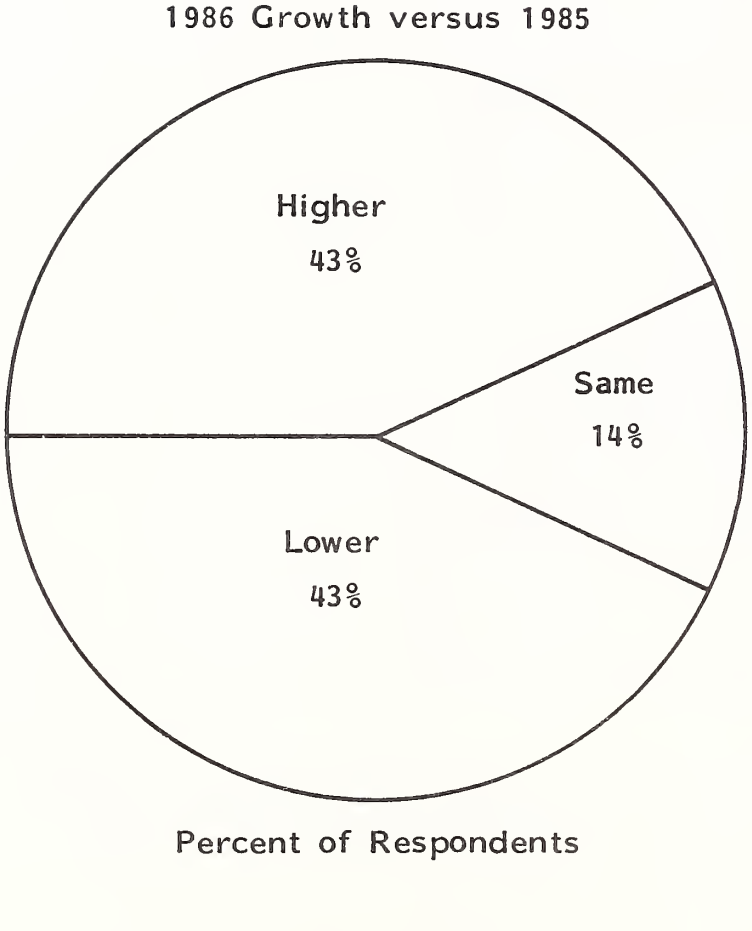
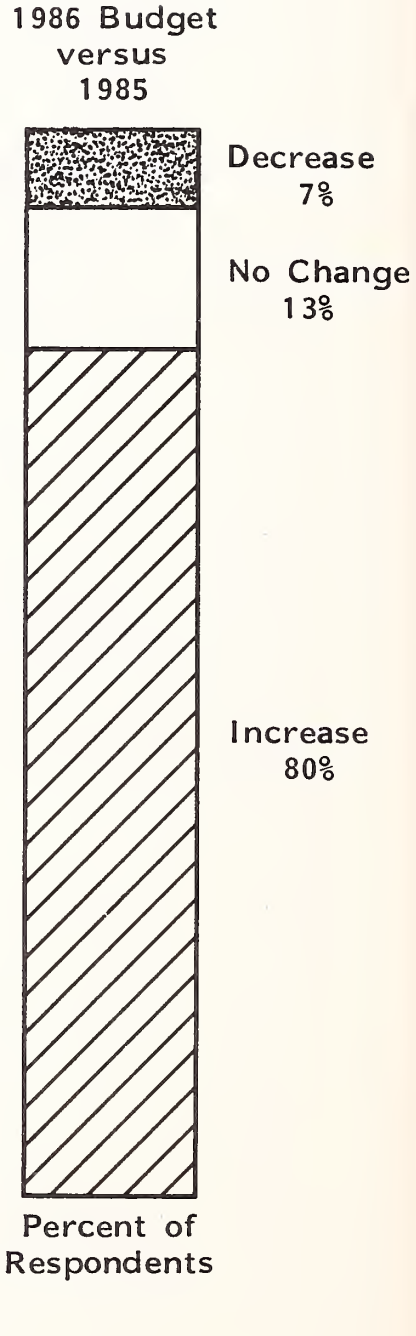


EXHIBIT IV-23

DISCRETE MANUFACTURING
MOST BUDGETS WILL INCREASE IN 1986



- Factors contributing to decreasing the IS budget include:

  . Replacement systems.

  . Staff reduction.

  . Improved hardware efficiency.

  . Management edict to reduce costs.

- The discrete manufacturing sector's IS budget is just as dependent on revenues as IS budgets in general, and less dependent on profit (see Exhibit IV-24). This sector's IS departments are beginning to get more visibility with senior management, but IS is still viewed as an operations department. The transition of IS to a strategic resource is just beginning. The full acceptance of IS a strategic partner is at least five years away in most discrete manufacturing firms.

## C. PROCESS MANUFACTURING

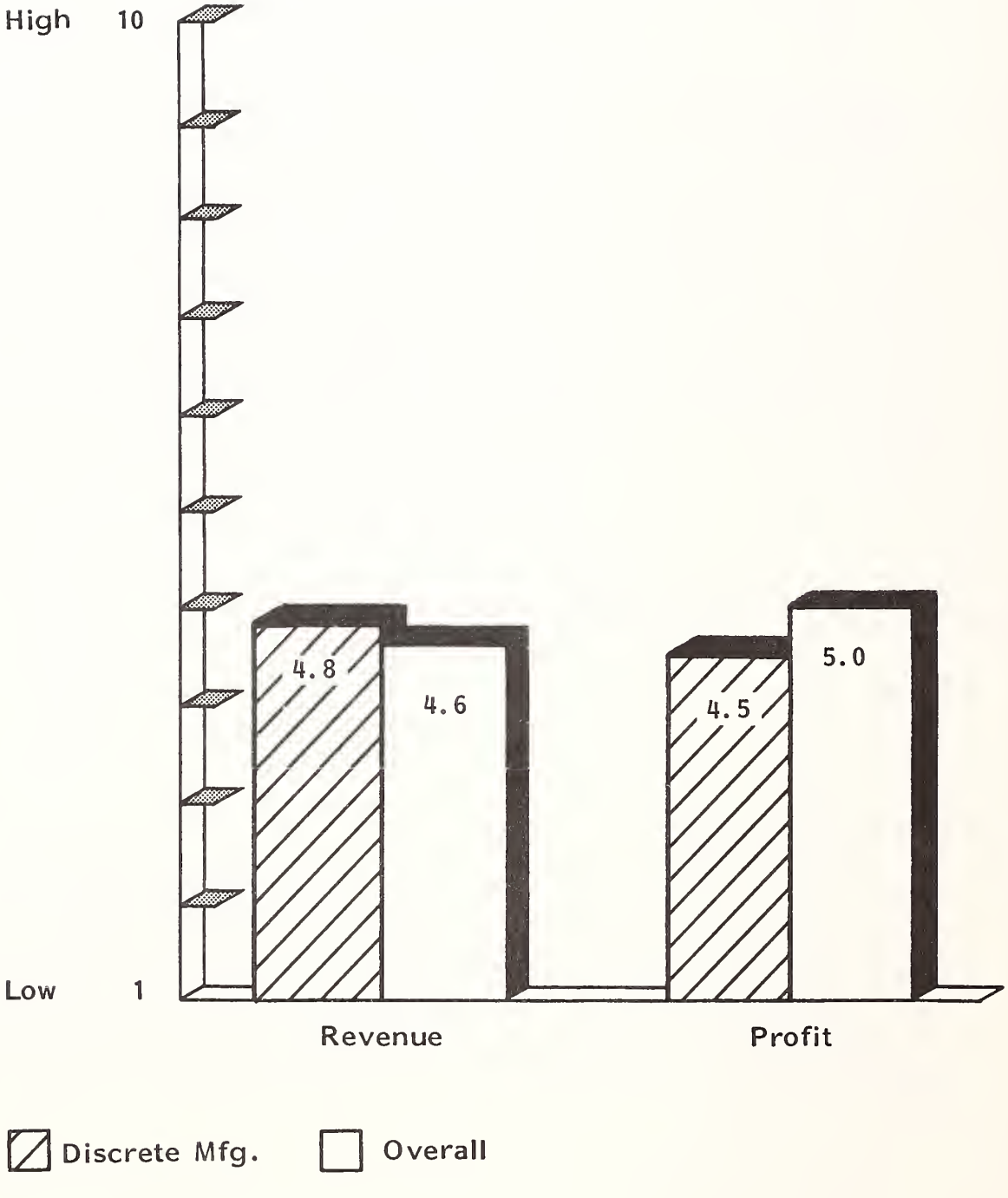
### 1. MAJOR ISSUES

#### a. Driving Forces

- The entire manufacturing plant and equipment base of IS industry is being targetted for overhaul by companies mindful of the threat of foreign competition. Process manufacturers are motivated by the use of new technology to reduce costs and by improvements in new products provided by foreign competition.

EXHIBIT IV-24

DISCRETE MANUFACTURING
I.S. BUDGET DEPENDENCE



- The international problem is exacerbated by tariff restrictions on export products. Thus, the foreign markets are shrinking while imports are making strong inroads in domestic markets.

- Some process manufacturers are dependent on other industries for their success (e.g., rubber and glass are dependent on automobile industries). These industries are also under severe cost constraints, therefore cost containment through technology is the key driving force for this sector.

- Exhibit IV-25 summarizes the driving forces for this sector.

b. Issues and Objections

- Similar to discrete manufacturers, process manufacturers are focusing on cost containment and increased productivity through technology. Cost containment is even a more severe constraint in this sector than in others. There is an emphasis on reducing information float by formulating an integrated data management strategy and providing software and networks that deliver this information on time and in an understandable format.

- This sector is also actively working with customers to establish two-way data networks for dissemination of order entry and order status information.

- This sector, as with the discrete manufacturing sector, still has a management perception problem: management perceives IS as a cost control mechanism, operational in scope. A goal of many respondents is to change this perception so management views IS as a strategic force in the company's success. The advent of IS services provided to customers (e.g., customer order entry/order status systems) is a first step in this process.

- Exhibits IV-26 and IV-27 summarize the key issues and objectives identified by the respondents.

EXHIBIT IV-25

## PROCESS MANUFACTURING
## DRIVING FORCES

- Cost Containment through Technology
- Import Competition
- Export Restrictions
- Dependent Markets

EXHIBIT IV-26

## PROCESS MANUFACTURING ISSUES

- Increase Productivity
- Cost Reduction through Information Systems
- Extend IS to Customers
- Improve Information Delivery

EXHIBIT IV-27

PROCESS MANUFACTURING
OBJECTIVES

- Reduce Information Float
- Increase Management Awareness of IS
- Develop a Data Management Strategy
- Improve Company Productivity through IS
- Cost Control

c. Management Perception and Organizational Issues

- Senior management is beginning to view IS as an asset. Most middle managers, however, still perceive IS as an unavoidable cost that hinders their efforts to reduce expenses. The long-term potential of IS to enhance profitability is understood, but many are not willing to make the investment to realize this potential. Management education of IS capabilities is still required.

- Forty percent of the respondents do not provide any measurements to management on IS contribution to the organization. The remainder focus on cost comparisions with similar firms and cursory cost benefit analysis on a project basis. The respondents believe their measurements are moderately successful. Exhibit IV-28 summarizes the measurements used in this sector.

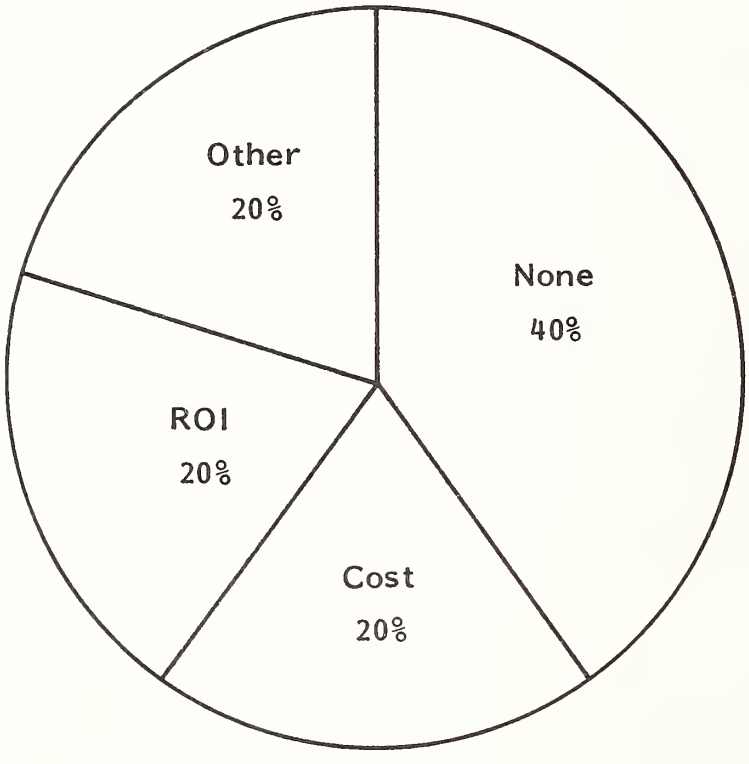
- The results demonstrated to management were again focused on project complexion, adherence to budget, and operational performance (e.g., on-line response time). Some respondents have begun office systems pilots and expanded communications capabilities, which are increasing and improving IS visibility throughout the organization.

- The respondents from this sector have felt IS has improved its image with executive management over the last two years. They believe that the executives are at least aware of the strategic benefit that IS can provide. In the next two years, IS wants to be perceived as technical business people instead of merely technicians.

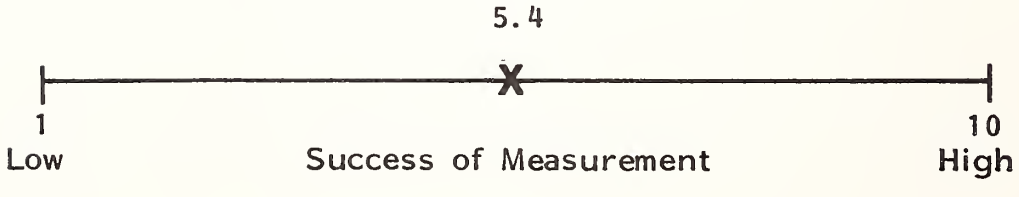
- IS is also getting more involved in the corporate planning process. Where organizations have a published business plan, IS' role ranges from developing an IS plan based upon the business plan to providing input to the line managers who draft this overall plan. Most respondents believed, however, that IS' participation as a major contributor to the corporate planning process is at least five years away; some felt it may never occur.

EHXIBIT IV-28

PROCESS MANUFACTURING
I.S. MEASUREMENT TO MANAGEMENT




Percent of Responses



- Most respondents believed IS' role in enhancing its firm's competitive advantage was through cost containment and dissemination of computer-based information to marketing and product development staff.

- Exhibit IV-29 shows that process manufacturers have a distributed IS environment. Respondents project that this environment will shift toward a centralized approach in 1986. The movement toward centralization is based upon the need for developing a corporate-wide data management and communication strategy. This sector's IS organization will still be more distributed than most others, but central support (both technological and strategic) will grow in importance.

d. Impact of Technology

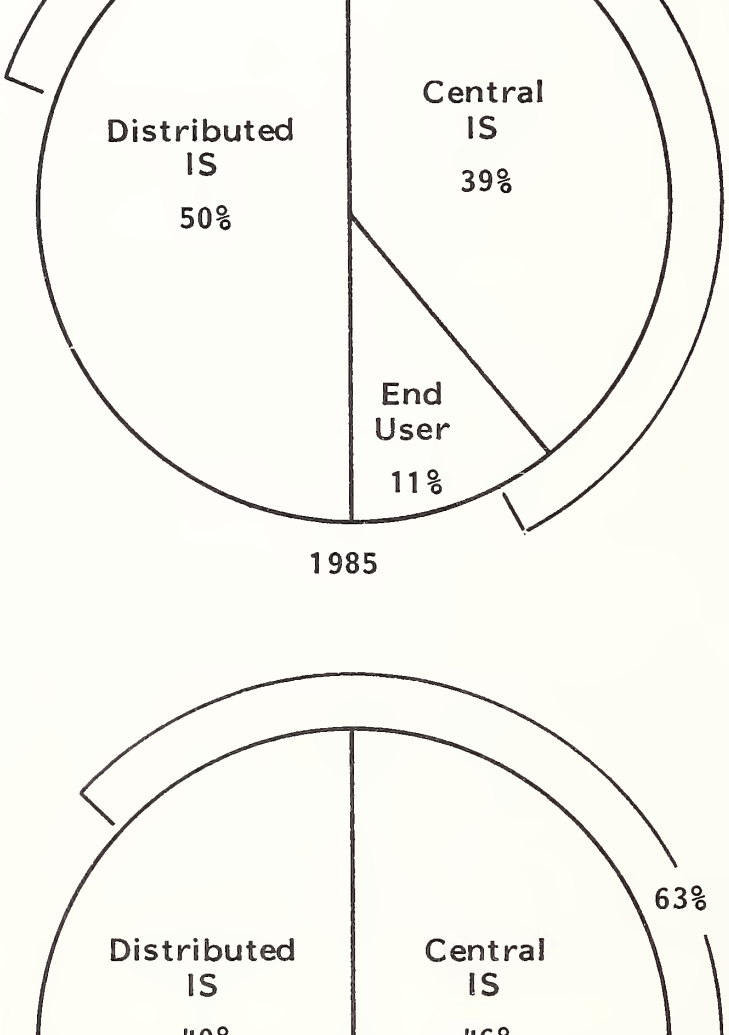
- End-user computing is having a high impact on process manufacturers' IS departments. It has caused reorganization in many respondent departments and has forced IS to become more service oriented.

- Departmental processing is having a moderate impact on this sector. The distributed organization of IS lends itself to the departmental processing concept, but the respondents believe data quality and communications among processors are the key issues in this area. One respondent thinks departmental processing is a solution looking for a problem and is more complex an environment than is required to satisfy user needs.

- Most distributed development activities in this sector are concentrated on micro-based software. Some respondents are shifting micro development to the end user, but IS is establishing corporate software standards. The goal of some respondents is to have autonomous user processing under central IS control.

EXHIBIT IV-29

PROCESS MANUFACTURING
DISTRIBUTION OF CORPORATE COMPUTING EXPENSE




Percent of Corporate and Company-wide IS Budgets

- Many respondents believe relational data bases are an important component of their data management strategy. Current use is primarily through fourth generation languages using a relational structure.

- Some respondents are investigating merging voice and data communications. The vendor-stated economic advantages of this approach are motivating these investigations, but the lack of proven products is delaying any other actions. Most respondents have merged data and voice communication support organizations.

- Very little activity in LAN installation is occurring in this sector. Most respondents are waiting for IBM to deliver a LAN product before they take any action.

- Exhibit IV-30 summarizes the impact of the above technology issues on IS for the process manufacturing sector.

e. End-User Computing

- End-user computing has forced this sector's IS organization to develop a customer (i.e., end user) support strategy. Resources have been shifted into this area and the information center (IC) has become the vehicle for providing this support. The respondents with the more advanced end-user/IC groups have seen improvements in IS' perception by management. One respondent has had an information center for over eight years and has seen the IC's role shifting from reactive with a small user base to proactive and becoming the champion of end-user computing.

- The IC has been the home for end-user training. Its role has expanded from merely training users of software products to educating management on the capabilities of the information center and IS. The training techniques include on-site training, classroom training at the IC and computer-based training as a supplement to on-site and classroom instruction. One respondent accomplishes 85% of end-user training through the IC.

EXHIBIT IV-30

PROCESS MANUFACTURING
IMPACT OF TECHNOLOGY

| | IMPACT | COMMENTS |
|---|---|---|
| End-User Computing | High | Restructuring IS organization and reallocating resources. |
| Departmental Processing | Medium | Needed to improve service but mostly in pilot phase. |
| Distributed Systems Development | Medium | Most activities through micros - mainly in the pilot and planning phase. |
| Relational Data Bases | Medium | Primarily via fourth-generation language data base. |
| Voice/Data Integration | Low | Unsure if technology can support this. Voice/data CBX will be considered when new PBX is needed. |
| LANs | Low | Most waiting on IBM. |

- Exhibit IV-31 summarizes IS' role in microcomputer support.

  - IS establishes procedures, advises, and coordinates microcomputer acquisition. IS takes a more active role in micro acquisition in this sector than most other sectors.

  - Software development is primarily the end-user's responsibility in this sector. IS will do software product evaluation.

  - IS takes a very active role in microcomputer training.

  - IS primarily controls corporate-wide maintenance contracts.

  - IS establishes micro security procedures in many organizations with the end user being responsible for adhering to these procedures. Some respondents are just beginning to develop these procedures.

  - Most respondents believe their micro support is outstanding, but none of the respondents have a formal measurement of user satisfaction. The basis for their belief is the lack of complaints and the positive reaction of management to end-user support in general.

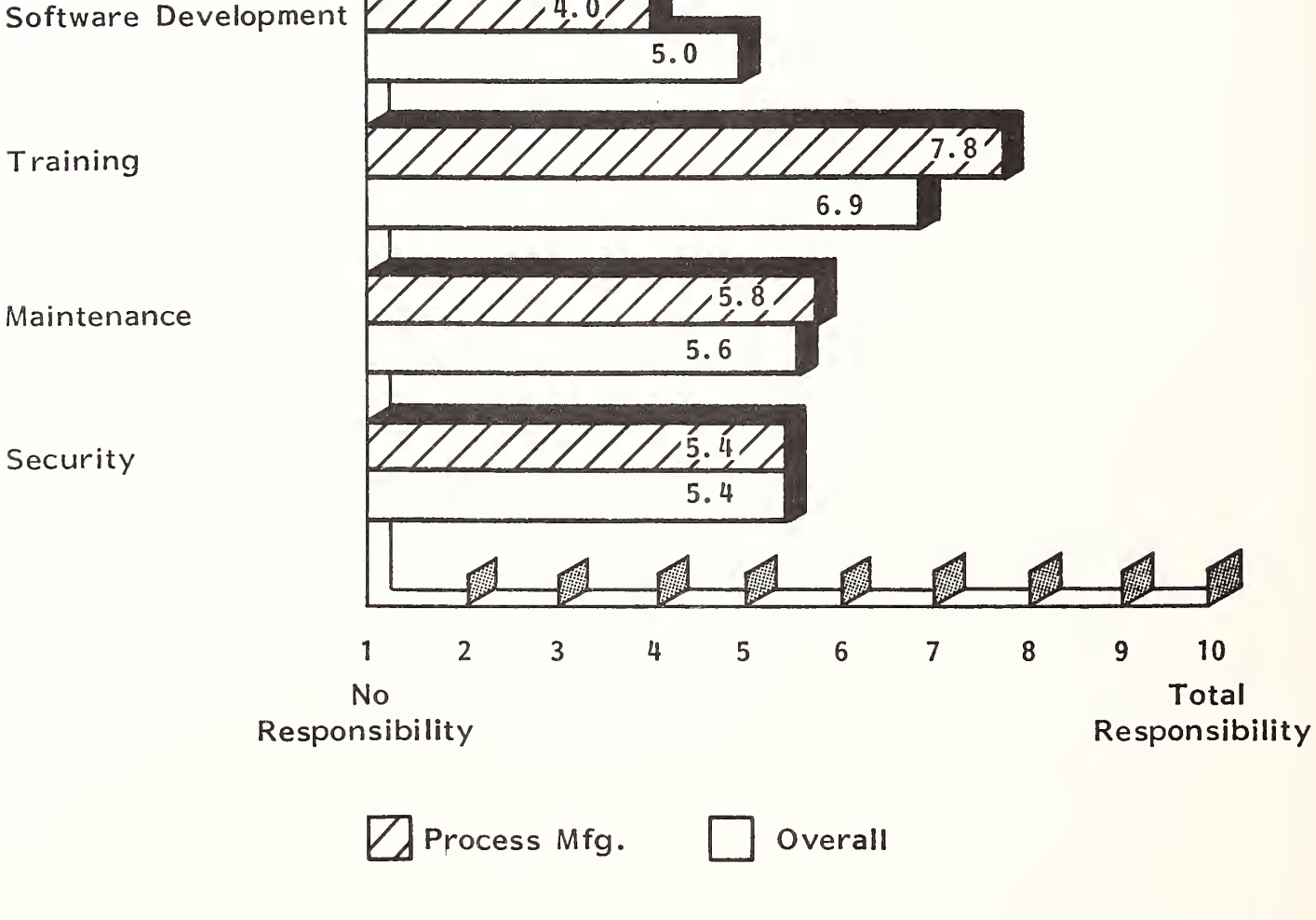
2. NEW APPLICATIONS

- Finance and accounting applications were the most commonly mentioned new applications. This is due to the obsolescence of the current support systems and the desire to have these systems be part of the integrated data management strategy.

- Manufacturing applications (process control, inventory, and materials management) are also being upgraded to reflect changes in technology and user needs. These systems are also being developed to interface with other

EXHIBIT IV-31

PROCESS MANUFACTURING
I.S. ROLE IN MICROCOMPUTER SUPPORT



systems within the organization and provide management information to corporate and end-user data bases.

- Office automation (OA) pilots have been started by some of the respondent companies. The goal is to enhance information access with OA being the window to this information.

- The majority of new systems development is performed by internal systems development personnel. The cost containment strategy within this sector discourages the use of external resources for product development.

- Exhibit IV-32 summarizes the major new applications activity in the process manufacturing sector.

3. BUDGET ANALYSIS

- Process manufacturers' IS budgets are growing at a much slower rate than overall IS budgets. This is due to the cost containment strategy of this sector's IS departments. Management still determines IS budgets primarily by comparing themselves to other process manufacturers. Although the respondents indicated that senior management is becoming aware of the potential of IS as a competitive weapon, the actions of these executives indicate that IS is still an operational cost that must be controlled.

  - Exhibit IV-33 shows the 1985 budget distribution and projects the growth of budget categories in 1986.

    . The largest projected growth category is microcomputers. This reflects the growing importance of end-user computing in these organizations.

    . There is no growth projected for outside processing, turnkey systems, and professional services, reflecting the cost control strategy that is in place at most process manufacturers.

EXHIBIT IV-32

PROCESS MANUFACTURING
NEW APPLICATIONS IN 1985

Most Important Applications

Finance and Accounting

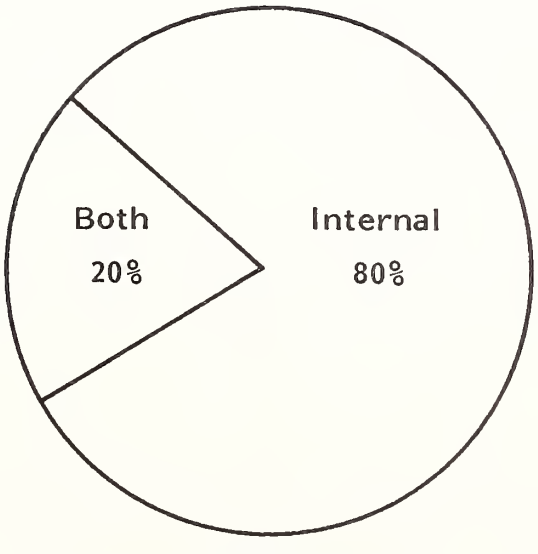
Process Control

Inventory

Office Systems

Materials Management

Source of Development (All New Major Applications)




Percent of Responses

Cost Range

$1.5K - $2M

EXHIBIT IV-33

## 1985 BUDGET DISTRIBUTION AND 1985/1986 CHANGES IN THE PROCESS MANUFACTURING SECTOR

| BUDGET CATEGORY | 1985 PERCENT OF I.S. BUDGET | 1985-1986 EXPECTED BUDGET GROWTH |
|---|---|---|
| Personnel Salaries and Fringes | 34.6% | 5.0% |
| Mainframe Processors | 16.0 | 5.5 |
| Minicomputers | 1.7 | 0.0 |
| Microcomputers | 0.8 | 15.0 |
| Mass Storage Devices | 10.2 | 5.5 |
| Other Hardware | 3.7 | 1.5 |
| Total Hardware | 32.4% | 5.0% |
| Data Communications | 11.9% | 8.4% |
| External Software | 6.8 | 4.9 |
| Professional Services | 2.4 | 0.0 |
| Turnkey Systems | 0.6 | 0.0 |
| Software Maintenance | 0.4 | 4.2 |
| Hardware Maintenance | 5.7 | 2.2 |
| Outside Processing Services | 0.7 | 0.0 |
| Other | 4.5 | (1.3) |
| Total | 100.0% | 4.7% |

- Exhibit IV-34 shows that this sector's IS budget growth in 1985 was lower than overall IS budgets. In 1986, process manufacturers are expecting very low growth (4.7%), less than half the project growth for all IS organizations.

- In 1986, almost 80% of the respondents believe their IS budgets will increase, but 50% believe the budget growth will be lower than 1985 (see Exhibit IV-35).

  - Factors contributing to increasing the IS budget include (in order of most frequently mentioned factors):

    . Personnel expense.

    . Hardware.

    . Inflation.

    . Data communications.

  - Factors contributing to decreasing the IS budget include:

    . Staff reduction.

    . Improved hardware performance.

    . Reduced development.

- The process manufacturing sector's IS department budget is less dependent on revenues but is as dependent on profit as all IS budgets (see Exhibit IV-36). It appears that near term cost containment overrides a clear dependence on these measurements. In this sector, IS is an operations department and it will be treated as such for budgetary considerations in the near future.

EXHIBIT IV-34

PROCESS MANUFACTURING
I.S. BUDGETS ARE GROWING SLOWER THAN ALL I.S. BUDGETS

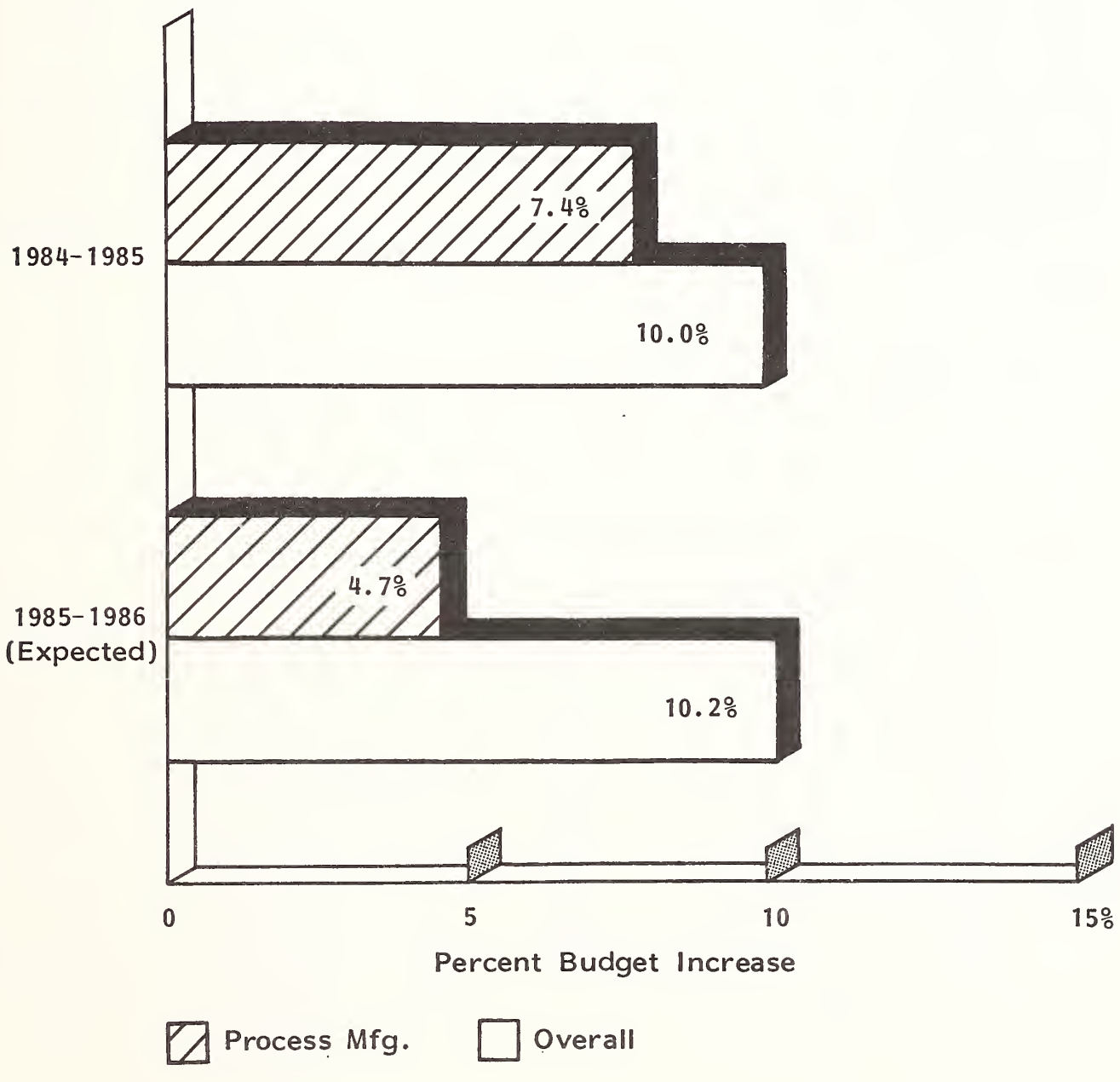
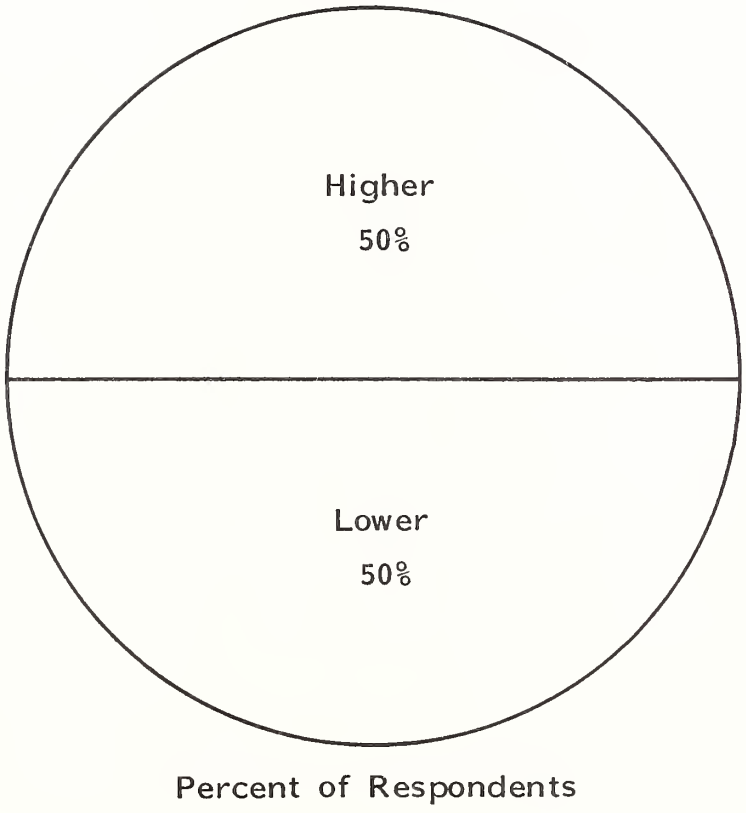


EXHIBIT IV-35

PROCESS MANUFACTURING
MOST BUDGETS WILL INCREASE IN 1986



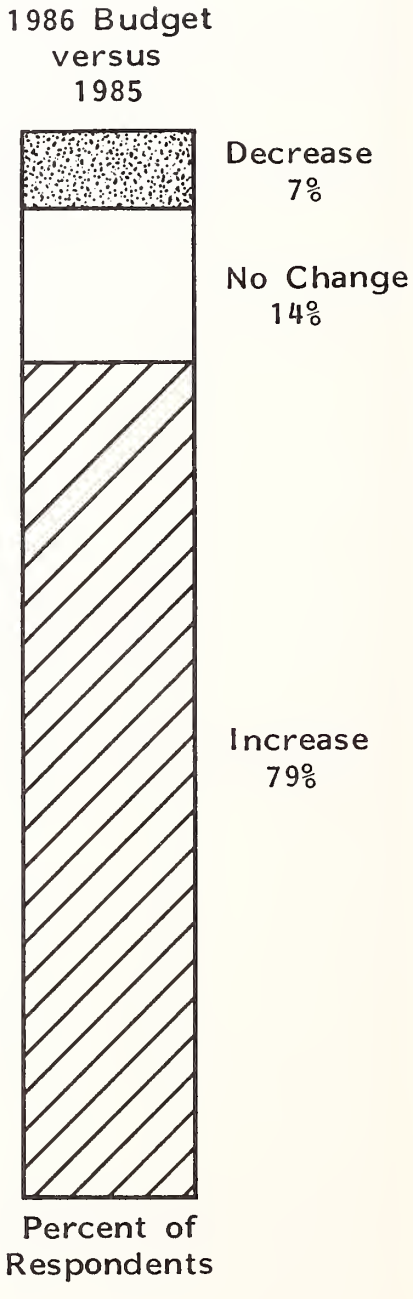
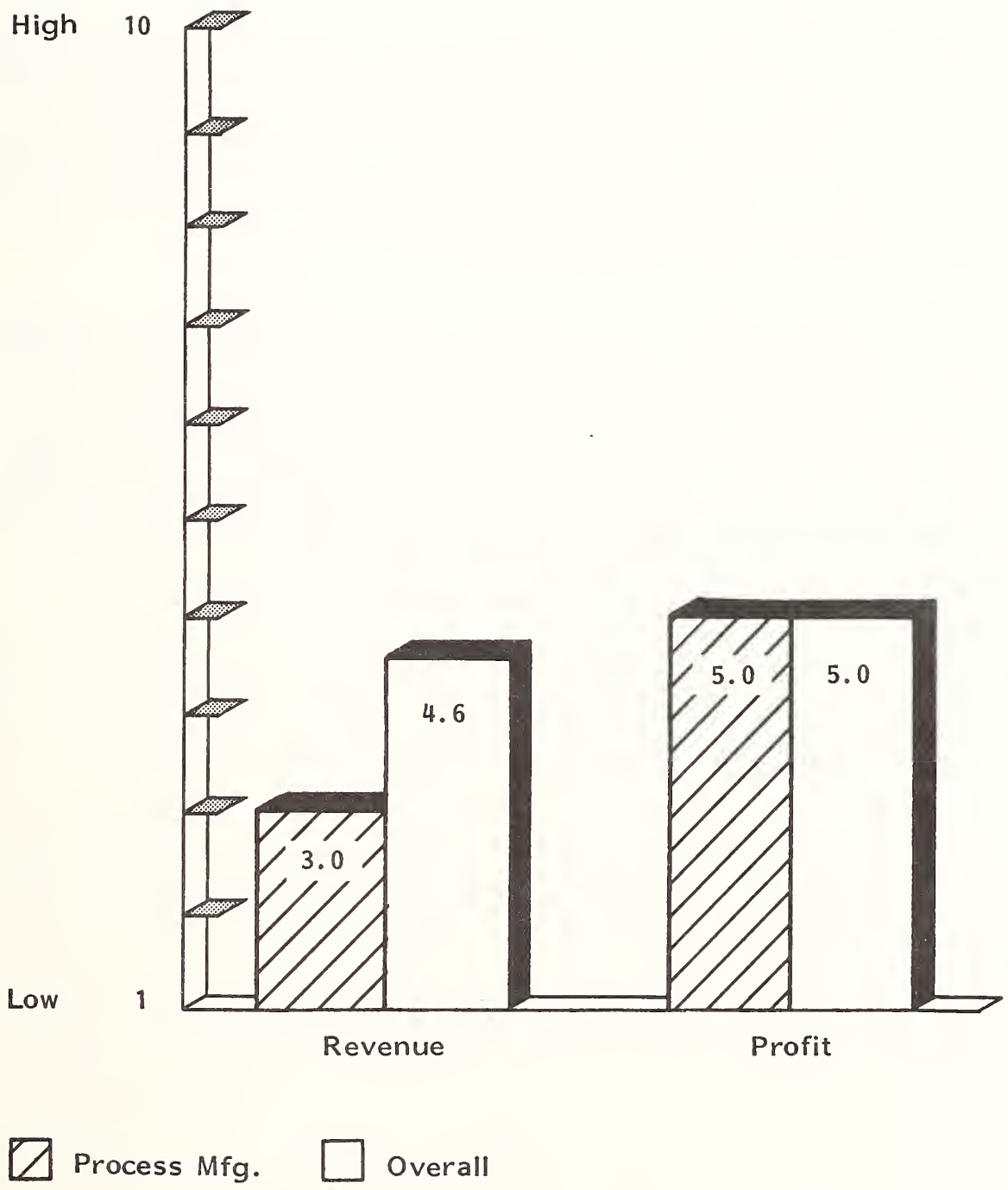



EXHIBIT IV-36

PROCESS MANUFACTURING
I.S. BUDGET DEPENDENCE



## D. INSURANCE

### 1. MAJOR ISSUES

#### a. Driving Forces

- The property/casualty segment of the insurance sector is facing an increasing number of corporations setting up captive insurers or self insuring. There is also an overcapacity of insurance underwriting. This is leading to increased competition, elimination of independent agencies, mounting losses, and a push for cost reduction through automation.

- The life/health segment is pressured by self-insurance, self-administration, and the advent of the "financial supermarkets." The segment's reaction has been to offer interest-based investment policies combining mutual funds and insurance. The primary systems needs cost containment systems, improved claim processing systems, and micro-based expert systems to help agents construct policies that fit individual customer needs.

- More sophisticated systems are needed to support agents, and there is a need to tie brokers to multiple companies using on-line links. Micro-based systems are also needed to assist agents with customer financial planning.

- A proliferation of products, especially in the life/health segment, requires better systems to administer these products and to track claims and other customer information across all product lines.

- Exhibit IV-37 summarizes the driving forces for the insurance sector.

EXHIBIT IV-37

INSURANCE
DRIVING FORCES

- Distribute Technology to Agents
- Severe Price Competition
- Cost Containment
- New Competitors
- More Complex Policies

b. Issues and Objectives

- The severe price competition and large losses posted by the property and casualty segment has placed pressure on IS to develop cost reduction methods using automation.

  - Improved claim processing systems that reduce the cost per claim are being actively pursued by some respondents.

  - Other respondents are actively pursuing methods of converting paper storage to computer-based media. Optical disk technology holds the greatest promise in this area.

- Although the insurance industry was one of the first to use computer technology, it has been slow to establish data communications networks to support field personnel and agents. A key issue for many respondents is to provide improved support to agents and field officers via:

  - Expanded networks.

  - Micro-based decision support systems.

  - Data bases that are customer versus product oriented.

- A major goal of many of the respondents is to become part of the product planning cycle. The potential for information systems-based products is great in this segment, but corporate management must realize that the IS' benefit does not only reside in the cost containment area of the business. User management education and successful pilot projects are key to transforming IS from solely a cost controlling entity to a participant in revenue production.

- Exhibits IV-38 and IV-39 summarize the key issues and objectives identified by the respondents.

EXHIBIT IV-38

INSURANCE
ISSUES

- Reduce Costs through Automation
- Convert to a Customer Versus Product Orientation
- Convert Paper Storage to Computer-Based Media
- Provide Agent Support Systems
- Electronically Distribute Information Internally, to Agents, and to Customers
- IS As a Revenue Producing Product

EXHIBIT IV-39

INSURANCE
OBJECTIVES

- Install Micro-Based DSS for Agents
- Provide On-line Systems for Universal Life and Other Complex Policy Calculations
- Improve Claim Processing to Reduce the Cost Per Claim
- Implement New Customer-Oriented Data Bases That Cross Product Lines
- Indentify Technology-Oriented Product Opportunities

c. Management Perception and Organizational Issues

- Most managers view IS as a corporate asset. Usually the more senior the level of management, the more strategic benefit is perceived from IS. Some user management are not convinced that IS can make a major impact on corporte revenue. Some respondents expressed concern that many new products must wait on support systems before they can be implemented.

- IS' measurement to management focuses on reducing cost, increasing productivity, and providing a tangible net benefit to the company (i.e., dollars saved are greater than those expended). Extensive cost measurements are conducted. The respondents felt that they have been very successful in measuring IS' success and reporting it to management. Exhibit IV-40 shows the IS measurement techniques used by the respondents in this sector.

- IS has participated more in the corporate planning process in the last two years than previously. Also, the scope of many responding IS departments has increased to include both data and voice communications. The largest projected change that the respondents see in the next two years is IS taking a more active role in revenue producing activities, even being primarily responsible for developing and supporting information-based products.

- IS' role in corporate planning is increasing rapidly. In some respondent companies, the head of IS is a member of the planning committee. Some respondents provide only a support role to the planning process, but indicate their role is increasing.

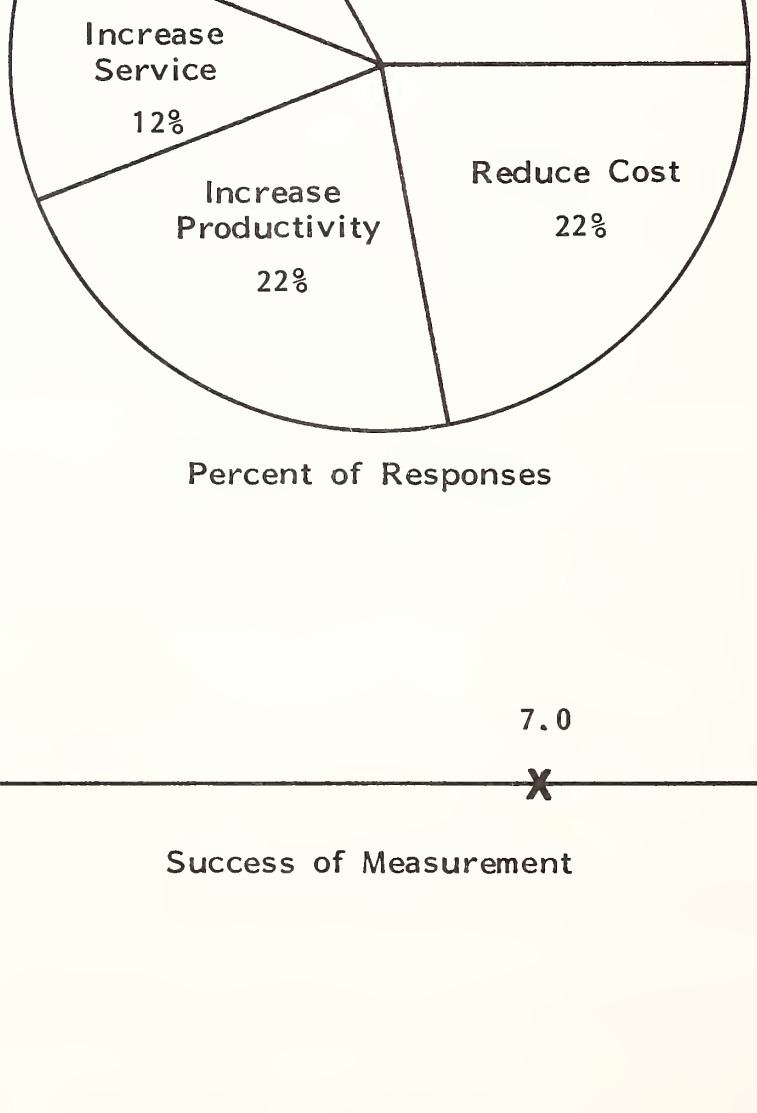
- The respondents indicate that information systems can be a competitive weapon in the insurance sector by:

  - Providing productivity enhancement systems.

  - Enhancing communications with agents and field offices.

EXHIBIT IV-40

INSURANCE
I.S. MEASUREMENT TO MANAGEMENT




Percent of Responses

- Providing customer (not just by product) oriented information.

- Providing decision support systems for financial planning and policy selection.

- Providing and supporting point of sale insurance machines.

- Placing computing in the hands of the end user.

- Exhibit IV-41 shows that IS within the insurance sector is primarily centralized. The respondents project a slight shift to distributed systems resulting in some movement of claim processing activities to the user organization. The need for constructing a customer oriented data base that crosses all product lines will require a large central IS effot.

d. Impact of Technology

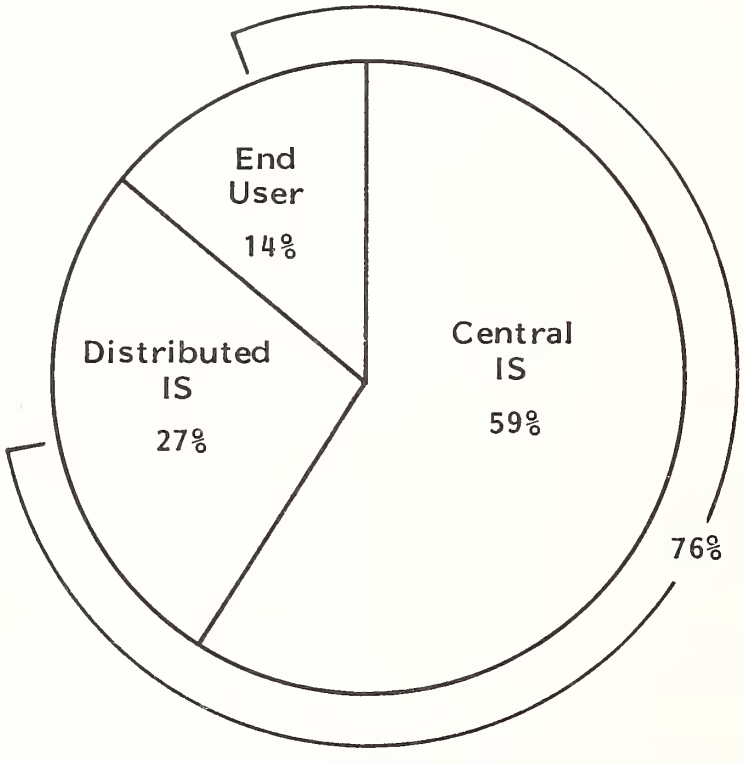
- IS is the driving force behind end-user computing, but many users are not convinced of the benefit. Thus currently, end-user computing has not had a major impact on IS.

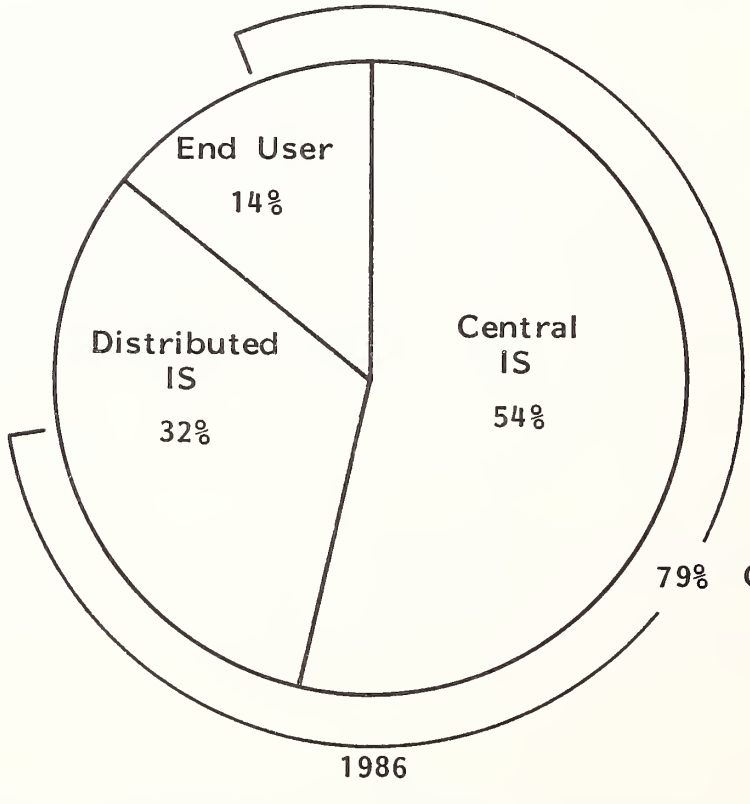
- Some respondents believe that departmental processors will be the major vehicle for end-user and distributed processing. These respondents are primarily trying to assimilate microcomputers and establish departmental processing. Most of the respondents see departmental processing as a new label for what they already have. These respondents are planning to distribute more processing to users when the users are ready. They see departmental processors having little near-term impact on their IS plans.

- All respondents indicated that systems development is done centrally. One respondent stated that there was a corporate commitment to do some distributed development, but currently there was no activity in this area.

EXHIBIT IV-41

INSURANCE
DISTRIBUTION OF CORPORATE COMPUTING EXPENSES




Percent of Corporate and Company-wide IS Budgets

- Most of respondents were very concerned about the resource requirements needed to support relational data bases. The only activity in this area was studying data base requirements and preparing a feasibility study on using IBM's DB2 to meet these requirements.

- Merging voice and data communications is being studied by most respondents. The potential cost savings is motivating the study, but there is skepticism about the availability of technology to meet the quality and response time requirements.

- There is very little LAN activity among the respondent companies. Some respondents do not want to confront the standards problem, others are waiting for IBM to release product, and the final group does not see an immediate need for them in their organization.

- Exhibit IV-42 summarizes the impact of the above technology issues on IS for the insurance sector.

e. End-User Computing

- End-user computing support is in place in many respondent companies. The next major step is distributed processing and providing integrated office automation functions to the end users. This step is two to five years away in most organizations, and most respondents are beginning to plan for this now.

- IS is taking an active role in end-user training. They are scheduling classes, providing management education, and conducting seminars and some classes.

- Exhibit IV-43 summarizes IS' role in microcomputer support.

  - Senior management looks to IS to assure that all microcomputer activities are justified and controlled. Thus in this sector, IS takes a more active role in microcomputer support than in most other sectors.

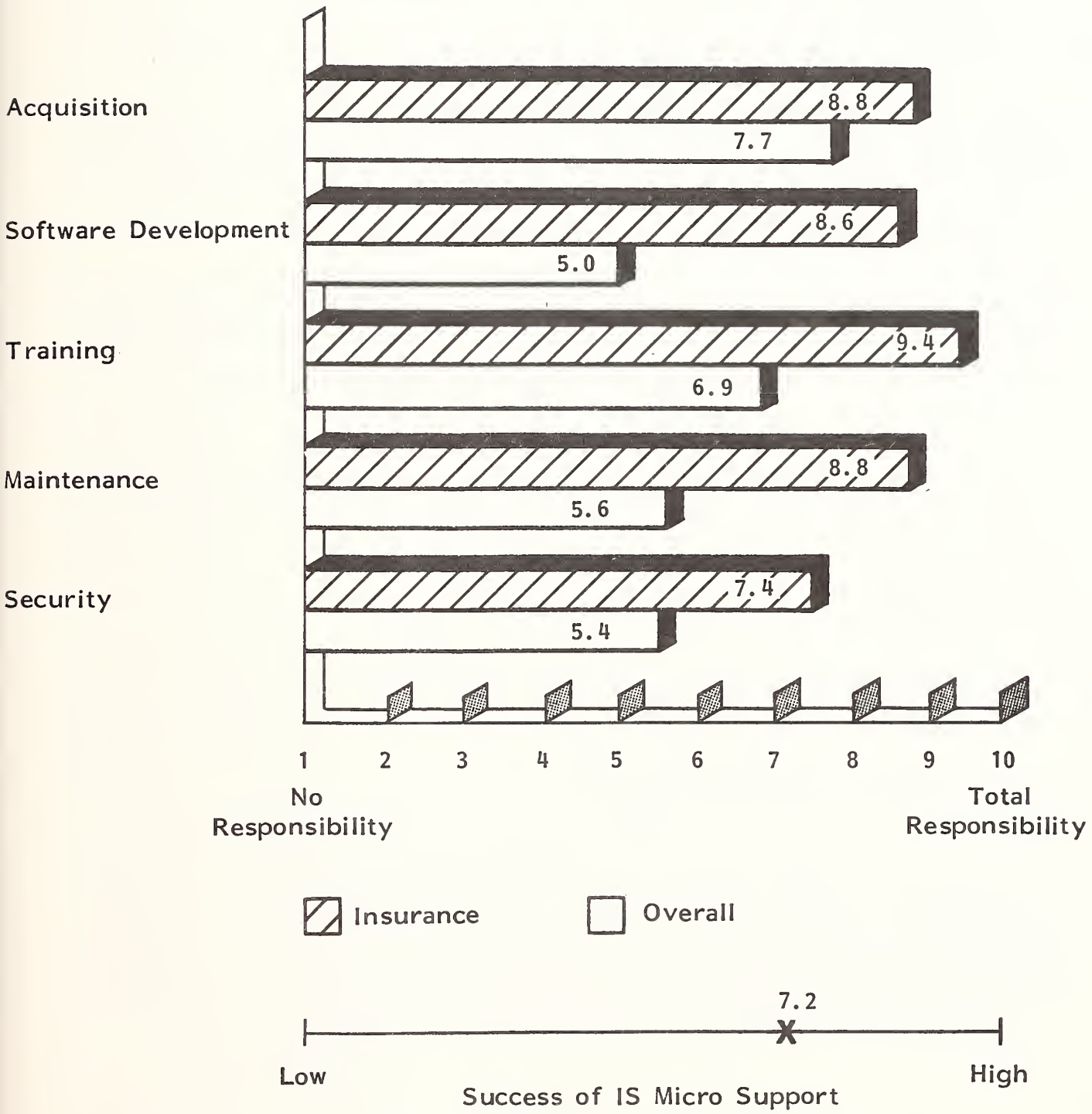
EXHIBIT IV-42

INSURANCE
IMPACT OF TECHNOLOGY

| | IMPACT | COMMENTS |
|---|---|---|
| End-User Computing | Low | Many not convinced of the benefit. |
| Departmental Processing | Low/Medium | New label for what has previously been done. Planning to distribute more to users when they are ready. |
| Distributed Systems Development | Low | Little activity. |
| Relational Data Bases | Low | Concerned about resource requirement. Little activity. |
| Voice/Data Integration | Medium/Low | Potential for cost savings and improved service. |
| LANs | Low | Little activity, most waiting for standards (i.e., IBM) |

EXHIBIT IV-43

INSURANCE
I.S. ROLE IN MICROCOMPUTER SUPPORT



- IS sets microcomputer acquisition standards. In some organizations, IS approves the acquisition but the end user is always responsible for justifying the acquisition of the equipment.

- IS provides a list of software packages that it will support and does most if not all of the micro software development when required.

- IS is the focal point for all micro training.

- Some of the respondents provide maintenance of micro hardware and software. In all other cases, IS coordinates the maintenance with external sources.

- All of the respondents were responsible for establishing security guidelines. One of the respondents had the responsibility for enforcement, although most left the enforcement to the end-user organization.

- Most of the respondents believed their micro support was above average, although one IS manager thought his organization was too reactive to demands.

2. NEW APPLICATIONS

- The highest activity in applications development is upgrading claims processing. The key motivation is to reduce the cost per claim, one of the most significant cost areas in this sector.

- The need to provide customer-oriented information across all product lines is motivated by the need to enhance marketing sales efforts to current customers. The respondents are working on new and/or enhanced marketing and sales systems to provide more effective and timely customer information.

- Agent support systems have not received a high priority. Respondents are now providing turnkey micro systems and on-line systems linked to the corporate information base to enhance agent performance. Network and data communication systems are needed to support the agents and field support staff.

- Government compliance reporting is always a high priority task. The reorganization of data bases so they are customer oriented should simplify this process.

- Most of the respondents are using internal resources for systems development. No respondent indicated that they are doing any joint development with vendors on major projects.

- Exhibit IV-44 summarizes the major new applications activity in the insurance sector.

3. BUDGET ANALYSIS

- Insurance companies' IS budgets are growing at a significantly faster rate than overall in IS organizations. The need to reduce claims costs, reorganize data bases so they are customer oriented, and improve agent and field staff support are all costly activities. Insurance companies realize that none of these activities can be deferred or else they may lose market share and reduce already depressed profitability.

  - Exhibit IV-45 shows the 1985 budget distribution and projects the growth of budget categories in 1986.

    . The largest projected growth categories are: microcomputers, mass storage, and data communications. This reflects the large data base and field support activities that are projected for 1986.

EXHIBIT IV-44

INSURANCE
NEW APPLICATIONS FOR 1985

Most Important Applications

Claims Processing

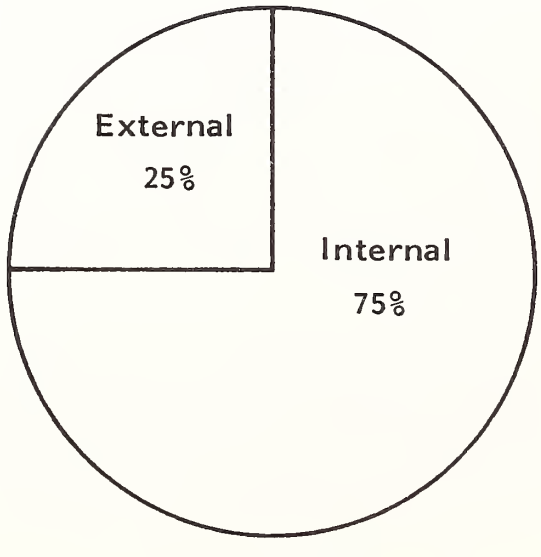
Marketing and Sales Support

Agent and Field Staff Support

Government Compliance Reporting

Network/Communications

Source of Development (All New Major Applications)




Percent of Responses

Cost Range
$40K - $8M

EXHIBIT IV-45

## 1985 BUDGET DISTRIBUTION AND 1985/1986 CHANGES IN THE INSURANCE SECTOR

| BUDGET CATEGORY | 1985 PERCENT OF I.S. BUDGET | 1985-1986 EXPECTED BUDGET GROWTH |
|---|---|---|
| Personnel Salaries and Fringes | 43.9% | 7.0% |
| Mainframe Processors | 10.7 | 17.7 |
| Minicomputers | 2.4 | 0.0 |
| Microcomputers | 1.8 | 25.0 |
| Mass Storage Devices | 3.8 | 25.2 |
| Other Hardware | 4.1 | 10.0 |
| Total Hardware | 22.8% | 16.3% |
| Data Communications | 10.7% | 19.5% |
| External Software | 7.6 | 11.4 |
| Professional Services | 1.6 | 12.3 |
| Turnkey Systems | 0.3 | 0.0 |
| Software Maintenance | 2.8 | 10.3 |
| Hardware Maintenance | 5.0 | 7.2 |
| Outside Processing Services | 0.8 | 0.0 |
| Other | 4.5 | 7.0 |
| Total | 100.0% | 16.6% |

  - The smallest growth areas are outside processing, turnkey systems, and minicomputers.

- Exhibit IV-46 shows that this sector's growth in 1985 was over 50% greater than IS budgets in general. In 1986, the growth is projected to be almost 60% greater than overall IS budgets.

- In 1986, all respondents indicated that their IS budgets would increase over 1985. However, only 14% said the growth would be greater than 1985 (see Exhibit V-47).

  - Factors contributing to increasing the IS budget include (in order of most frequently mentioned factors):

    - Hardware.
    - Personnel expense.
    - New products.
    - Office systems.
    - Inflation.

  - Factors contributing to decrease in IS budget includes:

    - Staff reduction.
    - Increased productivity.
    - Software improvements.
    - Communications.

EXHIBIT IV-46

INSURANCE
I.S. BUDGETS GROWING FASTER THAN ALL I.S. BUDGETS

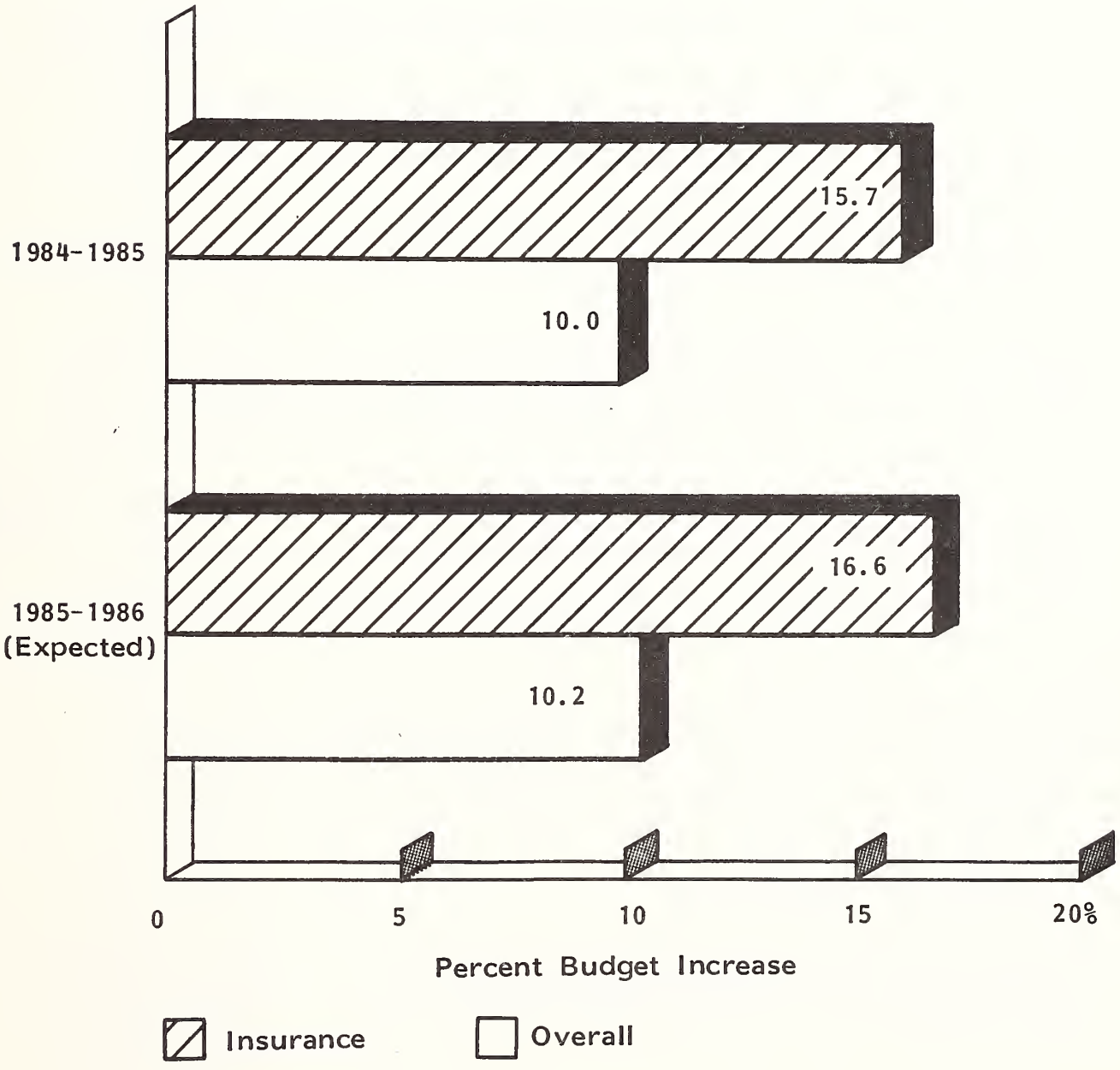
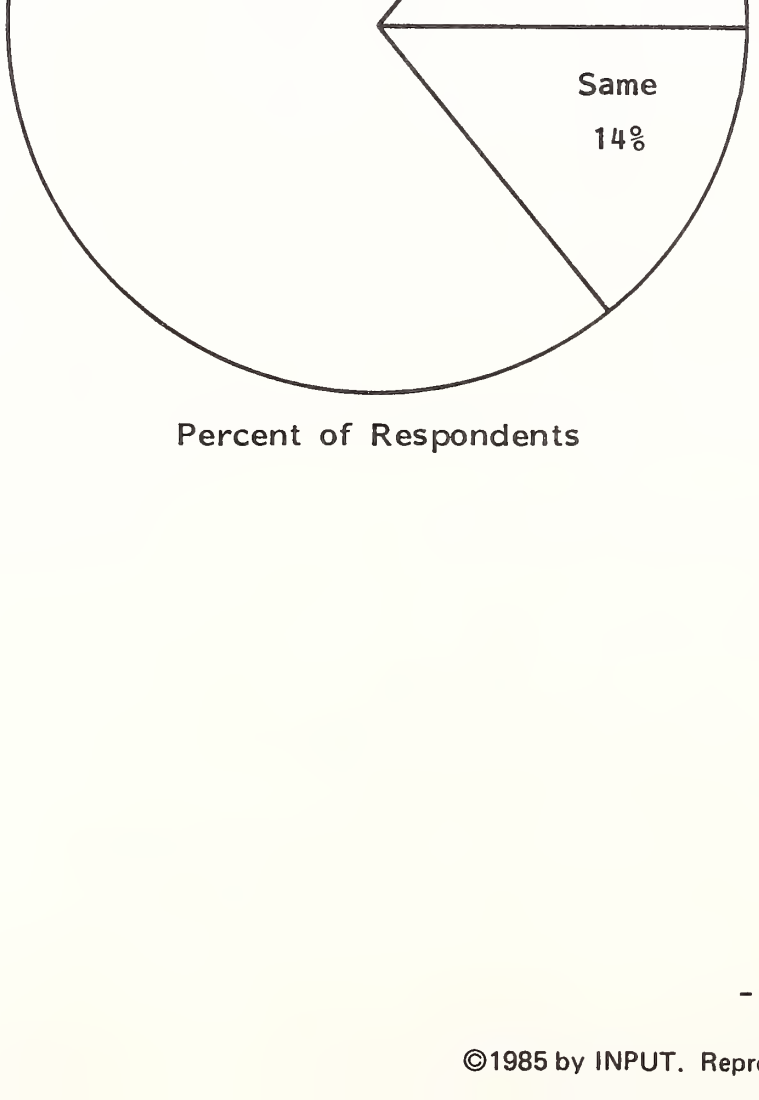
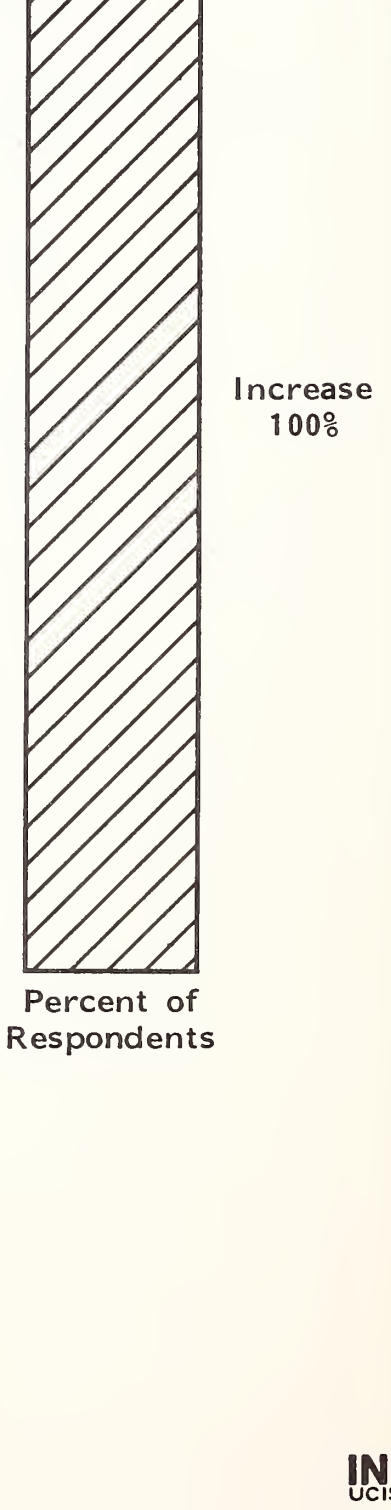


EXHIBIT IV-47

INSURANCE

BUDGETS WILL INCREASE IN 1986 BUT AT A LOWER RATE



- The insurance sector's IS department budget is less dependent on revenues and profits than overall IS departments (see Exhibit IV-48). The need to complete critical projects and the potential competitive advantage that IS provides overrides any direct correlation between IS budgets and profit or revenue. This independence should continue for the next two to five years.

## E. DISTRIBUTION (RETAIL AND WHOLESALE)

### 1. MAJOR ISSUES

#### a. Driving Forces

- The principal development in the retail segment is the spread of point of sale (POS) and automatic teller machine (ATM) terminals utilizing electonic funds transfer (EFT) to increase liquidity.

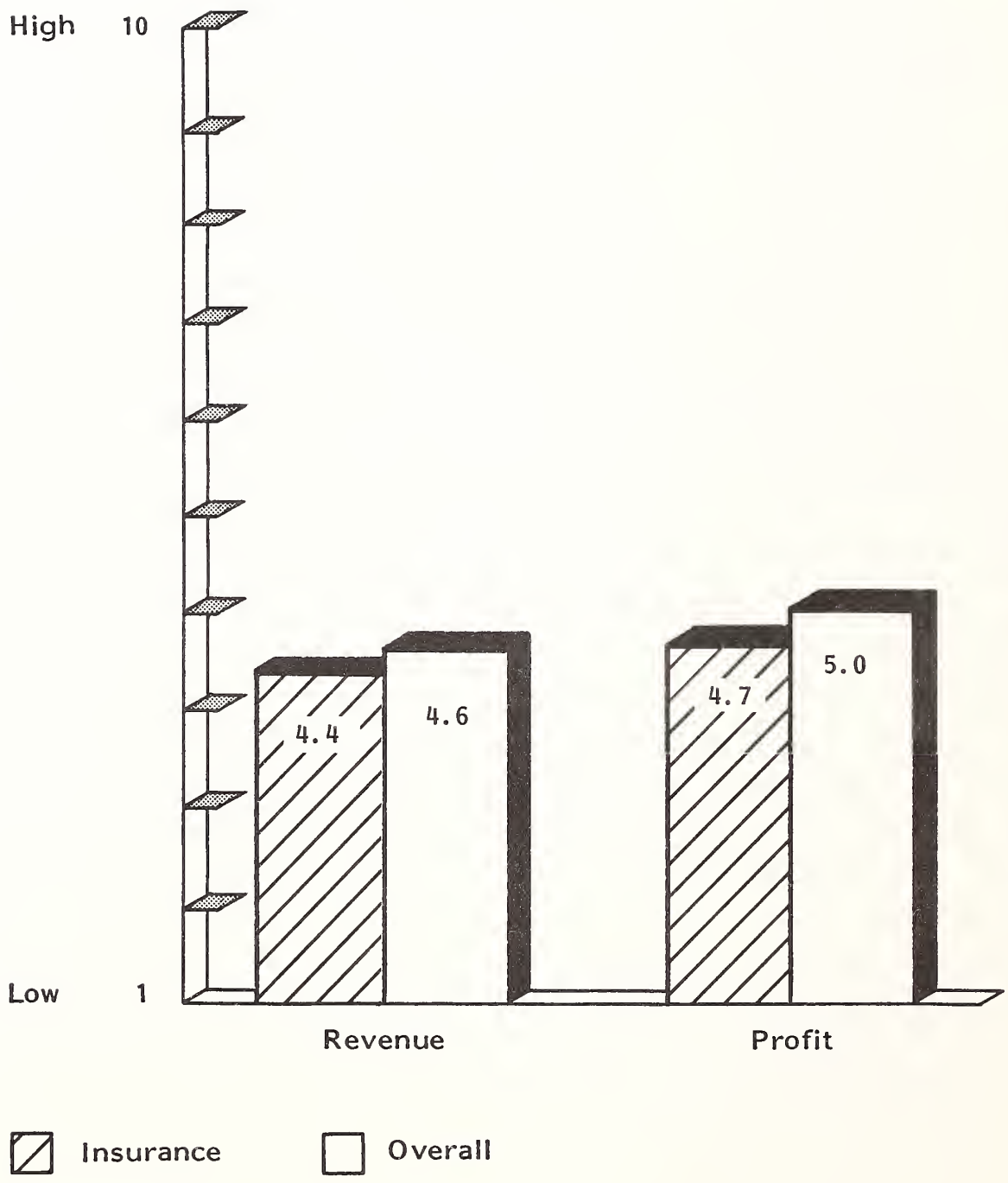
  - This requires changes to existing payment systems and increased priority for cost reduction, margin improvement, and store management systems.

  - Traditional applications need to be upgraded with emphasis on inventory control/stock replenishment and purchase order management. These systems must integrate with POS technology to fully realize its potential benefits.

- Wholesalers act as middlemen between producers and end users. They are heavily dependent on information handling and transfer. Their data and voice communications demand is increasing, especially in the area of intercompany electronic data exchange.

EXHIBIT IV-48

INSURANCE
I.S. BUDGET DEPENDENCE



- Inventory management and order control systems are critical to the success of wholesalers. Older systems must be upgraded to be on-line and reflect current stock and order positions to aid in forecasting demand.

- Microcomputers and network technologies must be incorporated into systems strategies to improve customer communication and satisfy customers turnaround demands.

- Exhibit IV-49 summarizes the driving forces for the distribution sector.

b. Issues and Objectives

- The rapid expansion of POS use by retailers has placed heavy demands on IS to develop systems that interface with this equipment.

  - Inventory control systems must interface to provide the realtime stock position attainable by this technology. Networks must be in place between the stores and the warehouses to improve stock replenishment systems.

  - Scanning technology is playing a major role in improving store productivity. Scanning devices need to be expanded throughout the store system.

  - Payment systems need to be upgraded to take advantage of the links with ATM networks. Credit and debit cards authorization need to be incorporated into POS.

  - Check verification systems are beginning to be incorporated into POS.

  - Management information and decision support systems that use POS data need to be developed, and managers should be able to access this data on a near "realtime" basis.

EXHIBIT IV-49

DISTRIBUTION
DRIVING FORCES

- POS
- EFT
- Low Margins
- Network Demands

- Both the retailer and warehouser need to reduce order turnaround time. The expanded use of intercompany document exchange for order entry, invoicing, and distribution requires upgrading current systems and networks. Microcomputers need to be incorporated into these systems to assist in forecasting stocking requirements.

- Exhibits IV-50 and IV-51 summarize the issues and objections addressed by the IS respondents for this sector.

c. Management Perception and Organizational Issues

- Management is keenly aware of IS' worth to the organization. Retail and wholesale companies operate on a low profit margin. The key to profitability is productivity, high turnover rates, and inventory control. Information systems can prove to be the difference between profit and loss to many organizations.

- Most respondents measure IS success by peforming a cost benefit analysis on each project performed. Due to the high demand for IS resources, few post implementation audits are performed after a project is implemented. The respondents believed that they were moderately successful in measuring their value to their company. Exhibit IV-52 summarizes the measurement techniques used by the respondents.

- The respondents saw little change in their role in the organization in the past two years. The main challenge is to keep up with the technology and provide information systems that keep their firms competitive. In the next two years, the respondents believe their role will shift toward a more consultive relationship to their users. Their goal is to be viewed as technological business people instead of merely technicians.

EXHIBIT IV-50

DISTRIBUTION
ISSUES

- POS and ATM Require Changes to Payment Systems
- Integrated Traditional Applications With New Technology (e.g., POS)
- Intercompany Electronic Data Exchange
- Improved Inventory and Order Control
- Provide Purchasing and Stocking Decision Support Information

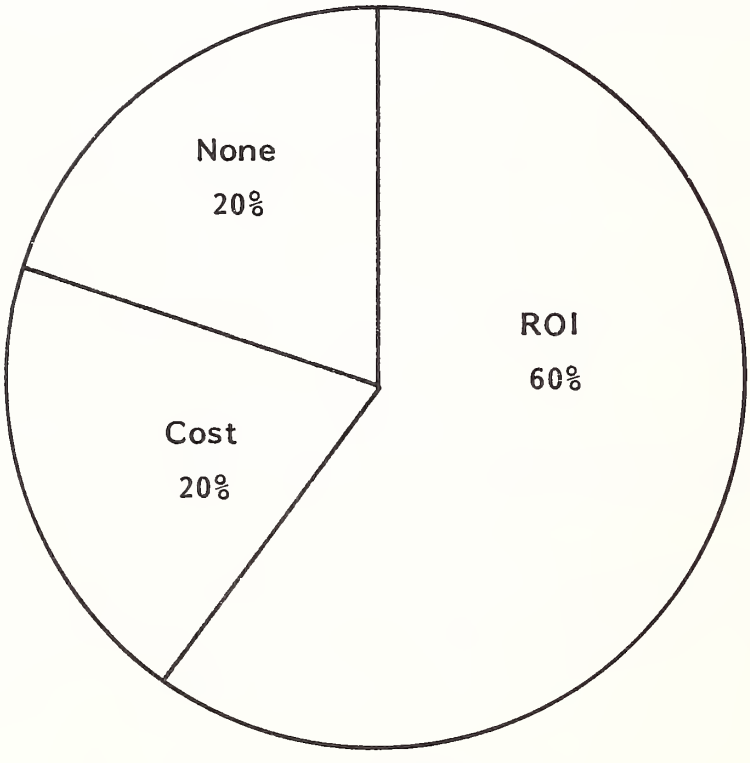
EXHIBIT IV-51

DISTRIBUTION
OBJECTIVES

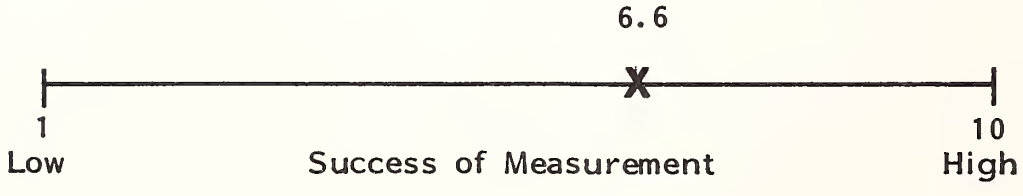
- Expand the Use of New Technologies in Stores (e.g., POS and Scanning)
- Improve Purchasing and Inventory Control Systems
- Improve Company Productivity through Automation
- Improve and Enhance Network for EFT and Store/ Warehouse Communication
- Provide More Timely Information to Management

EXHIBIT IV-52

DISTRIBUTION
I.S. MEASUREMENT TO MANAGEMENT




Percent of Responses



- IS plans are derived from the corporate business plan. Due to the dependence of this sector's success on information systems, IS is projected to play a more active role in the corporate planning process.

- The respondents listed the following ways of using information systems as a competitive weapon in the distribution sector.

  - Provide better inventory management.

  - Improve customer service.

  - Reduce labor costs.

  - Provide customer history information to help develop sales and marketing plans.

  - Improve store management.

  - Provide timely stocking information.

  - Expand the use of scanning in stores and warehouses.

- Exhibit IV-53 shows that the distribution sector's IS departments are primarily centralized. The respondents expect a slight shift toward decentralized IS in 1986 to provide more responsive service to their highly decentralized user community.

d. Impact of Technology

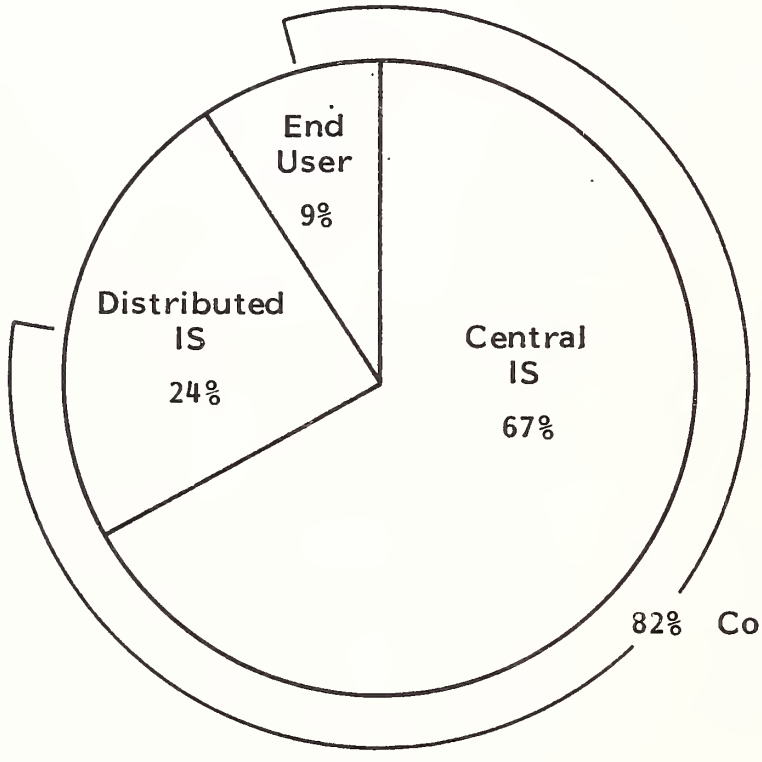
- Most of the respondents are just beginning to address end-user computing.

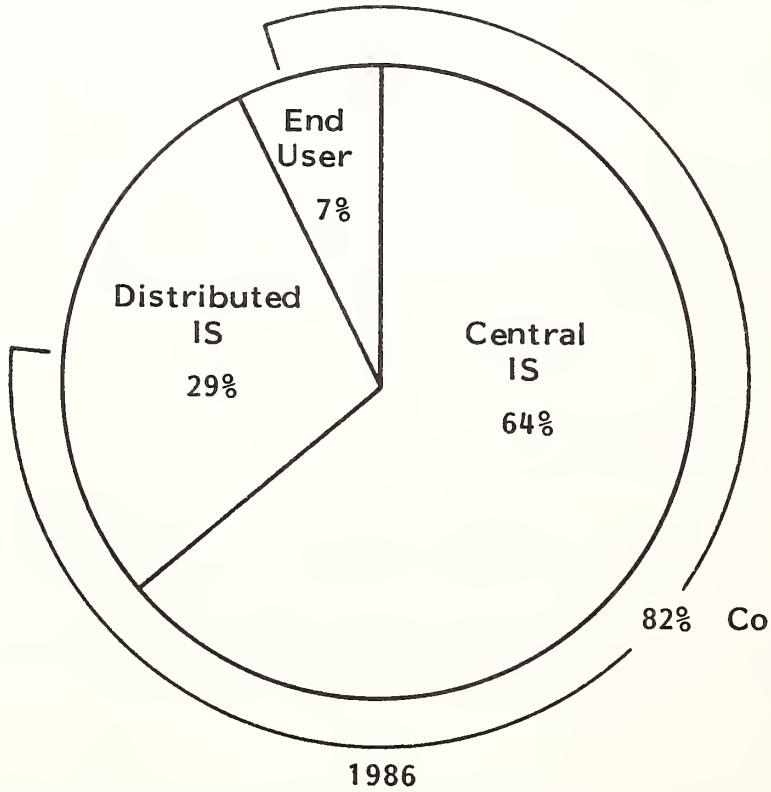
- Departmental processing is being studied by the respondents but little activity is currently in process.

EXHIBIT IV-53

DISTRIBUTION

DISTRIBUTION OF CORPORATE COMPUTING EXPENSES




Percent of Corporate and Company-wide IS Budgets

- There is very little distributed systems development in this sector.

- Relational data bases are viewed as something to address in the future. One respondent is piloting IBM's DB2 and another is using a relational-base fourth generation language for decision support, but few resources are allocated to these projects.

- There are comprehensive planning projects underway on communications, and merging voice and data is being studied in conjunction with these projects. The potential for reducing cost and simplifying managing networks are the potential benefits identified but none of the respondents plan to merge voice and data networks within the next three years.

- Most of the respondents did not have any LANs installed and saw no immediate need for them.

- Exhibit IV-54 summarizes the impact of the above technological issues on IS for the distribution sector.

e. End-User Computing

- End-user computing is in its infancy in most respondent companies. There is minor activity in the microcomputer area, and some of the respondents have an information center (IC).

- End-user training is also just beginning. The IC is the primary vehicle for training with limited use of computer-based training to augment classroom instruction.

- Exhibit IV-55 summarizes IS' role in microcomputer support.

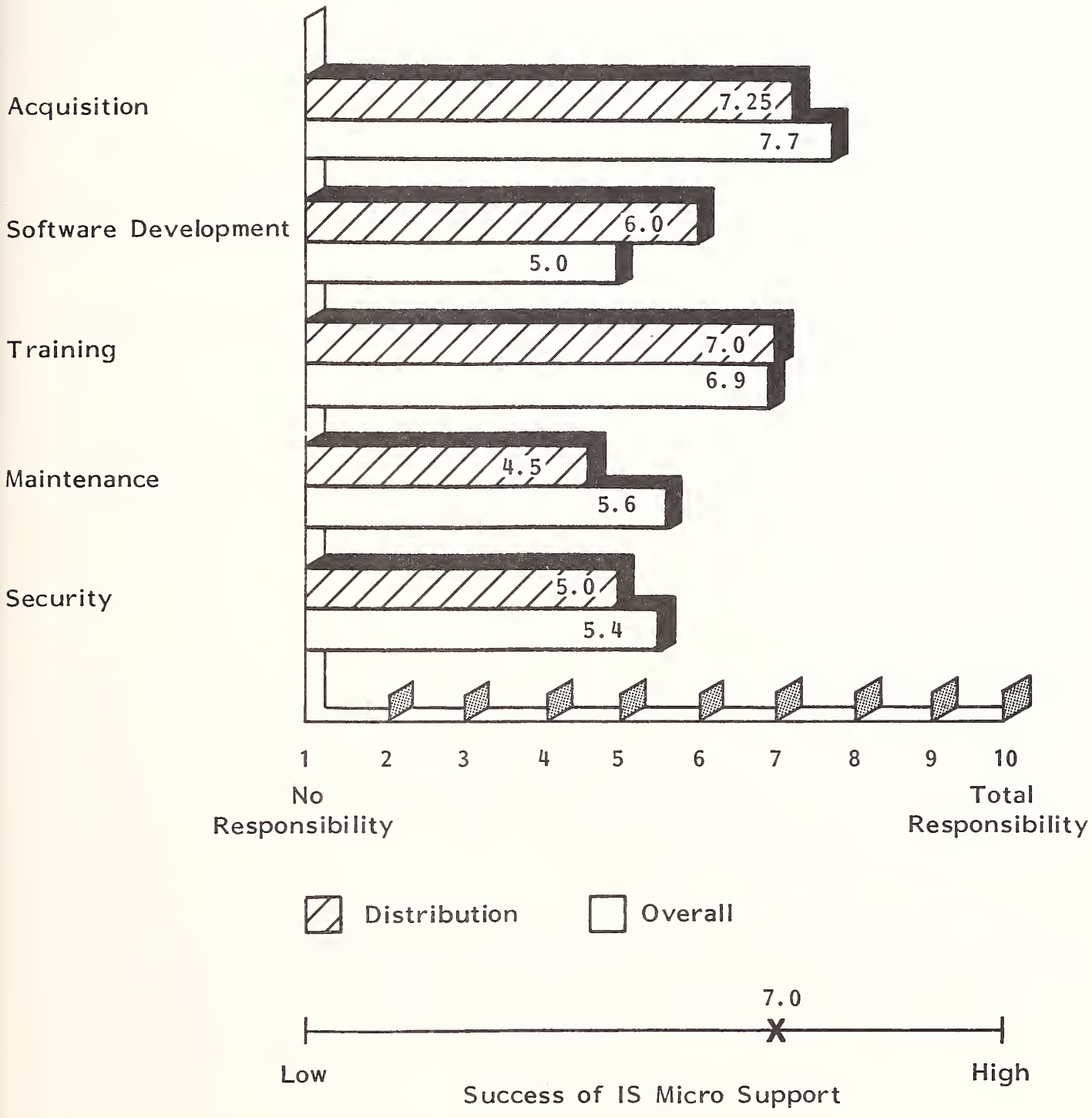
EXHIBIT IV-54

DISTRIBUTION
IMPACT OF TECHNOLOGY

| | IMPACT | COMMENTS |
|---|---|---|
| End-User Computing | Low | Just beginning. |
| Departmental Processing | Low | Very little activity. |
| Distributed Systems Development | Low | Very little activity. |
| Relational Data Bases | Low | Fourth-generation language DBs only. |
| Voice/Data Integration | Low/Medium | Planning phase. |
| LANs | Low | Very little activity. |

EXHIBIT IV-55

DISTRIBUTION
I.S. ROLE IN MICROCOMPUTER SUPPORT



- IS has established a list of preferred vendors for micro acquisition. IS is beginning to take a more active role in the acquisition process.

- IS does perform some micro software development for end users. This is due to the need of standarized micro applications, especially in demand forecasting for wholesalers.

- Training is primarily performed by IS through the IC. As the use of micros increase, the use of outside training organizations will be considered.

- Maintenance contracts are negotiated by IS for the respondent companies. The end user is responsible for dealing directly with the contractor for maintenance.

- IS is only responsible for establishing micro security standards for most respondent companies.

- The respondents believe that their microcomputer support is successful, although many respondents believe it is too soon to determine the actual effectiveness of micro end-user support.

2. NEW APPLICATIONS

- Major new applications in the distribution sector focuses on upgrading financial systems to be take advantage of the EFT environment and new store/warehouse management systems. Decision support systems (DSS) that help in ordering, inventory control, and traffice routing are also important. These DSS are primarily micro-based.

- Almost 75% of the development will be performed by internal resources. Most of the use of external products and services will be for distributed systems used in the stores and warehouses.

- Exhibit IV-56 summarizes the major new applications activity in the distribution sector.

3. BUDGET ANALYSIS

- The distribution sector's IS budget exhibited the greatest growth of any sector in 1985. In 1986 their budgets will also grow faster than IS budgets in general. This is due to the large investment in POS support systems and communication-based systems for wholesalers.

  - Exhibit IV-57 shows the 1985 budget distribution and projects the growth of budget categories in 1986.

    . The largest growth areas in 1986 are mini and microcomputers, mass storage, and communications. This reflects the main activity of exploiting POS' potential and providing micro-based DSS.

    . The smallest growth areas are outside processing (reduced spending), professional services and turnkey systems. This indicates the IS is using its internal resources to develop and support systems.

  - Exhibit IV-58 shows that this sector's growth was nearly three times the growth rate of IS budgets in general (28% versus 10%). In 1986, the distribution sector's IS budget will grow 17% faster than the overall IS budgets (11.9% versus 10.2%).

- In 1986, 92% of the respondents indicated that their budgets will increase, but 77% of the respondents indicated that their IS budgets will grow at lower rate from the hefty rates achieved in 1985. Exhibit IV-59 summarizes the 1986 growth projections of the respondents.

EXHIBIT IV-56

DISTRIBUTION
NEW APPLICATIONS FOR 1985

Most Important Applications

Finance (e.g. AP, AR)

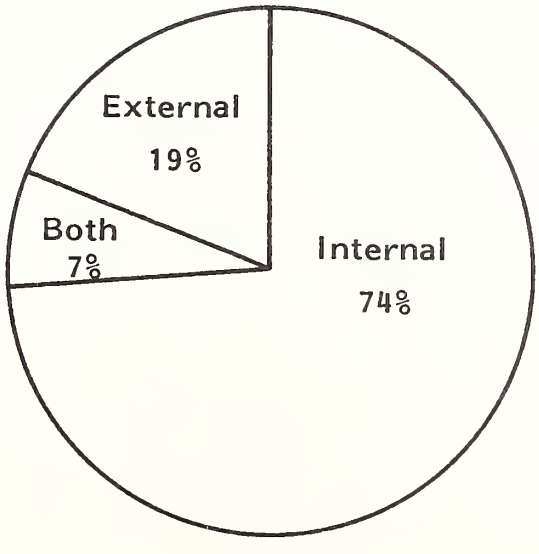
Merchant Processing

Personnel

Store Management

Decision Support

Source of Development (All New Major Applications)




Percent of Responses

Cost Range

$100K - $974K

EXHIBIT IV-57

## 1985 BUDGET DISTRIBUTION AND 1985/1986 CHANGES IN THE DISTRIBUTION SECTOR

| BUDGET CATEGORY | 1985 PERCENT OF I.S. BUDGET | 1985-1986 EXPECTED BUDGET GROWTH |
|---|---|---|
| Personnel Salaries and Fringes | 38.1% | 9.8% |
| Mainframe Processors | 7.2 | 11.7 |
| Minicomputers | 8.9 | 20.0 |
| Microcomputers | 1.3 | 30.6 |
| Mass Storage Devices | 3.0 | 25.0 |
| Other Hardware | 5.4 | 0.0 |
| Total Hardware | 25.8% | 14.6% |
| Data Communications | 9.6% | 14.9% |
| External Software | 4.9 | 8.4 |
| Professional Services | 2.2 | 0.0 |
| Turnkey Systems | 5.6 | 2.0 |
| Software Maintenance | 1.2 | 6.2 |
| Hardware Maintenance | 4.1 | 5.0 |
| Outside Processing Services | 3.8 | (3.6) |
| Other | 4.7 | 0.0 |
| Total | 100.0% | 11.9% |

EXHIBIT IV-58

DISTRIBUTION
I.S. BUDGETS GROWING FASTER THAN ALL I.S. BUDGETS

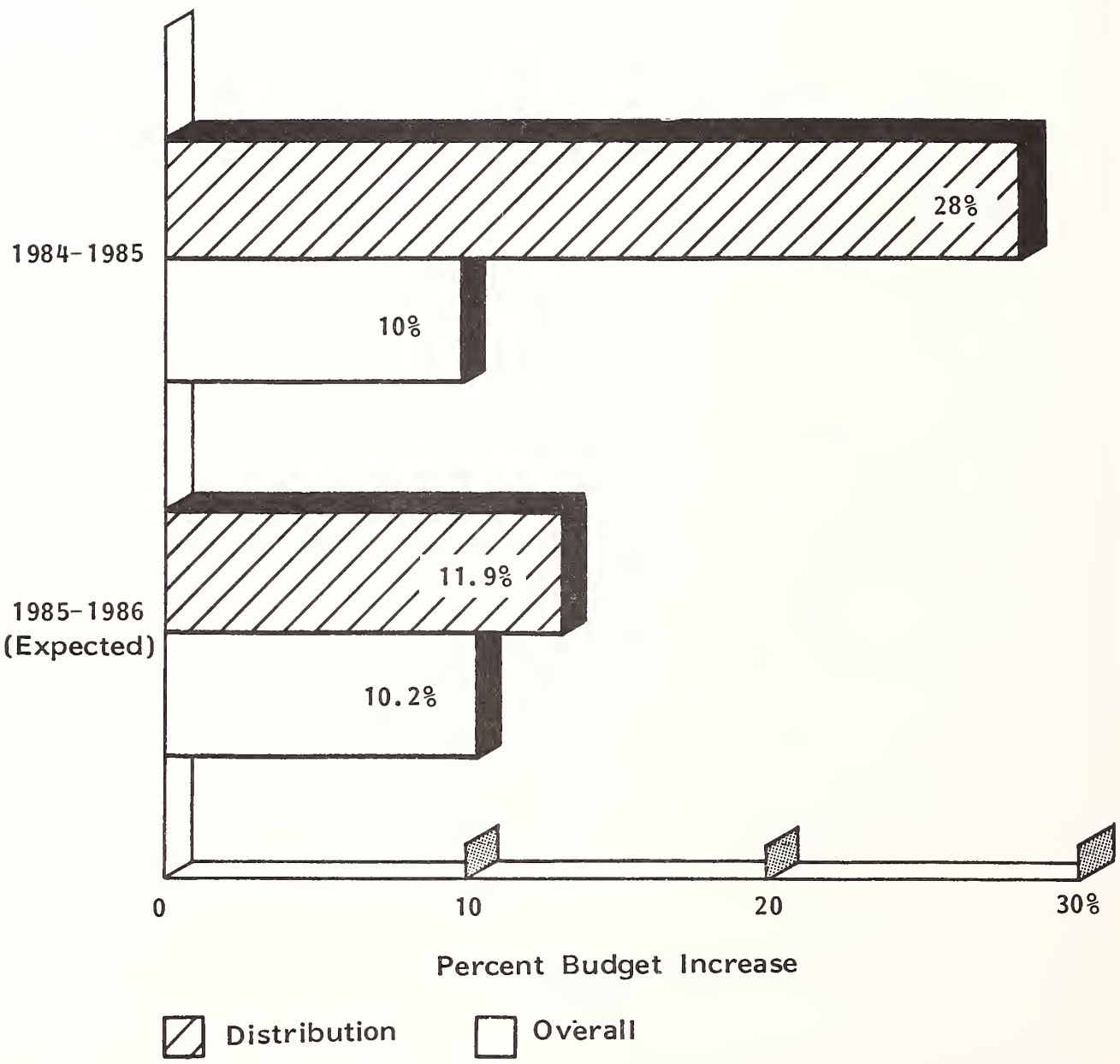
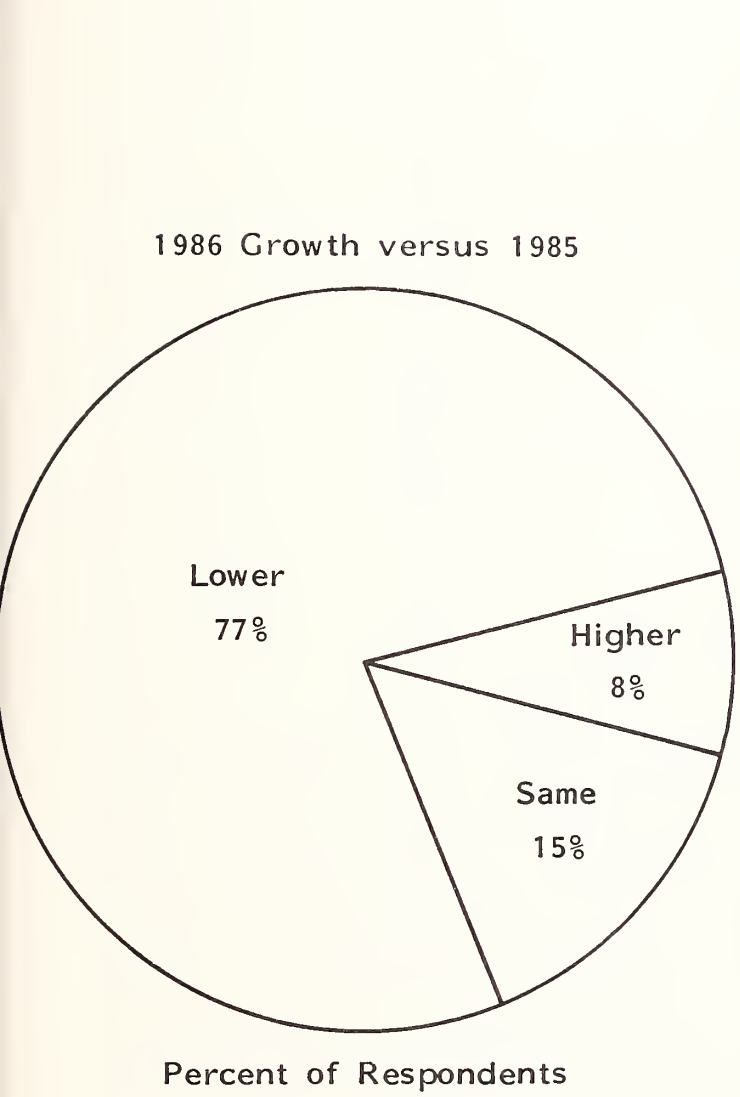
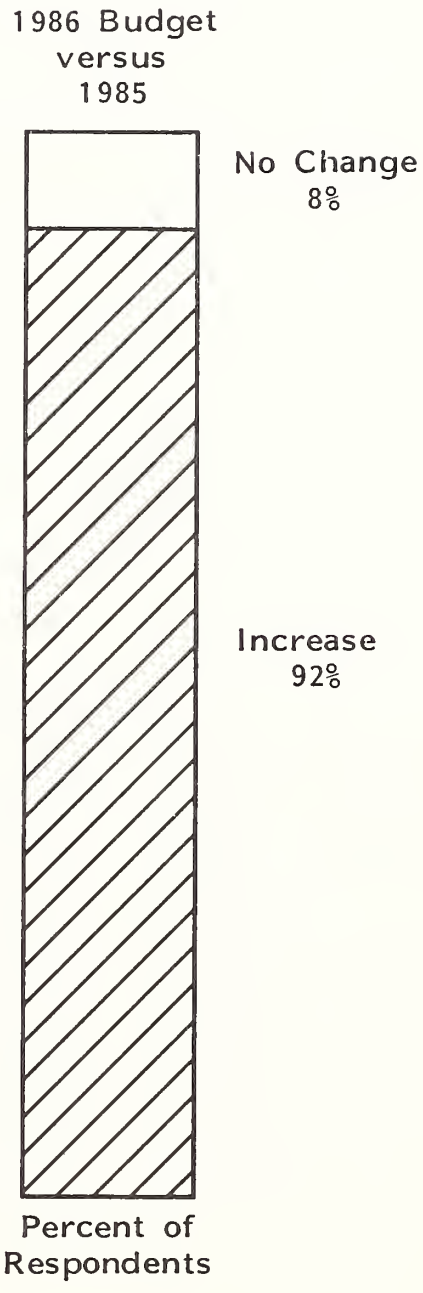


EXHIBIT IV-59

DISTRIBUTION
BUDGETS WILL INCREASE IN 1986 BUT AT A LOWER RATE



- Factors contributing to increasing the IS budget include (in order of most frequently mentioned factors):

  . Personnel expenses.

  . Hardware.

  . Software.

  . Data communications.

  . Inflation.

- Factors contributing to decreases in IS budgets include:

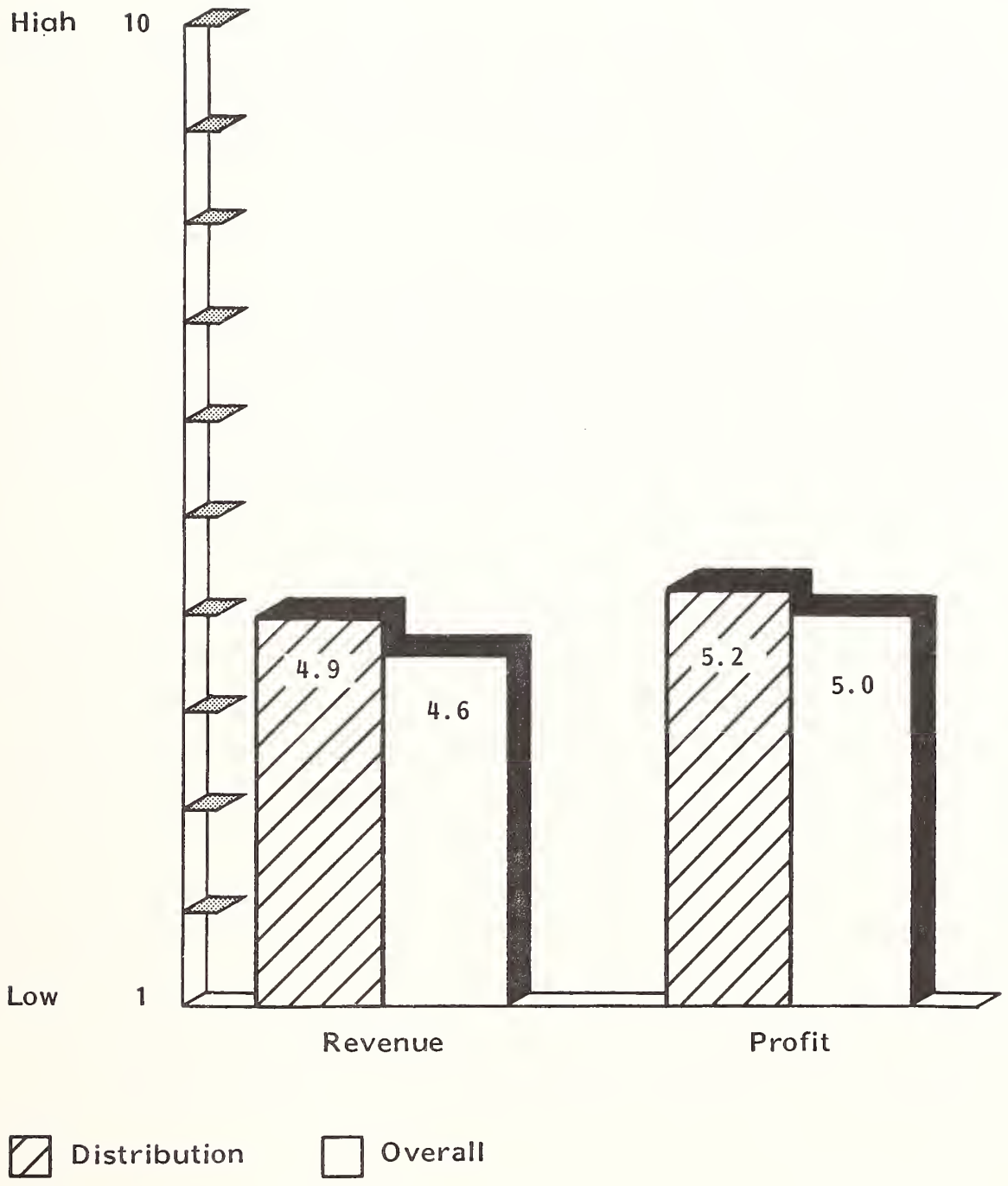
  . Less hardware.

  . Improved hardward efficiency.

- The distribution sector's IS department budget is more dependent upon corporate revenue and profit than IS department budgets in general (see Exhibit IV-60). As a potentially major contributor to corporate performance, management in this sector directly links corporate performance to IS budgets. However, the large impact of technology (e.g., POS and EFT) on the success of these institutions seems to warrant investment in IS independent of profit and revenue. This occurred in 1985 and should continue until systems are in place that exploit the potential these technologies present.

EXHIBIT IV-60

DISTRIBUTION
I.S. BUDGET DEPENDENCE



## F. UTILITIES

### I. MAJOR ISSUES

#### a. Driving Forces

- Most utilities have completed major capital projects resulting in up to 50% excess capacity in many utility operations. Demand has slowed, increasing at a 2% to 3% rate annually. Thus, no new major construction projects will be required until the 1990s.

- The economy has improved. Lower inflation and interest rates are usually good news to a capital intensive industry like utilities. Unfortunately, most of the major building programs were financed during periods of high inflation rates. Thus, the combination of excess capacity, lower growth in consumer demand, and high debt servicing requirements have placed most utilities into a major cost reduction program.

- Hardware and software obsolescence will impact many utilities. Basic commercial applications (e.g., billing, financial reporting, etc.) need to be upgraded. New billing and payment systems that take advanage of technological advances such as pay-by-phone and frequency emitting meters will need to be developed. Engineering and operation systems will require more integration with modeling systems to project capacity.

- Regulatory reporting will continue to place a burden on information systems resources.

- Exhibit IV-61 summarizes the driving forces for the utilities sector.

EXHIBIT IV-61

UTILITIES
DRIVING FORCES

- Regulation
- Economy (Inflation and Interest Rates)
- Excess Capacity
- Lower Growth in Demand

b. Issues and Objectives

- IS key issues for this sector focus on solving the paradox of containing costs while upgrading obsolete systems. In addition, management looks to IS to produce systems that improve productivity throughout the organization, but usually applies the same cost constraints on IS as on other departments.

- Utilities that are under less severe cost pressures (e.g., telephone companies) have issues and objectives encompassing expert systems, formalizing end-user support organizations, and taking a more active role in the corporate planning process.

- Exhibits IV-62 and IV-63 summarize the issues and objectives of the IS respondents for this sector.

c. Management Perception and Organizational Issues

- Management in the utility sector perceives IS as a technical asset, not a business asset. They are just beginning to see the advantage of IS as a strategic tool, but management is most concerned with cost containment and IS' role in achieving that goal by improving corporate-wide productivity.

- IS measures its success in terms in which management is most interested--cost. Costs are compared to other departments and with IS departments of similar organizations. Some respondents do perform cost benefit analysis on major projects and communicate the results to management, but very little post implementation analysis is performed. Most respondents believe they have moderate success in communicating their measurements to management. Exhibit IV-64 summarizes the measurement techniques used by the respondents.

- IS departments' responsibilities are increasing, and they are reporting higher in the organization than two years ago. In the next two years, respondents

EXHIBIT IV-62

UTILITIES
ISSUES

- Cost Containment
- Hardware and Software Obsolescence
- Regulatory Reporting
- Improve Productivity
- Management Awareness of Strategic Worth of IS

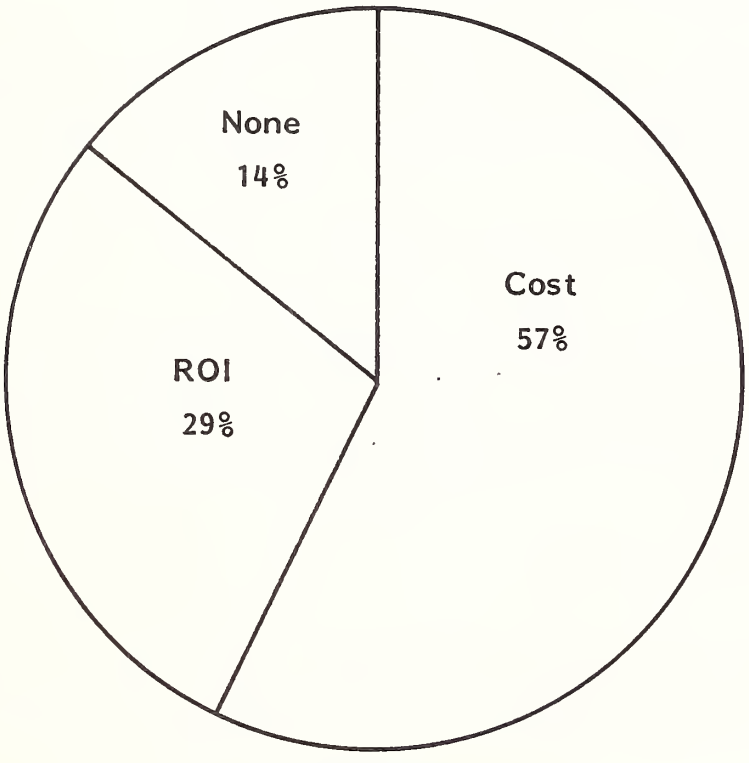
EXHIBIT IV-63

UTILITIES
OBJECTIVES

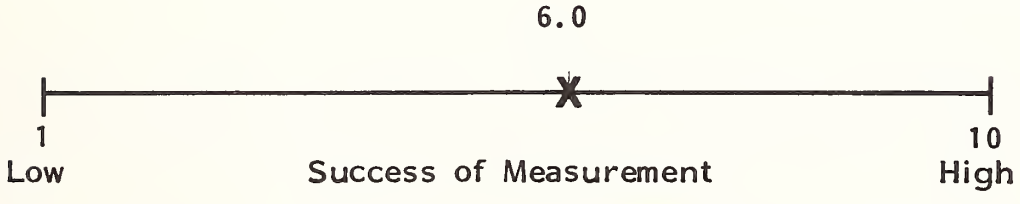
- Upgrade Billing and Payment Systems
- Establish Expert Systems for Network Management
- Establish Cost Justification Procedure for End-User Computing
- Install Capital Management System
- Integrate IS Plan with Corporate Strategic Plan
- Allocate Scarce Resources during Period of Extreme Cost Containment

EXHIBIT IV-64

UTILITIES
I.S. MEASUREMENT TO MANAGEMENT




Percent of Responses



anticipate a move from a back office operation role to a consulting business solution role.

- Most respondents have very minor involvement in corporate planning, but some see their role in this area increasing. One respondent is part of the corporate strategic planning group.

- Respondents believe some of IS' services can be used to increase revenues. They identified two major areas:

  - Sell systems to customers. One respondent developed a network management expert system that is being marketed to customers.

  - Consult on a fee basis to customers.

- The utilities' IS departments are primarily centralized and this organization should remain indefinitely. Exhibit IV-65 shows the distribution of this sector's IS departments in 1985 and projected distribution in 1986.

d. Impact of Technology

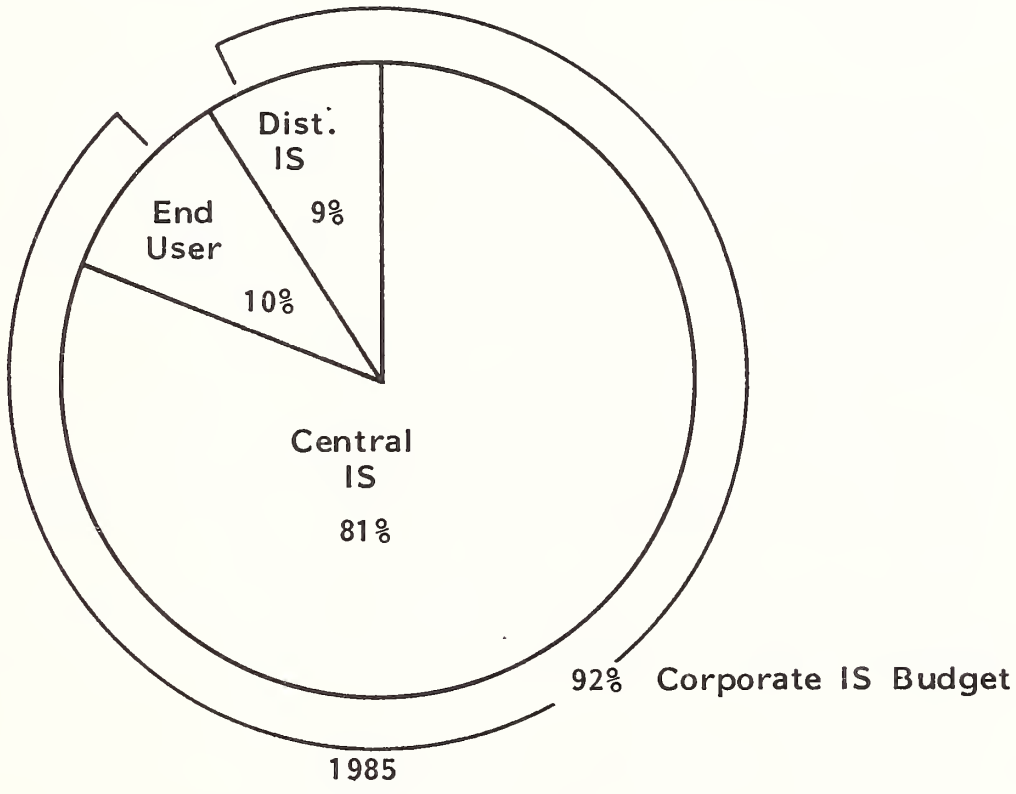
- End-user computing has had a significant impact on this sector's IS department. It has broadened IS' scope and required it to become service oriented.

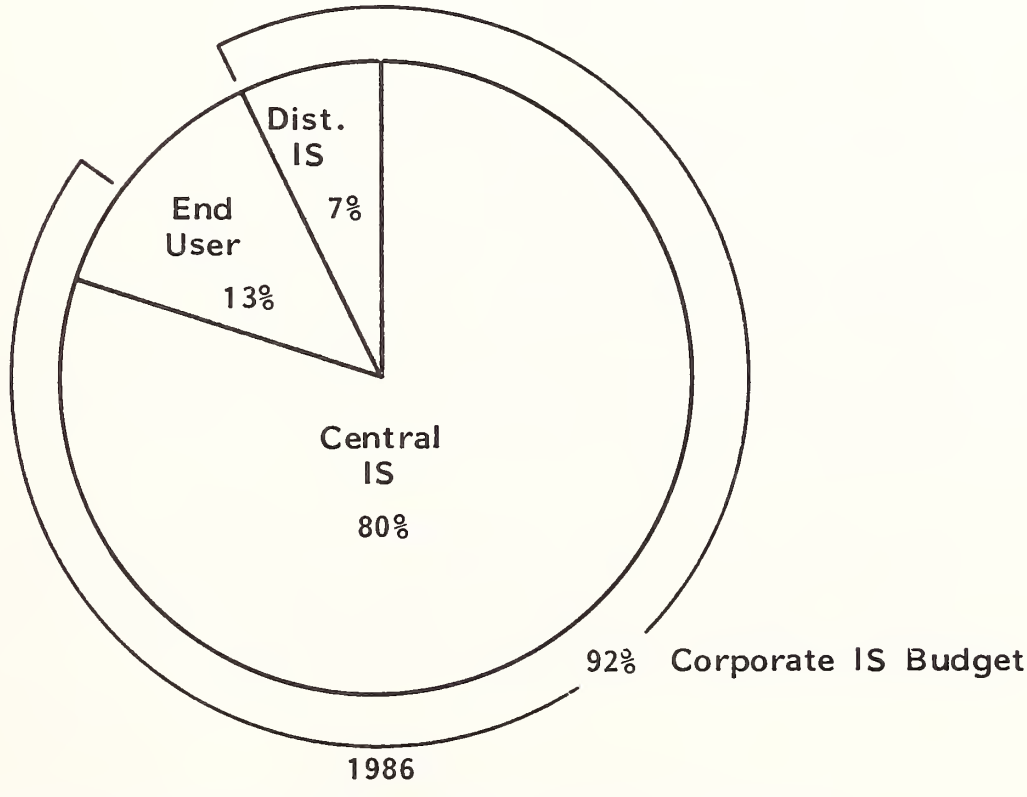
- Departmental processing has had little impact in this sector. The highly centralized approach to processing coupled with severe cost controls has relegated the study of departmental processing to a very low priority in many companies.

- The major thrust in distributed systems development is micro-based end-user applications. One respondent is developing two systems using this technique.

EXHIBIT IV-65

UTILITIES
DISTRIBUTION OF CORPORATE COMPUTING EXPENSES




Percent of Corporate and Company-wide IS Budgets

- The respondents felt that the learning curve for relational data base use is very high. However, some respondents are developing applications using relational data bases and others are using relational-like fourth generation languages.

- Most of the respondents believe that mergin voice and data will be required in their organization. Their belief is based on the concept that voice communications costs would be reduced once voice and data are merged. The respondents are planning for merging voice and data, but believe it will be at least two years before it can be implemented.

- The lack of LAN standards is delaying the wide spread use of LANs in respondent companies. Respondents state that they can not make an educated decision on which architecture to use, so most companies ae taking a tentative, cautious approach to LAN implementation.

- Exhibit IV-66 summarizes the impact of the above technological issues on IS for the distribution sector.

e. End-User Computing

- This sector has had great success with their end-user computing support. One respondent has increased staff in this area at annual rate of 20% since 1982 and now has a staff of over 60 people supporting end users. In other organizations, end-user computing has forced IS to become more business and service oriented. Ancillary benefits to establishing the end-user support organization have been to increase user understanding of the complexitieis of IS and heightened management awareness of the capabilities IS can provide.

- As in other sectors, the information center (IC) has been the focal point for end-user training. The more advanced end-user organizations have a separate training group that performs the following functions:

EXHIBIT IV-66

UTILITIES
IMPACT OF TECHNOLOGY

| | IMPACT | COMMENTS |
|---|---|---|
| End-User Computing | High | Dramatic increase in staff, 20% AAGR 1982-1984. Broadened IS scope. |
| Departmental Processing | Low | Unsure of usefulness. |
| Distributed Systems Development | Low/Medium | Causing IS architectural problems. Some using FGL for this. |
| Relational Data Bases | Low/Medium | Learning curve is higher than anticipated. Primarily using FGLs. |
| Voice/Data Integration | Medium | Most in planning phase. High potential for cost savings. |
| LANs | Low | Cautious approach. Lack of standards is precluding action. |

- Trains other IS personnel.

- Develops computer-based training programs.

- Conducts seminars for user groups.

- Arranges vendor presentations.

- Conducts on-site classes.

- Conducts classes in the IC.

- Exhibit IV-67 summarizes IS' role in microcomputer support.

  - IS has established a list of approved vendors, and many of the respondents have approval authority over all microcomputer acquisitions.

  - Most of the micro software is purchased from a list of products approved by IS. IS does little micro software development.

  - IS has a major role in microcomputer training.

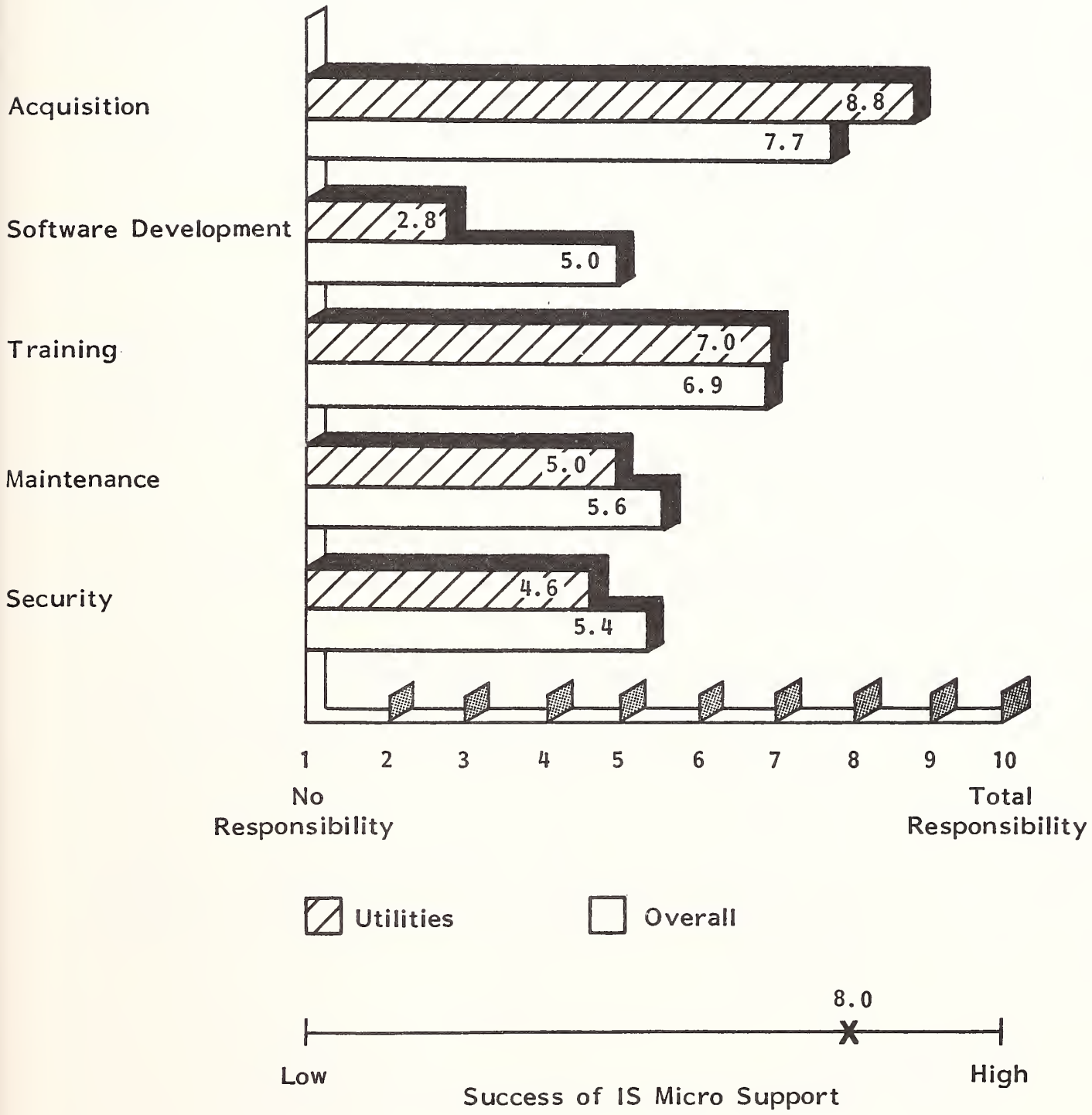
  - Most respondents use outside vendors for micro maintenance. IS is responsible for managing the maintenance contracts.

  - IS primarily sets micro security standards. It is up to the user organization to enforce these standards.

  - Most respondents believe their micro support is excellent. One of the respondents received an outstanding rating by the company's auditors on the level of micro support. The biggest support problem experienced by the respondents is keeping up with the demand.

EXHIBIT IV-67

UTILITIES
I.S. ROLE IN MICROCOMPUTER SUPPORT



## 2. NEW APPLICATIONS

- The major focus of the utilities sector for applications development is on upgrading or replacing obsolete applications.

- The vast majority (81%) of the applications development effort is conducted by internal resources. The respondents were not doing any joint development with outside organizations on major projects but are using software packages where they are cost effective.

- Exhibit IV-68 lists major new applications being developed by the respondents in this sector.

## 3. BUDGET ANALYSIS

- Although the utilities sector is under severe cost constraints, the respondents' IS budgets grew faster than IS budgets in general in 1985 and are projected to grow faster than the norm in 1986. This is due to the need to upgrade obsolete systems and the success of end-user computing.

  - Exhibit IV-69 shows the 1985 budget distribution and projects the growth of budget categories in 1986.

    . The largest projected growth categories are data communications and microcomputers. This is consistent with the desire to reduce communications cost and the acceleration of end-user computing.

    . The smallest growth areas are turnkey systems and outside processing. This reflects the IS desire to maintain control over processing.

EXHIBIT IV-68

# UTILITIES
# NEW APPLICATIONS IN 1985

## Most Important Applications

Materials Management

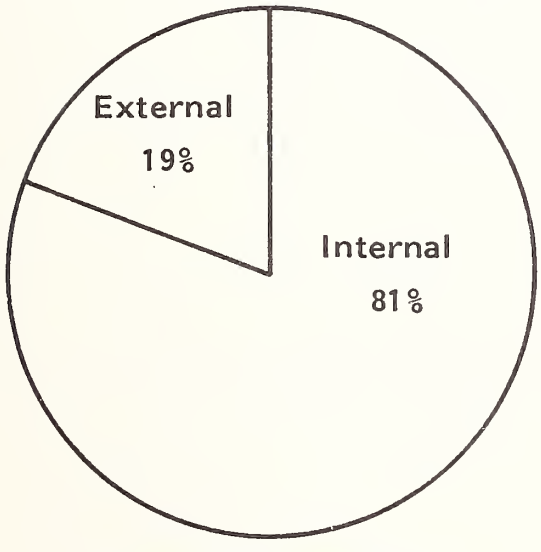
Property and Capital Management

Service and Maintenance Systems

Finance

Customer Billing

Source of Development (All New Major Applications)




Percent of Responses

Cost Range

$500K - $3M

EXHIBIT IV-69

1985 BUDGET DISTRIBUTION AND 1985/1986 CHANGES
IN THE UTILITIES SECTOR

| BUDGET CATEGORY | 1985 PERCENT OF I.S. BUDGET | 1985-1986 EXPECTED BUDGET GROWTH |
|---|---|---|
| Personnel Salaries and Fringes | 40.8% | 8.0% |
| Mainframe Processors | 9.5 | 10.0 |
| Minicomputers | 2.6 | 10.0 |
| Microcomputers | 1.6 | 15.0 |
| Mass Storage Devices | 5.4 | 10.0 |
| Other Hardware | 13.2 | 5.0 |
| Total Hardware | 32.3% | 11.8% |
| Data Communications | 7.4% | 17.5% |
| External Software | 3.8 | 7.7 |
| Professional Services | 4.3 | 9.3 |
| Turnkey Systems | 2.0 | 0.0 |
| Software Maintenance | 5.0 | 7.0 |
| Hardware Maintenance | 0.9 | 6.8 |
| Outside Processing Services | 1.5 | 0.0 |
| Other | 2.0 | 0.0 |
| Total | 100.0% | 12.3% |

- Exhibit IV-70 compares the sector's IS growth in 1985 and projected growth in 1986 to the growth rates of IS budgets in general.

- All respondents in the utilities sector indicated that their IS budgets will increase in 1986, and over half of the respondents said their budgets will increase at a higher rate than 1986 (see Exhibit IV-71).

  - Factors contributing to increasing the IS budget include (in order of most frequently mentioned factors):

    . Hardware.

    . Software.

    . Personnel expenses.

    . Inflation.

  - There were no factors identified that contributed to decreases in the IS budget.

- The utilities sector's IS budget was less dependent on revenue and profit than overall IS budgets (see Exhibit IV-72). This is due to the severe pressure to upgrade obsolete systems. Once the upgrades are completed, IS budgets will become more dependent on revenues. IS will be treated as a cost center, subject to the same severe cost constraints as most other departments.

EXHIBIT IV-70

UTILITIES
I.S. BUDGETS ARE GROWING FASTER THAN ALL I.S. BUDGETS

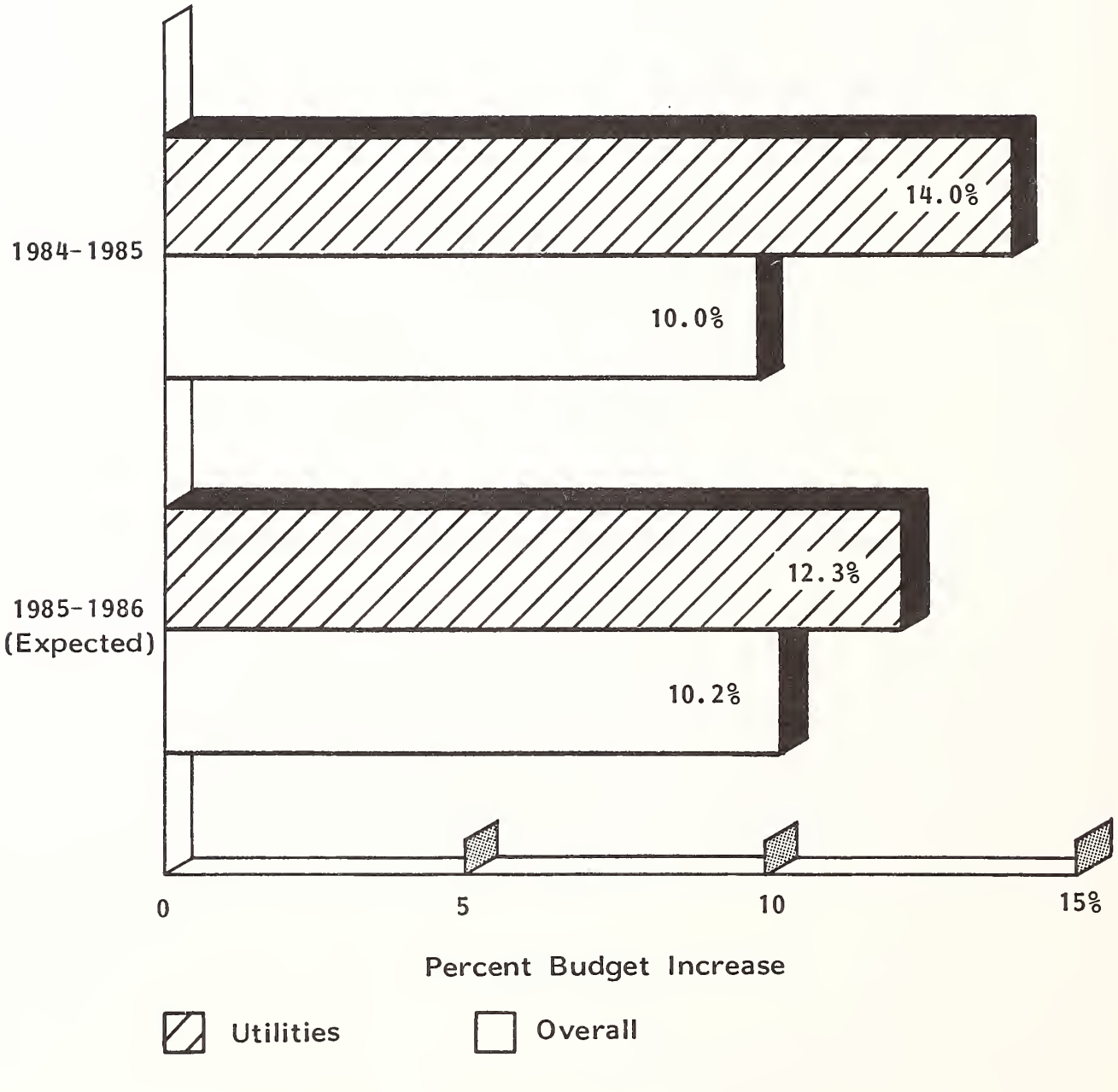
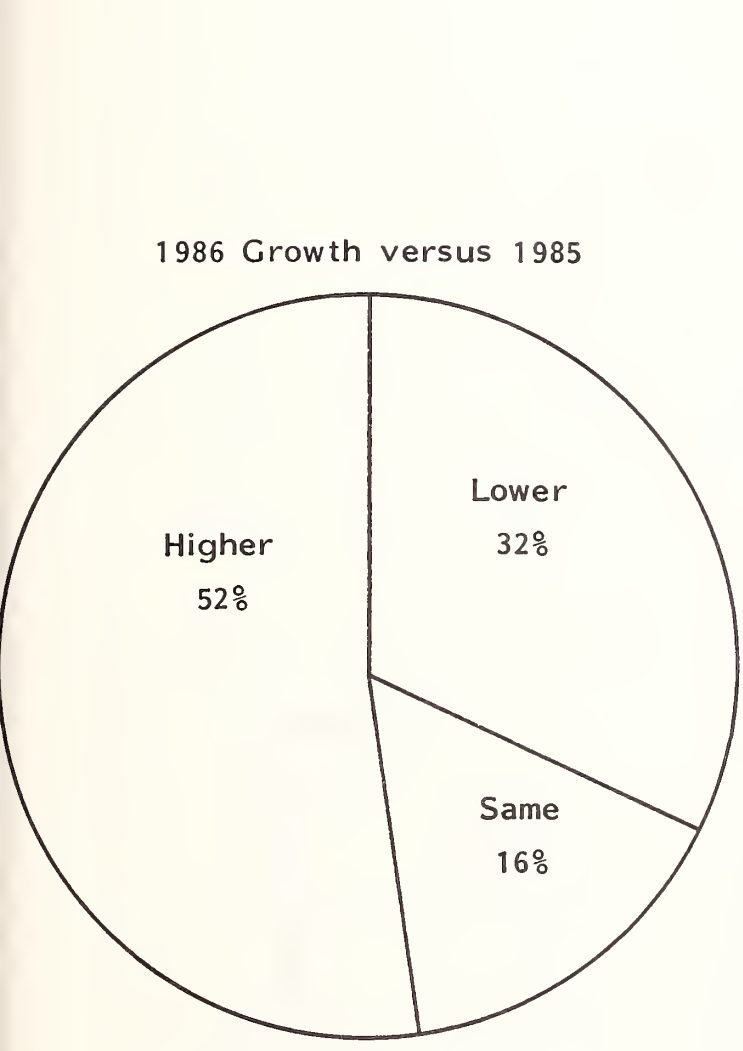


EXHIBIT IV-71

# UTILITIES
## BUDGETS WILL INCREASE BUT PRIMARILY AT A LOWER RATE



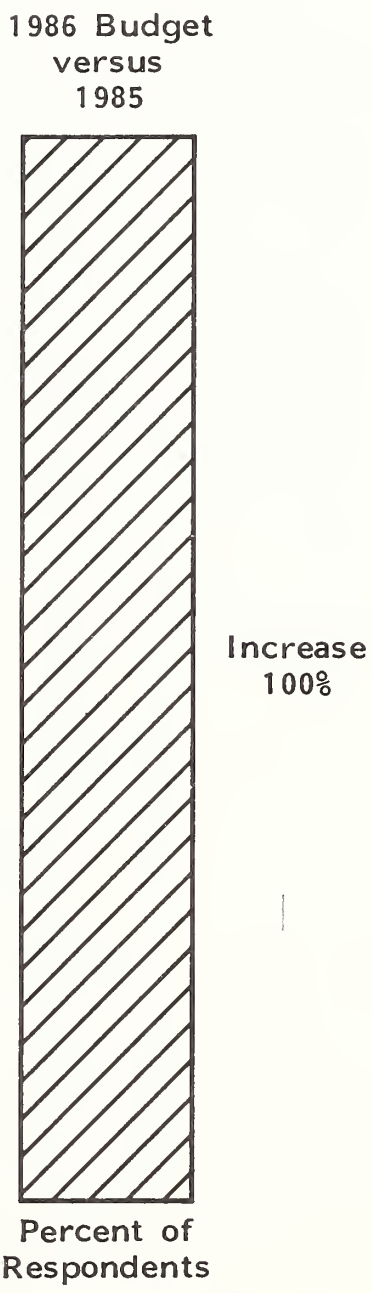
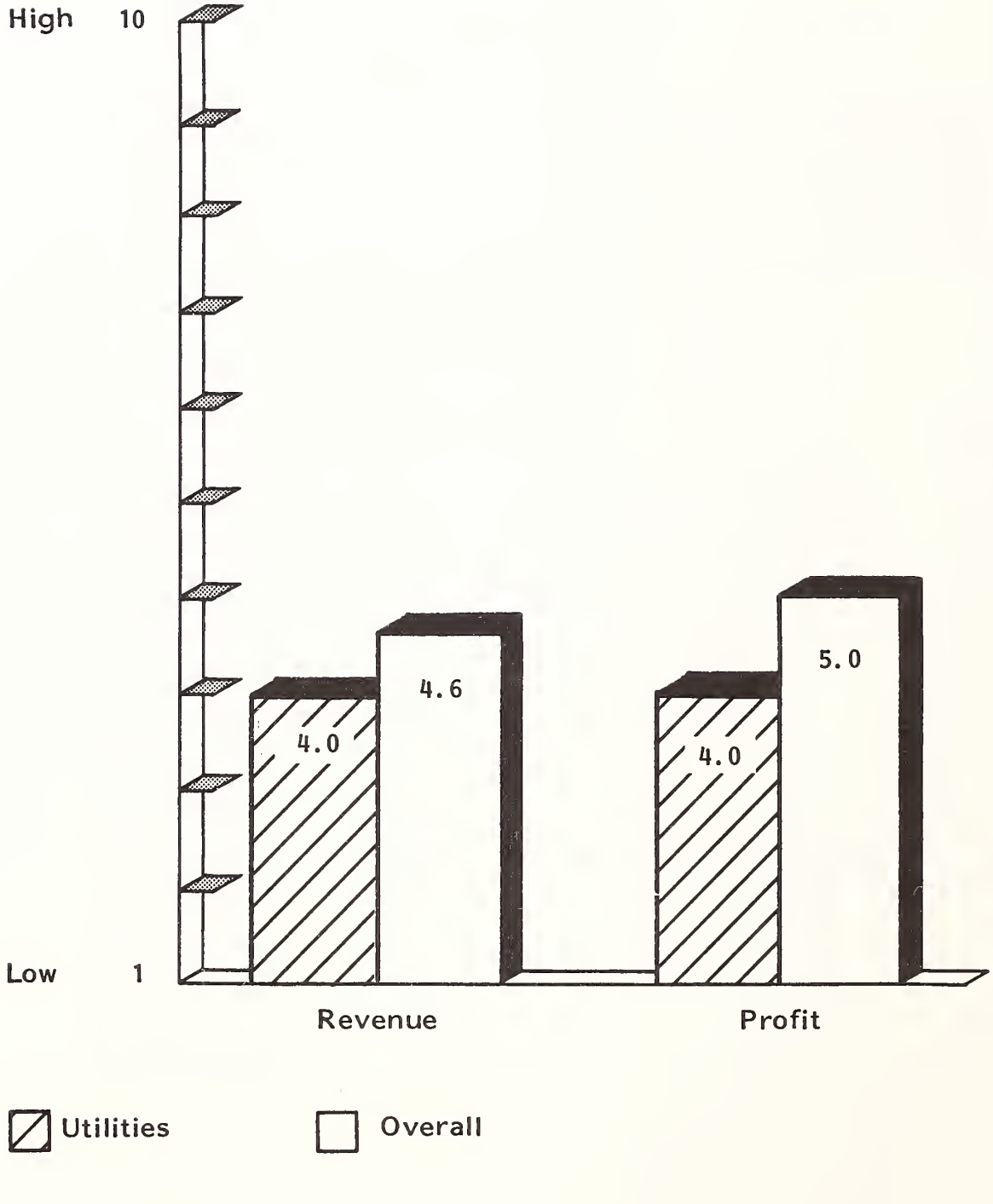



EXHIBIT IV-72

UTILITIES
I.S. BUDGET DEPENDENCE



## G. TRANSPORTATION

### 1. MAJOR ISSUES

#### a. Driving Forces

- The key requirement of transportation providers is to contain costs. Deregulation has made tariff regulations more complex and cost containment critical for profitable operation. Systems that identify the cost components of the operation need to be upgraded to provide timely cost information.

- Competitive analysis systems such as fare analysis for airlines are increasing in importance. Systems that integrate tariff, cost, and competitive information into decision support systems will be essential for the deregulated segment of the industry.

- Routing and fleet tracking systems will need to be upgraded to integrate with operations and maintenance applications.

- Exhibit IV-73 summarizes the driving forces for the transportation sector.

#### b. Issues and Objectives

- This sector's major IS issues focus on system integration, information delivery, and decison support. The respondents indicated that they had extensive data bases on customer history, routing, and fleet maintenance, but no integration. Also, this data was not easily accessable to planners, marketing personnel, or management. The key goal is to design an information architecture that can deliver timely information to a larger community of users. Respondents are also examing the potential for using information systems to provide product differentiation or even become revenue producing products themselves.

EXHIBIT IV-73

TRANSPORTATION
DRIVING FORCES

- Deregulation
- Cost Containment
- More Timely and Integrated Information

- The respondents' immediate goals center on communication, cost reduction, and increasing management awareness of IS' capabilities.

  - Over 15% of this sector's IS budget is spent on data communications. There is a major effort to contain this expense item, yet not diminish its role in the corporation. Since transportation is dependent on communications, data security on the network is a key concern in this sector.

  - IS is trying to improve its programmers' productivity and attempting to build end-user decision support systems that require minimal IS involvement. Both of these goals are being undertaken to improve responsiveness and reduce IS costs.

  - There is great potential for using information systems as a competitive weapon in this industry. United Airlines and American Airlines have effectively used their airline reservation systems to provide revenues and improve visibility with travel agents. Other companies within this sector could also use IS as means to increase revenues and product differentiation. But to do so, IS must elevate its status with senior management. Many of the respondents are establishing a management communication program to inform management of the strategic benefits of information systems.

- Exhibits IV-74 and IV-75 summarize the key issues identified by the respondents in the transportation sector.

c. Management Perception and Organizational Issues

- Most respondents believe their management views information systems as an asset. However, management still sees IS as a maintainer and data provider. In some companies in this sector there is still only minimal use of IS for strategic purposes.

EXHIBIT IV-74

TRANSPORTATION
ISSUES

- Information Delivery to Broader Base of Users and Customers
- Integrate Information from Diverse Systems for Competitive Analysis
- Create Competitive Analysis Systems
- Integrate Tracking Systems With Operation Systems
- Provide Product Differentiation through IS and Technology

EXHIBIT IV-75

TRANSPORTATION
OBJECTIVES

- Improve IS Recognition by Senior Management
- Improve Programmer Productivity
- Make Information Available with Minimal IS Involvement
- Reduce Communication Costs
- Improve Data Security

- The respondents are trying to increase their visibility with management by measuring IS success. The main vehicles used are project completion and the establishment of user steering committees. Cost benefit analysis is performed on major projects and management is kept aware of status via reports to key executives. End-user computing is also being used effectively to increase management's awareness of IS' capabilities. The respondents believe their management communications is moderately successful. Exhibit IV-76 summarizes the measurements the respondents use to communicate IS' value to management.

- IS' role has not changed in the last two years. Respondents believe that in the next two years IS will participate more in corporate planning and increase executive awareness of information systems strategic worth to their company.

- The respondents listed the following ways information systems can be used as a competitive weapon in the transportation sector:

  - Sell systems as part of their company's service.

  - Improve marketing and sales information.

  - Provide decision support systems internally and sell to customers for the following areas:

    . Maintenance.

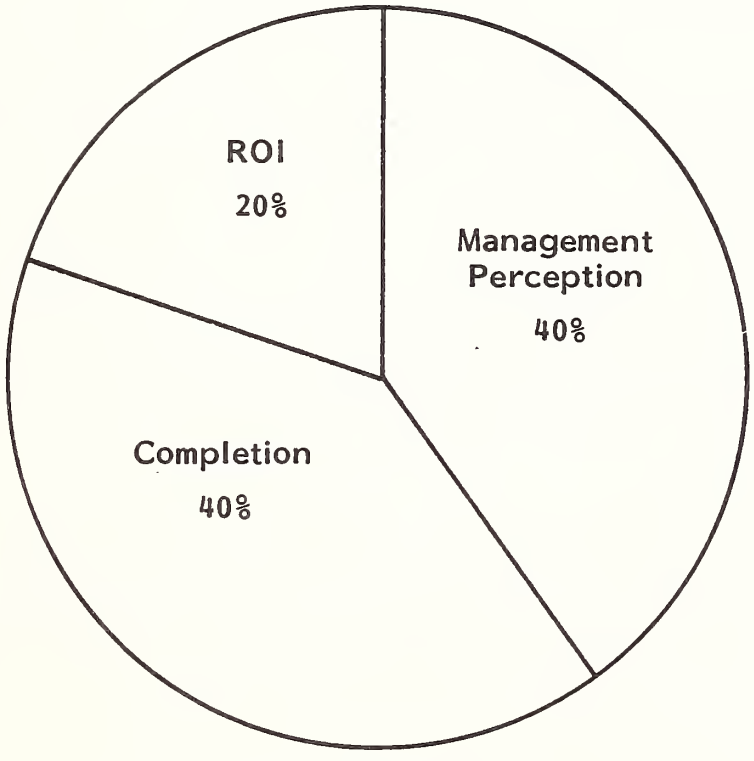
    . Fleet tracking.

    . Inventory.

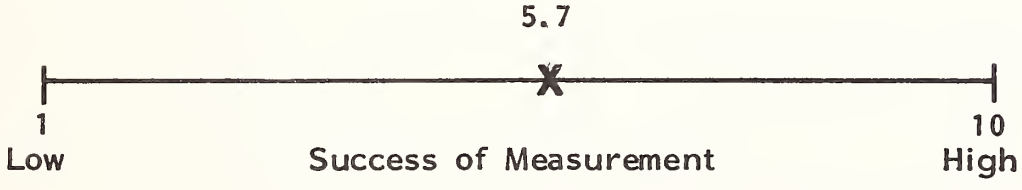
    . Routing.

EXHIBIT IV-76

TRANSPORTATION
I.S. MEASUREMENT TO MANAGEMENT




Percent of Responses



- Exhibit IV-77 shows that the respondent IS departments are primarily centralized, with 80% of the company's IS expenditures controlled by corporate IS. This distribution is not projected to change in 1986.

d. Impact of Technology

- End-user computing has had a moderate impact on the respondent IS organizations. It has placed more demands for IS resources, but has also reduced the programming backlog.

- The respondents believe that departmental processors will have little impact on their IS strategy. End-user information needs will be primarily satisfied by micro-to-mainframe applications.

- Some of the respondents believe that distributed systems development will have a significant long-range impact on IS. However, in the near term they see little impact. Most of the activity is focused on end users doing ad hoc reporting programs.

- Relational data base management systems will have a minor near term affect on IS. Most respondents are not taking any action in this area. They are concerned about performance problems and are not convinced that the ease of use is worth the operations cost.

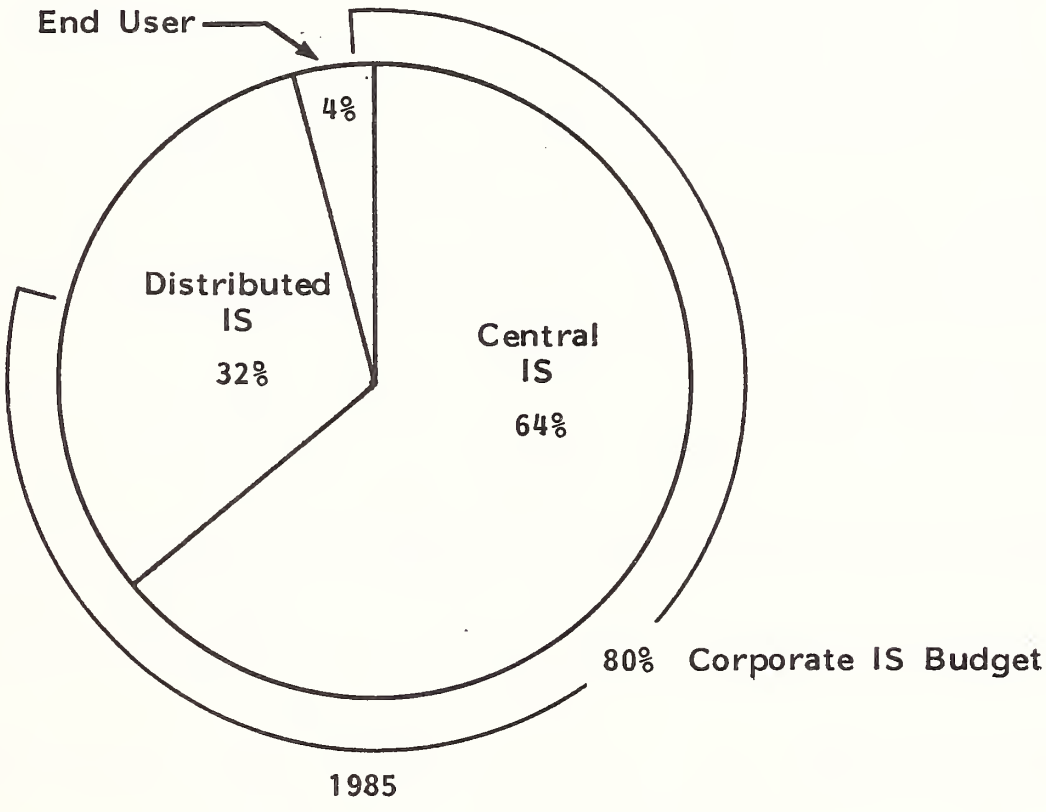
- Most respondents stated that merging voice and data is not practical in the near term. Although a major goal is to contain communications costs, they are not convinced that merging voice and data is a solution.

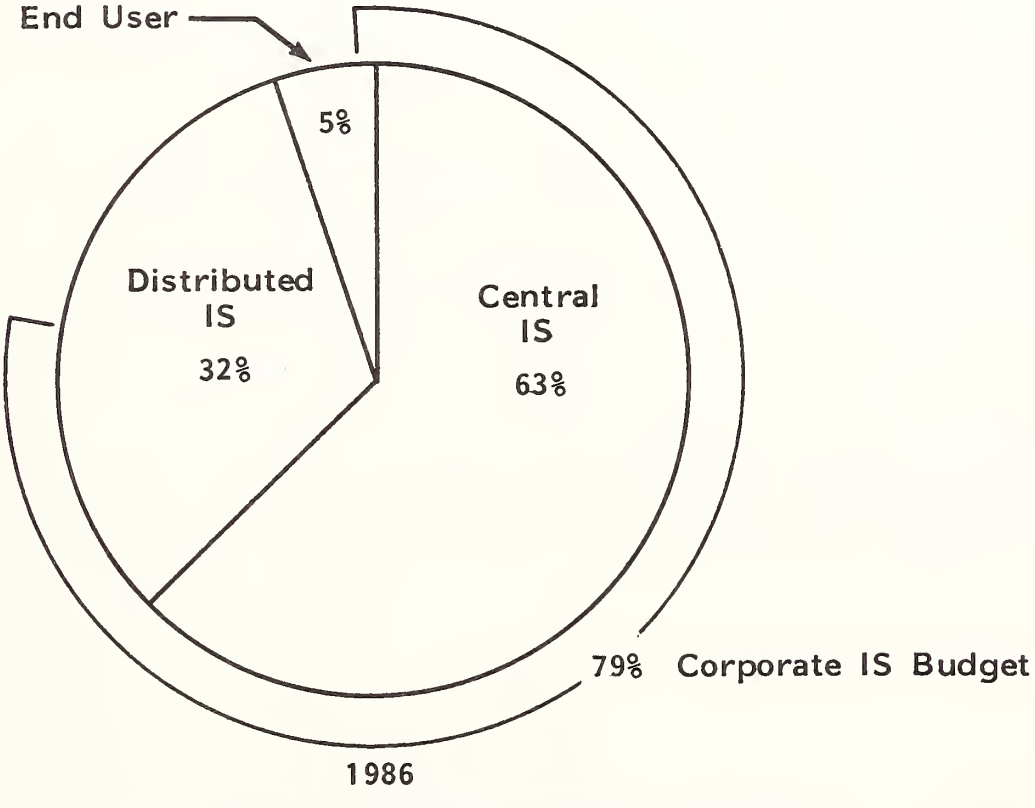
- The respondent companies had only a few LANs installed, and they see little short-term need for them.

- Exhibit IV-78 summarizes the impact of the above technological issues on IS for the transportation sector.

EXHIBIT IV-77

TRANSPORTATION
DISTRIBUTION OF CORPORATE COMPUTING EXPENSES




Percent of Corporate and Company-wide IS Budgets

EXHIBIT IV-78

TRANSPORTATION
IMPACT OF TECHNOLOGY

| | IMPACT | COMMENTS |
|---|---|---|
| End-User Computing | Medium | Significantly decreased backlog. |
| Departmental Processing | Low | Most looking to M-M to satisfy this need. |
| Distributed Systems Development | Low/Medium | Long-range, potentially high impact, primarily for ad hoc reporting and analysis. Little impact now. |
| Relational Data Bases | Low | Been deferred due to potential performance problems. |
| Voice/Data Integration | Low | Little activity. |
| LANs | Low | Few LANs. |

e. End-User Computing

- End-user computing has significantly reduced the program backlog (up to 30%), but has increased the demand for IS resources. The information center (IC) has been very successful and has been a major force in increasing IS' visibility with senior management.

- The IC has been the focal point for end-user training. Most of this training has been on microcomputers, and very little computer-based training has been used.

- Exhibit IV-79 summarizes IS' role in microcomputer support.

  - IS primarily advises users on micro purchases.

  - IS takes a very minor role in micro software selection and development.

  - Microcomputer training is conducted through the IC, although many users find other sources for training.

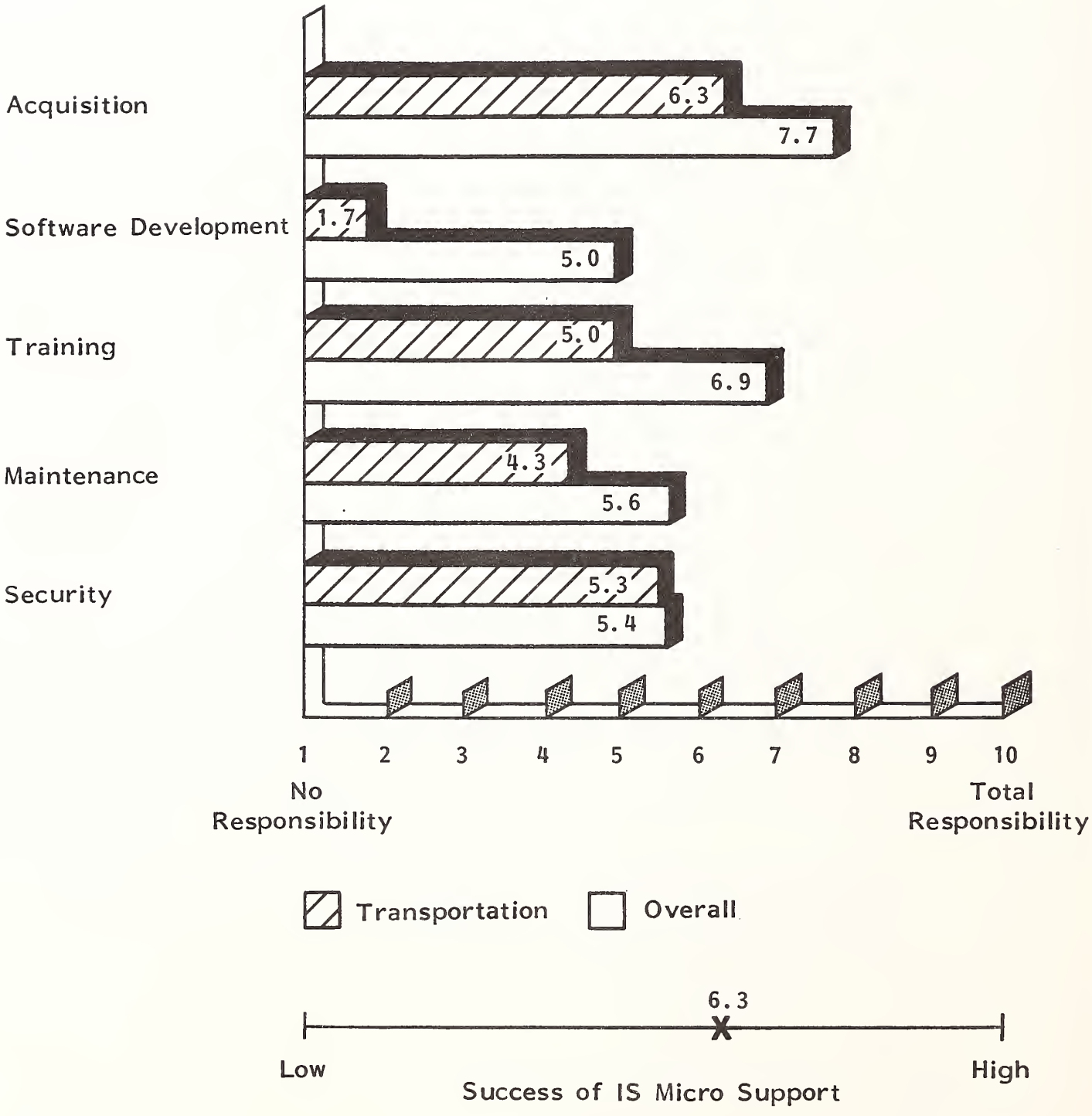
  - IS advises users on sources for micro maintenance. Users are responsible for maintaining their own equipment.

  - IS establishes corporate security procedures with no specific group responsible for enforcement.

  - The respondents believe their micro support has been above average, although they have received little comment from users or management on the success of this suport.

EXHIBIT IV-79

TRANSPORTATION
I.S. ROLE IN MICROCOMPUTER SUPPORT



## 2. NEW APPLICATIONS

- Most of the major new applications have been cross-industry applications.
  - There is a need to upgrade outdated administrative systems and systems software.
  - Office automation (OA) is beginning to be actively pursued due to the successful use of microcomputers by end users.
- Most of the applications development is being done by internal resources. Software packages are being used for OA and some administrative systems.
- Exhibit IV-80 lists the major new applications that the respondents are developing in the coming year.

## 3. BUDGET ANALYSIS

- The respondents' IS budget growth is significantly slower than IS budgets in general. Deregulation has put pressure on profitability and IS has been directed to contain costs.
  - Exhibit IV-81 shows the 1985 budget distribution and projects the growth of budget categories in 1986.
    - The largest projected growth categories are minicomputers, microcomputers, and mass storage devices. The growth of mini and micros are from a low expenditure level (0.5% and 0.7% of budget) and reflects some expansion of end-user computing. The mass storage expansion is a prerequisite to improving the availability of computer-based information throughout the organization.

EXHIBIT IV-80

TRANSPORTATION
NEW APPLICATIONS IN 1985

Most Important Applications

Finance

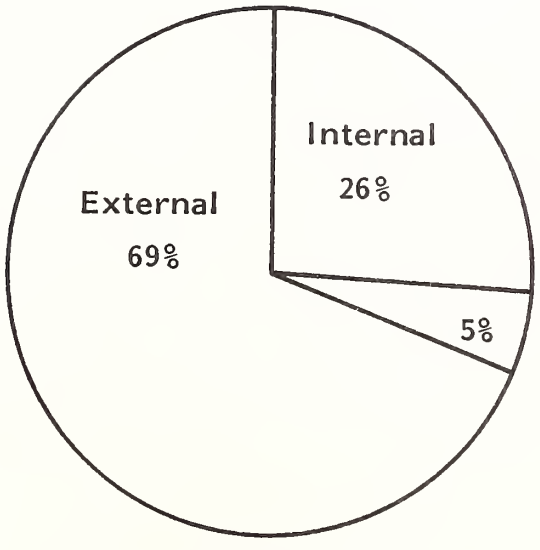
Office Systems

Systems Software

Human Resources

Truck Licensing

Source of Development (All New Major Applications)




Percent of Responses

Cost Range

$25K - $120K

EXHIBIT IV-81

## 1985 BUDGET DISTRIBUTION AND 1985/1986 CHANGES IN THE TRANSPORTATION SECTOR

| BUDGET CATEGORY | 1985 PERCENT OF I.S. BUDGET | 1985-1986 EXPECTED BUDGET GROWTH |
|---|---|---|
| Personnel Salaries and Fringes | 40.6% | 4.0% |
| Mainframe Processors | 6.1 | 10.0 |
| Minicomputers | 0.5 | 100.0 |
| Microcomputers | 0.7 | 10.0 |
| Mass Storage Devices | 6.2 | 8.0 |
| Other Hardware | 7.1 | 0.0 |
| Total Hardware | 20.6% | 9.5% |
| Data Communications | 15.8% | 2.4% |
| External Software | 1.4 | 3.8 |
| Professional Services | 4.1 | 5.5 |
| Turnkey Systems | 0.0 | 0.0 |
| Software Maintenance | 0.5 | 0.5 |
| Hardware Maintenance | 12.1 | 5.0 |
| Outside Processing Services | 2.5 | 0.0 |
| Other | 2.4 | 0.0 |
| Total | 100.0% | 6.0% |

  - . The smallest growth areas are software maintenance, outside processing, and data communications. Cost containment is focusing on deferable expenses and data communications.

  - Exhibit IV-82 shows that the respondent companies' IS growth was less than half of the growth rate experienced by all IS organizations in 1985 (4.0% versus 10%). In 1986, this sector's IS budget growth will also be just over half of IS' budget growth in general.

- Sixty percent of the respondents anticipate their IS budgets will increase in 1986, but 60% of these project that their budgets will grow at a lower rate than 1985 (see Exhibit IV-83).

  - Factors contributing to increasing the IS budget include (in order of most frequently mentioned factors):

    - . Hardware.

    - . Inflation.

    - . Software.

    - . Personnel expense.

  - There were no factors identified by respondents that contributed to decreases in the IS budget.

- The transportation sector's IS budget is less dependent on corporate revenue and profits than other IS organizations (see Exhibit IV-84). This sector is currently focusing on cost containment and that factor drives the IS budget. This sector will need to expand its IS budget in the near future to take advantage of the opportunities that information systems can provide. The companies that do not invest in information systems may find their competi-

EXHIBIT IV-82

TRANSPORTATION

I.S. BUDGET GROWTH IS SLOWER THAN ALL I.S. BUDGETS

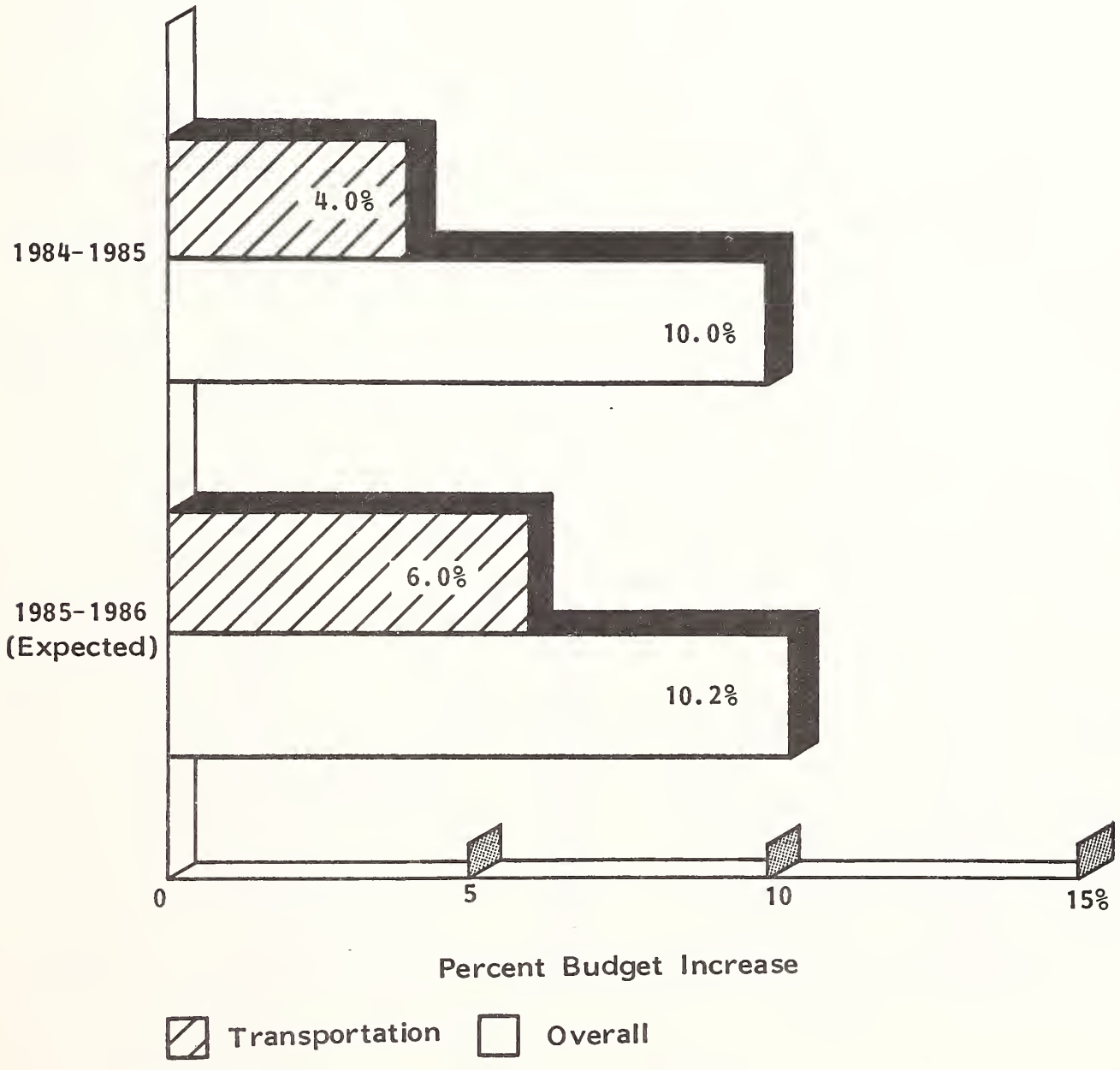
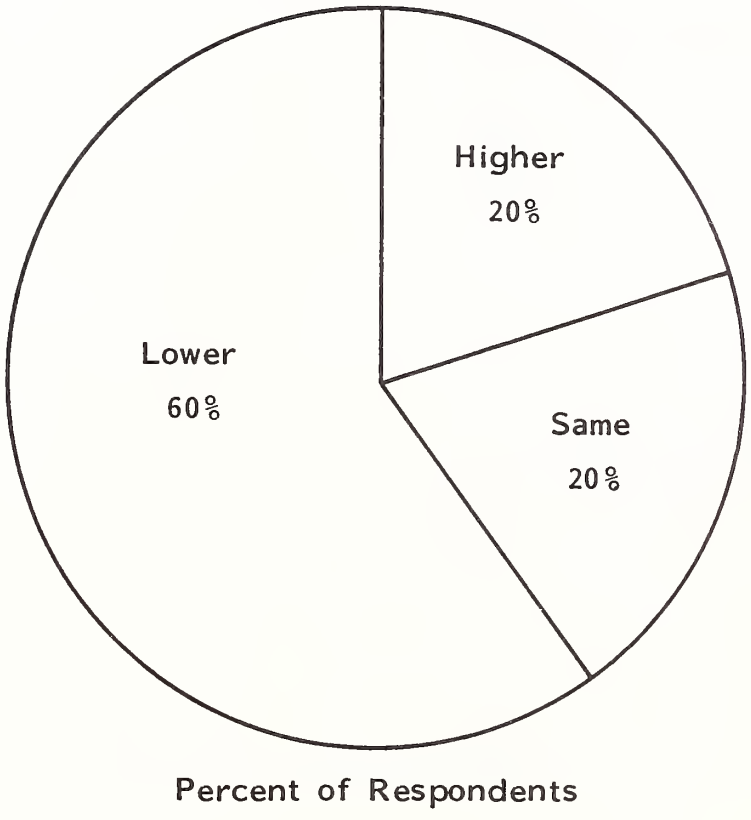


EXHIBIT IV-83

TRANSPORTATION
MOST BUDGETS WILL INCREASE BUT AT A LOWER RATE



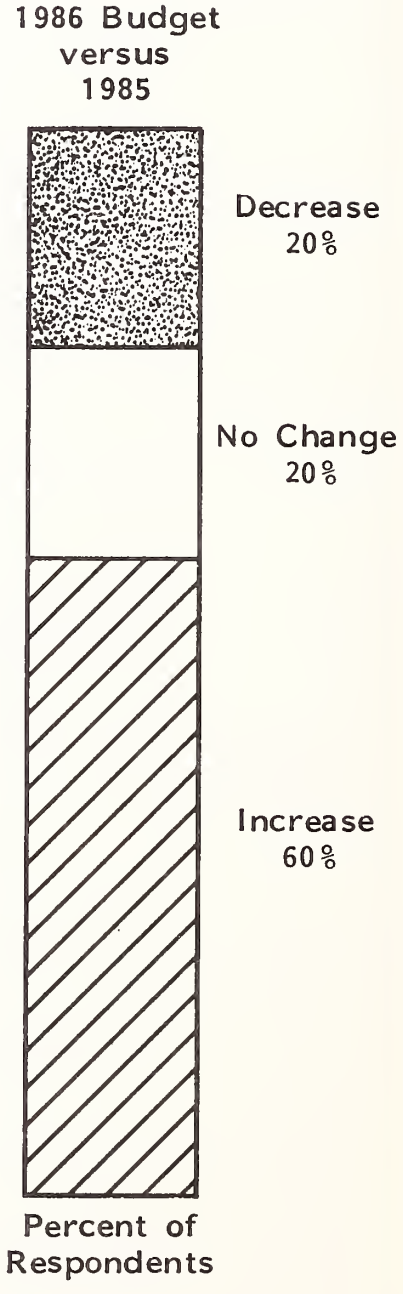
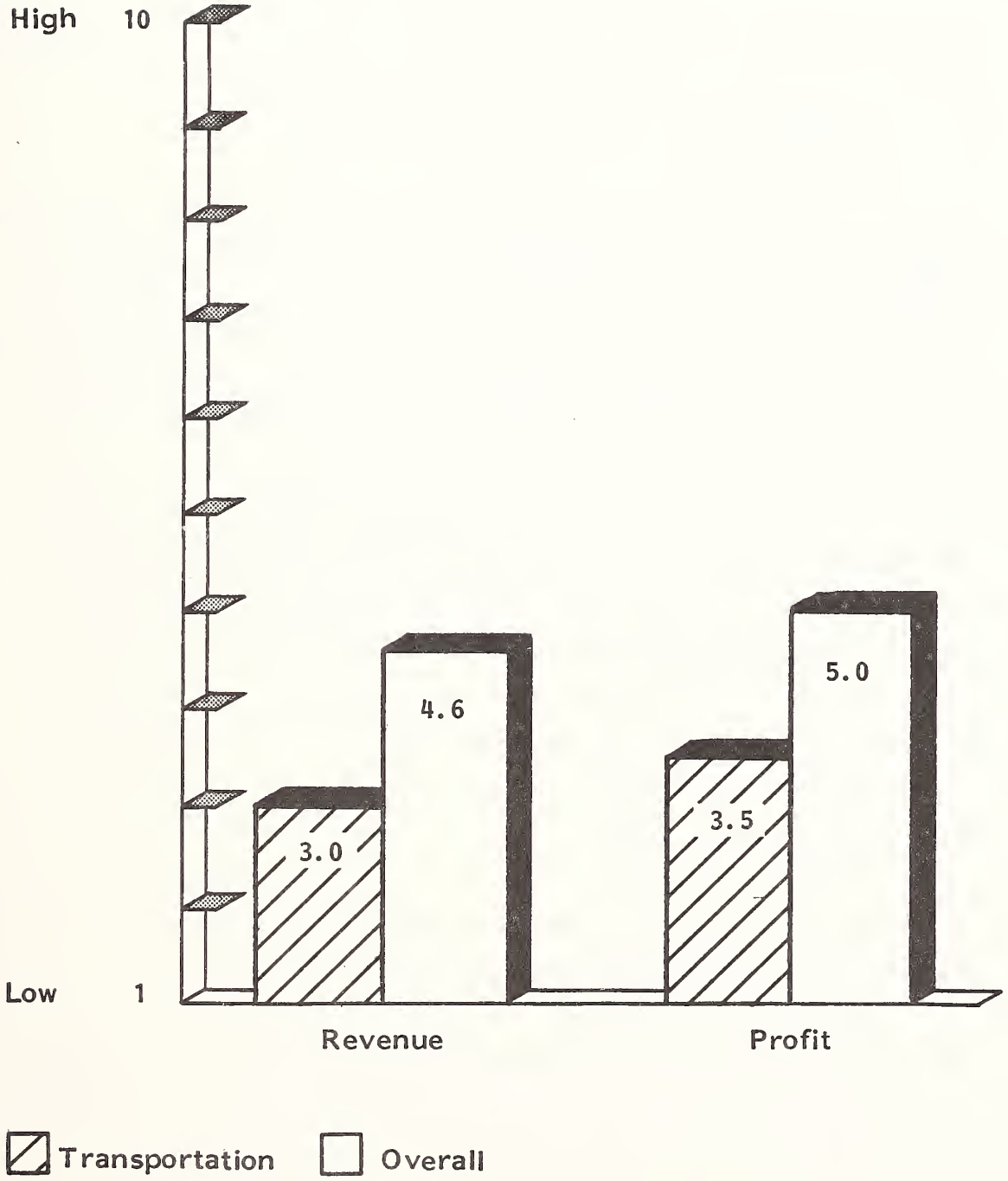



EXHIBIT IV-84

TRANSPORTATION
I.S. BUDGET DEPENDENCE



tive position weakened and competitors making inroads in their market share by providing products that take advantage of information system technology.

## H. SERVICES

### 1. MAJOR ISSUES

#### a. Driving Forces

- The services sector is a composite of disparate business activities with one significant factor in common: The broad shift of the U.S. economy away from manufacturing to a service-based economy is having a beneficial effect on all of the service sector's business areas. The sector is characterized by a large number of small to medium firms that are human resource dependent.

- Many of the participants in this sector are using technology to differentiate their service offerings. Customer access to value-added data bases provides them with time critical information. This has lead to a need for intercompany communications for both information access and document exchange.

- Exhibit IV-85 lists the driving forces affecting IS in the services sector.

#### b. Issues and Objectives

- Key issues in this sector focused on using microcomputers and data networks to deliver information/products to customers.

  - The microcomputer has provided a vehicle for expanding product offerings to include turnkey systems and links to proprietary data bases.

EXHIBIT IV-85

SERVICES
DRIVING FORCES

- Product Differentiation through Technology
- Provide Least-Cost Service
- Intercompany Telecommunication

- Information exchange between customers and services is possible through communication gateways between the customer and services systems. These gateways can ease the information exchange between these companies and can provide a barrier to entry for competitors.

- Near term objectives center on improving customer data base, distributing corporate information to the end-user community, and providing decision support systems for sales and market analysis. Overriding these objectives is the charter to contain costs, so the services can provide the most value for the lowest price.

- Exhibits IV-86 and IV-87 summarize the issues and objectives that were identified by respondents.

c. Management Perception and Organizational Issues

- Most respondents' management view IS as a corporate asset. Some of the organizations used information systems as their service; for others, IS is critical to supporting the personnel-dependent activities that are indicative of this sector.

- This sector's respondents measured their success by service level and cost comparison to budget and competitors. The respondents thought their measurements were an effective means of communicating with management. Exhibit IV-88 shows the measurement techniques used by respondents in this sector.

- In the last two years, the respondents' IS departments began to take a more active role in product development. They have seen IS attain more power, with IS reporting to an executive officer in the corporation. In the next two years, IS will do more consulting to other business units.

EXHIBIT IV-86

SERVICES
ISSUES

- Integration of POS with Back Office Systems
- Provide Network Gateways with Customers
- Leverage Current Systems with New Service and Products
- Incorporate Personal Computers with Current and Future Products
- Cost Containment

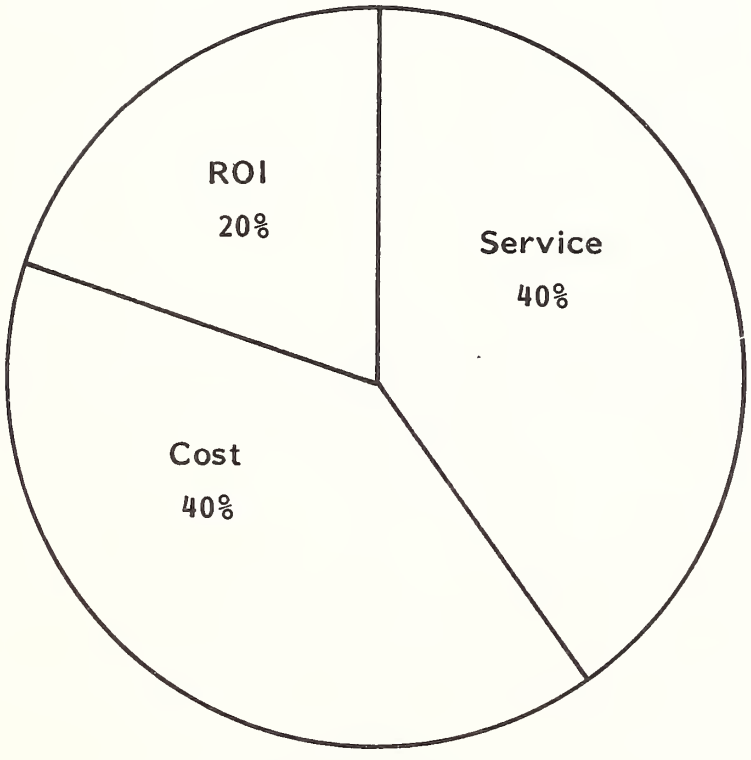
EXHIBIT IV-87

SERVICES
OBJECTIVES

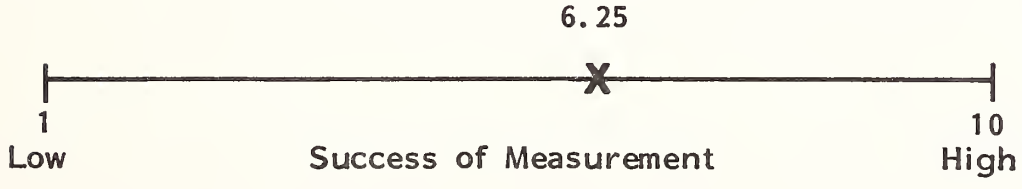
- Provide Marketing and Sales Decision Support Systems
- Cost Containment of IS Resources
- Distribute Processing to Micros and Small Minis
- Improve Perception of Value of IS to Corporation
- Establish a Customer Oriented Corporate-Wide Data Base

EXHIBIT IV-88

SERVICES
I.S. MEASUREMENT TO MANAGEMENT




Percent of Responses



- IS' roles in corporate planning range from being a member of the planning committee to being solely an information provider. Typically, the companies that view IS as a major contributor to revenue and profits give IS the largest role in corporate planning.

- The respondents believe IS can be a competitive weapon by:

  - Providing product differentiation through IS-based services.

  - Reducing cost/increasing corporate productivity.

  - IS becoming an equal participant in product planning and development.

  - IS becoming the product.

- Exhibit IV-89 shows that the services sector IS spending is controlled by corporate IS and that IS is highly centralized. This distribution should not change in 1986.

d. Impact of Technology

- End-user computing has made IS more service oriented and has made it easier for IS to perform its function.

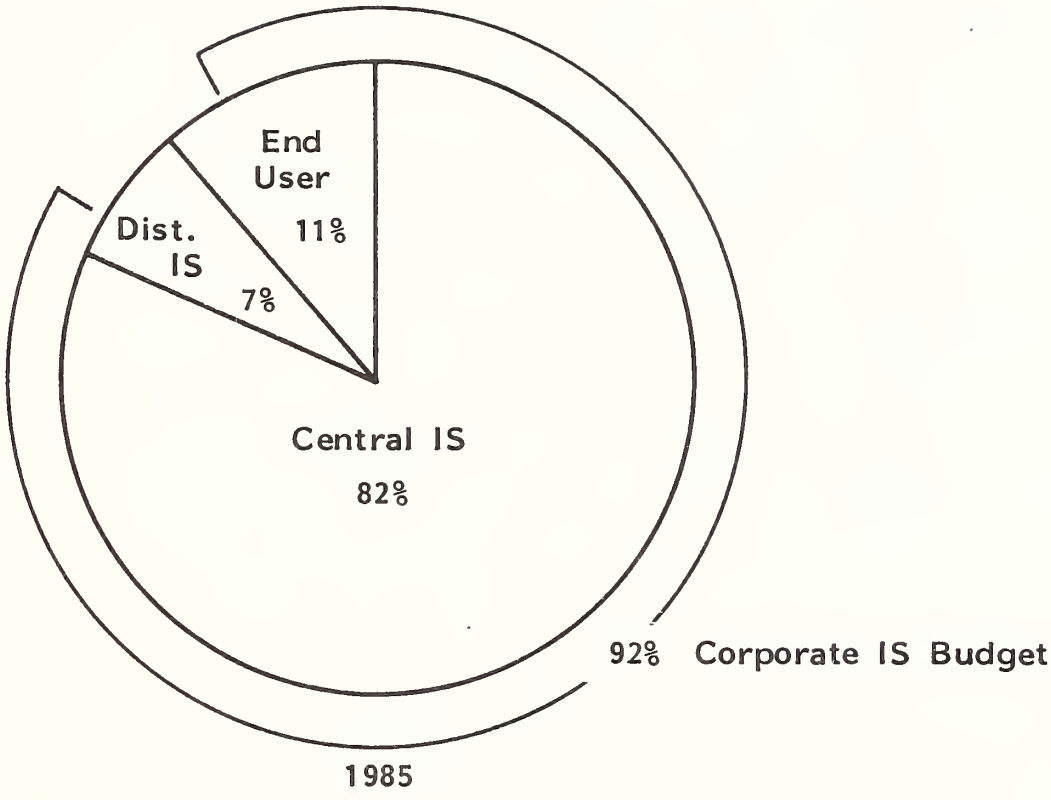
- There is very little consideration being given to departmental processing by the respondents.

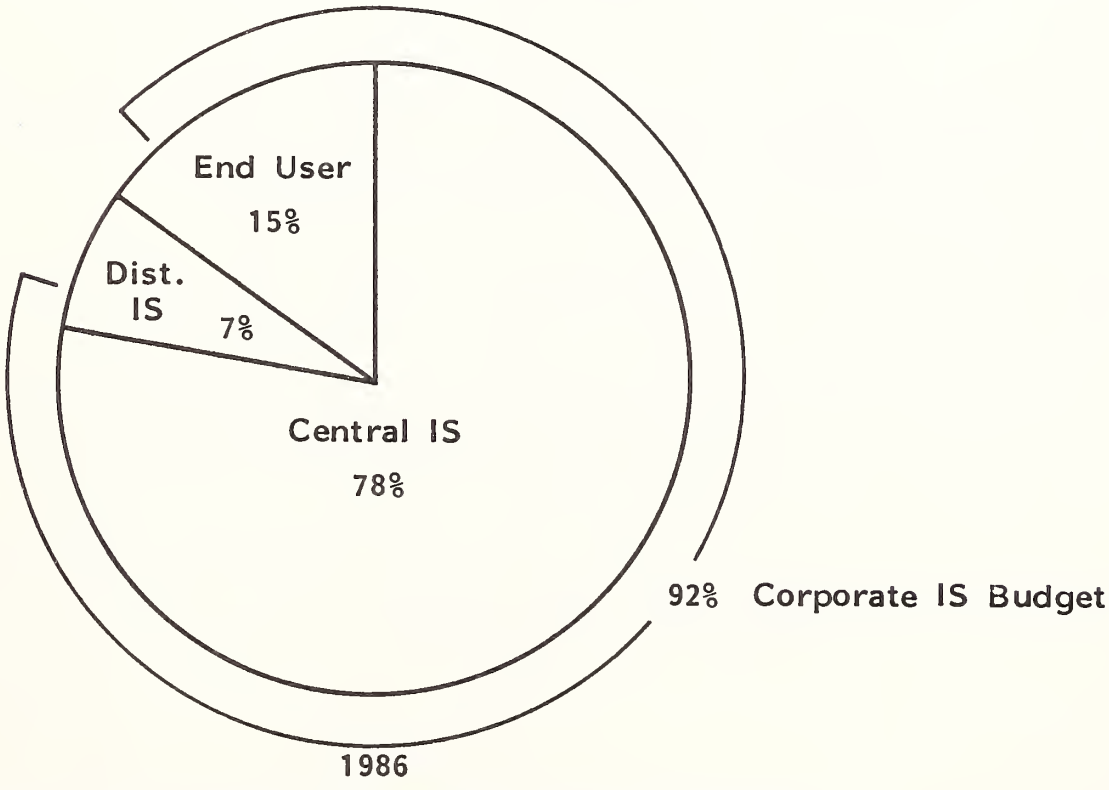
- The IS departments in this sector are performing all development centrally. There is some discussion about distributing some processing, but not development.

- Due to the trend of having customer accessing some data bases, there has been some planning for relational data bases. The only implementation has

EXHIBIT IV-89

SERVICES
DISTRIBUTION OF CORPORATE COMPUTING EXPENSES




Percent of Corporate and Company-wide IS Budgets

been using relational-like structures in fourth generation languages. One respondent uses CCAs's Model 204 DBMS.

- Most respondents felt that merging voice and data communications was not essential. They also stated that the technology is not advance enough to support merging voice and data.

- There was very little activity in LAN installation by respondents. Most respondents said they had no immediate need and wanted to wait to see what IBM will do.

- Exhibit IV-90 summarizes the impact of the above technological issues on IS for the services sector.

e. End-User Computing

- End-user computing is forcing IS into the service business. It has educated the user on the complexities of information systems and has made it easier for IS to get its job done. It has, however, placed additional resource requirements on IS that are just beginning to be met by staffing redeployment.

- Training is being handled primarily on an ad hoc basis in this sector. Some respondents are using computer-based training for field sites, but overall IS is not keeping up with user demand for training.

- Exhibit IV-91 summarizes IS' role in microcomputer support.

  - IS takes a very active role in microcomputer acquisition. In most cases, IS must approve all new acquisition requests.

  - IS develops a list of approved software and often modifies packages or develops programs for users.

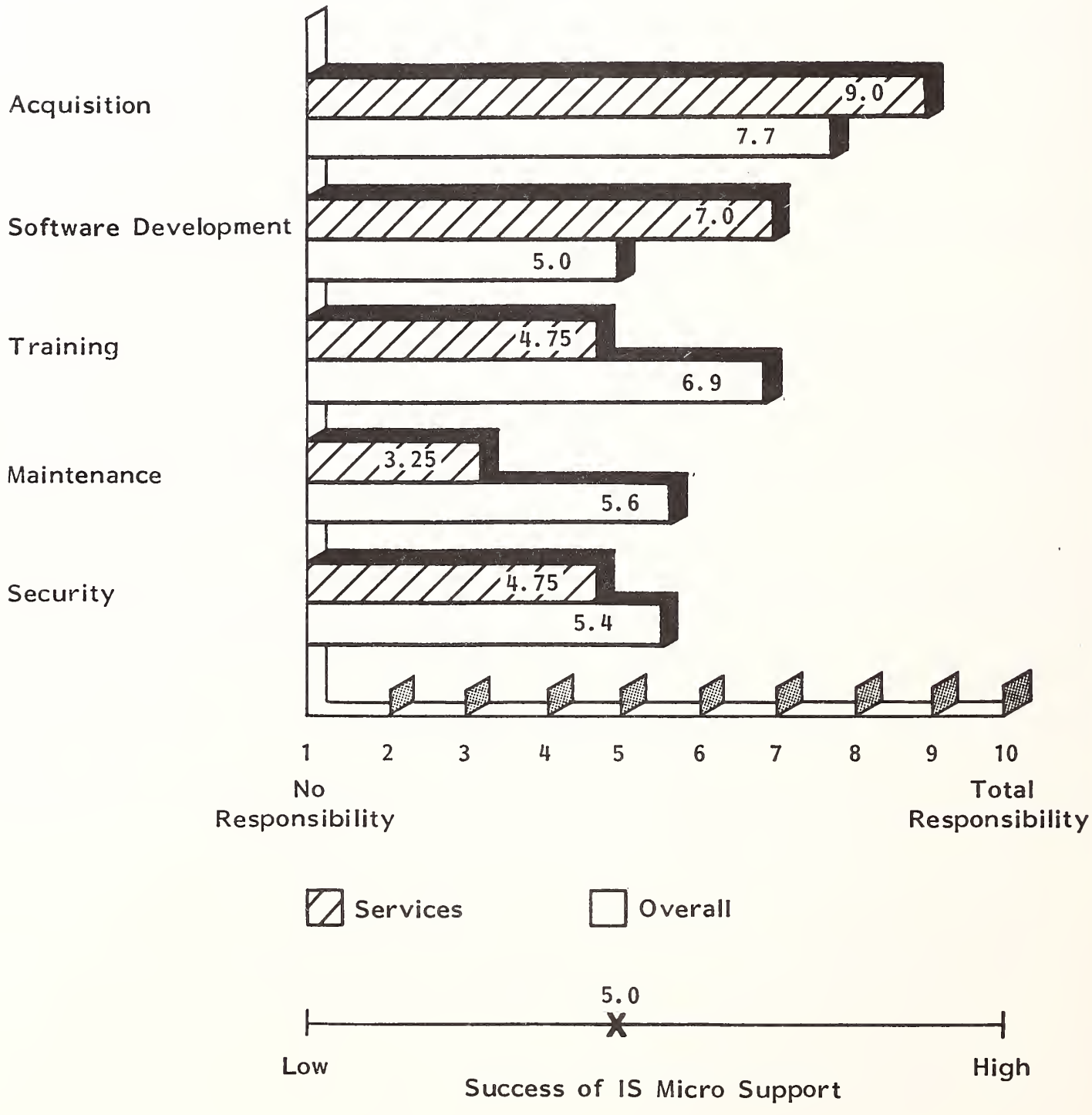
EXHIBIT IV-90

SERVICES
IMPACT OF TECHNOLOGY

| | IMPACT | COMMENTS |
|---|---|---|
| End-User Computing | Medium | Makes it easier for IS to do its job. Believes IS needs to coordinate and control. |
| Departmental Processing | Low | Not much horizontal communications, most centralized. |
| Distributed Systems Development | Low | Little activity. |
| Relational Data Bases | Medium | Most FGL-oriented, some making a major effort to convert to relational systems for easier customer access. |
| Voice/Data Integration | Low | Don't believe the technology currently exists to support this. Little activity. |
| LANs | Low | Little activity. |

EXHIBIT IV-91

SERVICES
I.S. ROLE IN MICROCOMPUTER SUPPORT



- IS performs training primarily on an ad hoc bases.

- IS coordinates microcomputer maintenance.

- IS develops security guidelines. It is the user's management's responsibility to enforce these guidelines.

- Respondents believe they are doing an adequate job of supporting microcomputers in their organization. Their biggest concern is that IS cannot keep up with the demand.

## 2. NEW APPLICATIONS

- Since the service sector is comprised of disparate business activities, the most frequently mentioned new applications were cross industry applications.

  - Systems software reflects the major effort to redesign data bases and provide a mechanism to effectively distribute this information both internally and to customers.

  - Office automation and decision support applications reflect this sector's need to satisfy the high user demand in this area.

- Most of the new applications development will be performed internally, with no joint vendor development being planned by the respondents.

- Exhibit IV-92 lists the most important new applications that were identified by the respondents.

## 3. BUDGET ANALYSIS

- The service sector's IS budget growth lagged the overall IS budget growth in 1985 but is projected to grow faster than IS budgets in general in 1986. This

EXHIBIT IV-92

SERVICES
NEW APPLICATIONS IN 1985

Most Important Applications

Systems Software

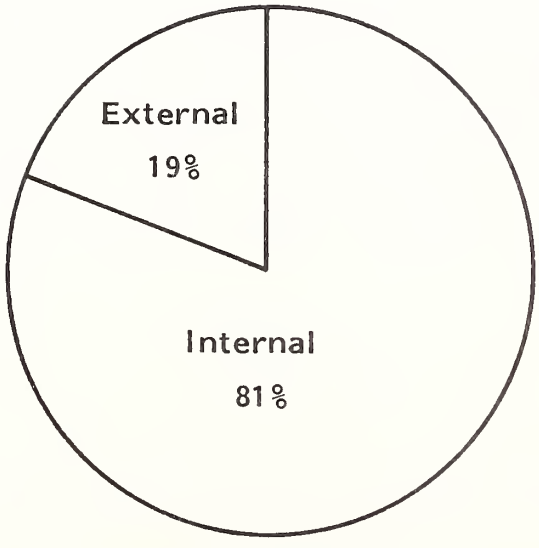
Office Systems and Decision Support

Human Resources

Accounting and Finance

Sales Support

Source of Development (All Major New Applications)




Percent of Responses

Cost Range

$50K - $400K

change reflects major IS efforts to upgrade data bases and end-user computing.

- Exhibit IV-93 shows the 1985 budget distribution and projects the growth of budget categories in 1986.

  . The largest projected growth categories are mass storage devices and microcomputers.

  . The smallest growth areas are professional services, turnkey systems, and outside processing. This reflects the internal focus of the respondent companies. Although the IS budget growth rate is projected to double in 1986, this increase is due to the need to upgrade data bases. In order to apply the most resources to this project, the use of external resources will be minimized.

- Exhibit IV-94 compares the sector's IS growth in 1985 and projected growth in 1986 to the growth rates of IS budgets in general.

- Eighty-four percent of the respondents expect their 1986 IS budgets to increase, and two-thirds of them expect their budget growth to be higher than 1985 (see Exhibit IV-95).

  - Factors contributing to increasing the IS budget include (in order of most frequently mentioned factors):

    . Hardware.

    . Data communications.

    . Office automation.

EXHIBIT IV-93

## 1985 BUDGET DISTRIBUTION AND 1985/1986 CHANGES IN THE SERVICES SECTOR

| BUDGET CATEGORY | 1985 PERCENT OF I.S. BUDGET | 1985-1986 EXPECTED BUDGET GROWTH |
|---|---|---|
| Personnel Salaries and Fringes | 40.0% | 3.8% |
| Mainframe Processors | 8.9 | 20.0 |
| Minicomputers | 3.6 | 21.2 |
| Microcomputers | 4.9 | 14.0 |
| Mass Storage Devices | 3.3 | 33.5 |
| Other Hardware | 5.1 | 0.0 |
| Total Hardware | 25.8% | 17.5% |
| Data Communications | 10.0% | 6.2% |
| External Software | 3.7 | 5.8 |
| Professional Services | 0.3 | 0.0 |
| Turnkey Systems | 0.6 | 0.0 |
| Software Maintenance | 1.3 | 1.7 |
| Hardware Maintenance | 4.0 | 4.6 |
| Outside Processing Services | 5.0 | 0.0 |
| Other | 9.3 | 0.0 |
| Total | 100.0% | 14.0% |

EXHIBIT IV-94

SERVICES

I.S. BUDGET GROWTH IS FASTER THAN ALL I.S. BUDGETS

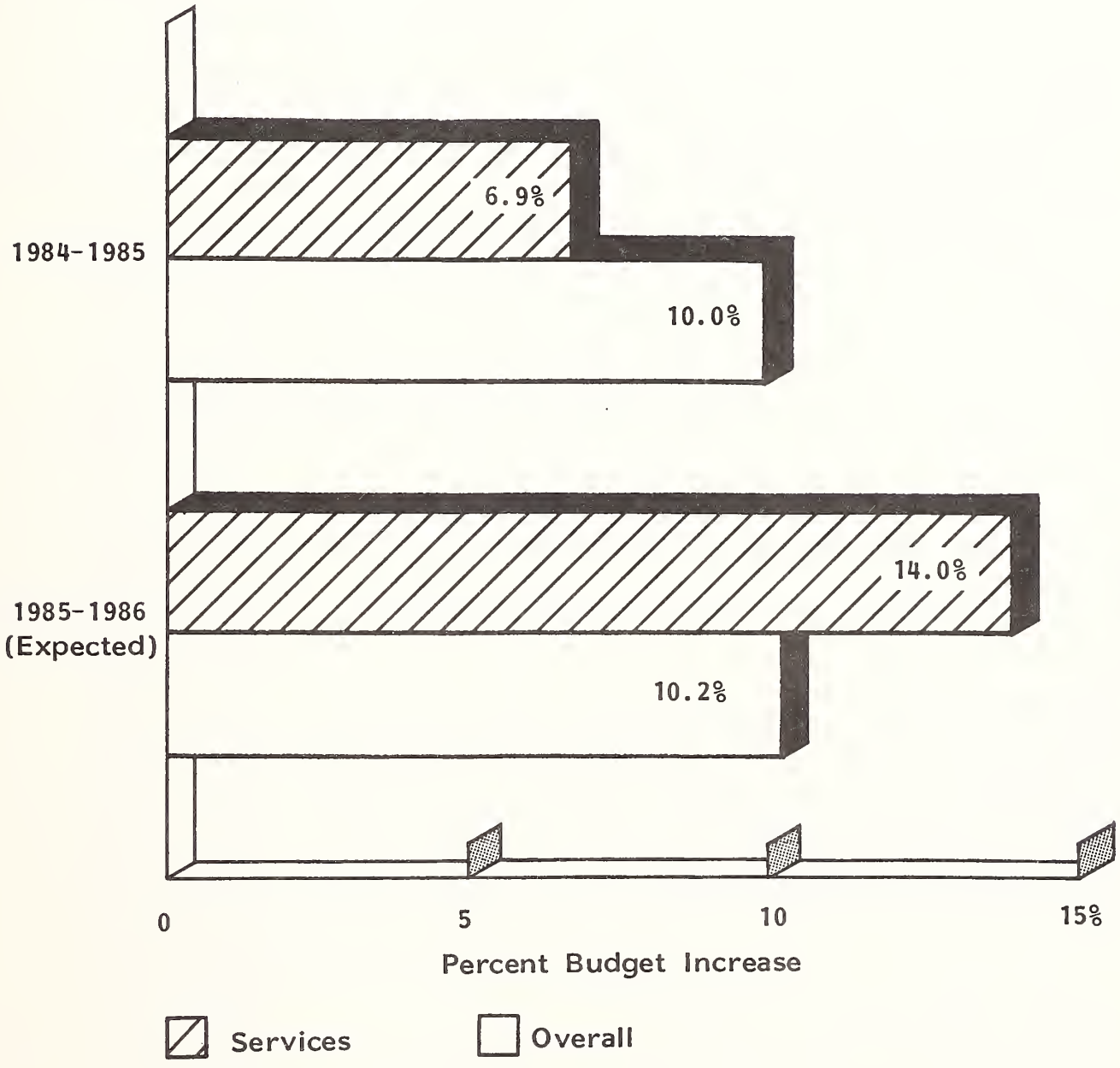
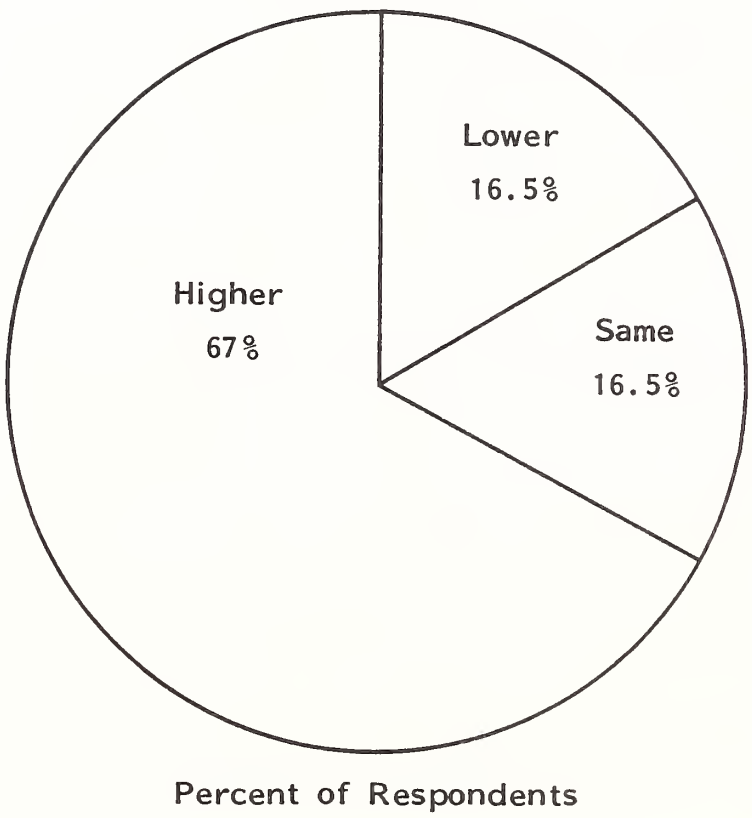
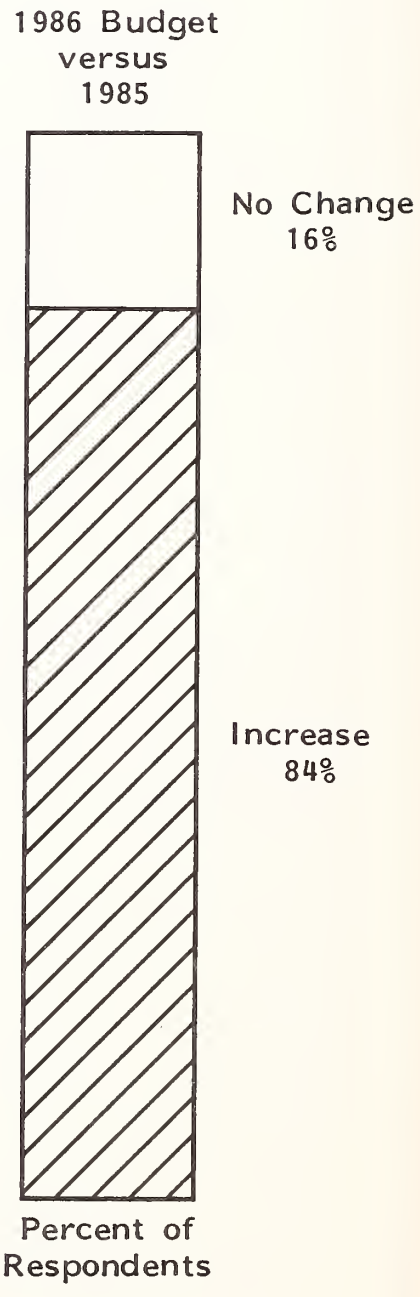


EXHIBIT IV-95

SERVICES

MOST BUDGETS ARE INCREASING AT A HIGHER RATE



- Factors contributing to decreases in the IS budget include:

  . Increased productivity.

  . Staff reduction.

  . Software efficiency.

- The services sector IS budget is much more dependent upon corporate revenues and less dependent upon profit than IS budgets in general (see Exhibit IV-96). Since many service companies provide information systems as part of their services mix, this is to be expected. Information systems will fuel the growth of many segments of the services sector.

## I. MEDICAL AND HEALTH CARE

### 1. MAJOR ISSUES

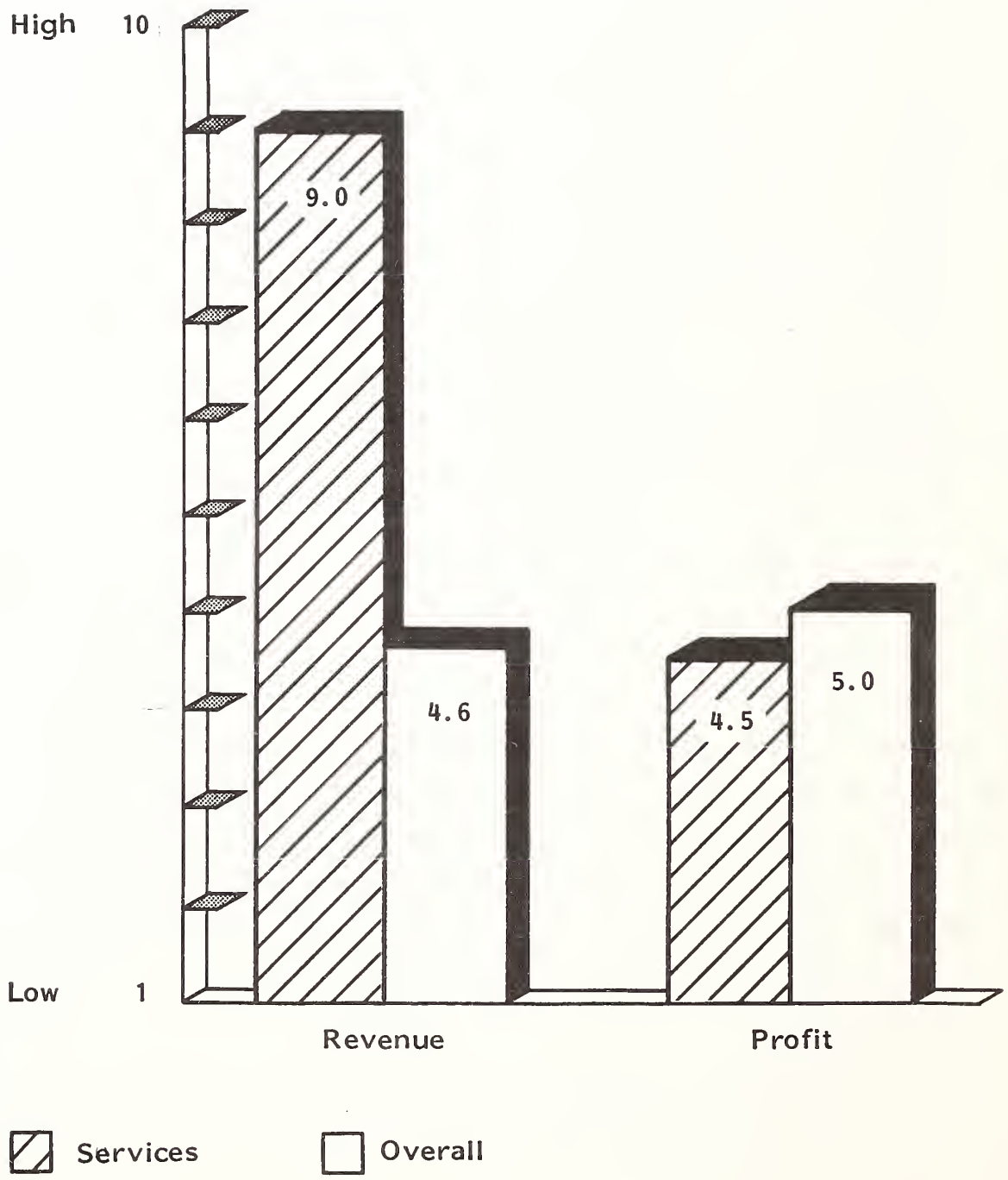
#### a. Driving Forces

- Reimbursement mechanisms play a significant role in the health care system. Since payments and services are separated, there is a need for a large and complex accounting system at the health care center level, the regional level, and the state level. Reclassifying expenses and gaining exemptions from health care ceilings imposed by local state law has created a new stratum of advisory services and consulting.

- Emphasis has been on automating previously manual processes. The emphasis will shift toward productivity improvement systems due to recently introduced flat rate systems by Medicare and the promise of other such systems to follow.

EXHIBIT IV-96

SERVICES
I.S. BUDGET DEPENDENCE



- Exhibit IV-97 summarizes the driving forces for the medical/health care center.

b. Issues and Objectives

- The key issues and objectives identified by respondents focused on organizing patient information and interfacing this data with regulatory, accounting, and payment systems. Some respondents identified an issue of using IS to attract physicians. The primary example is developing or acquiring a medical diagnostic expert system.

- Exhibits IV-98 and IV-99 list the most important IS issues and objectives identified by the respondents.

c. Management Perception and Organizational Issues

- Most respondents' management are unaware of the benefits that IS can provide. They perceive IS as solely a cost. This is due to the late entry of most of these institutions in automating their non-medical functions.

- Respondents measure their performance by performing cost benefit analysis on major projects and comparing their budget expenditures to similar institutions' IS departments. None of the respondents believed that these measurements convinced management that IS is of strategic importance to the institution. Exhibit IV-100 shows the measurement techniques used by the respondents.

- The IS departments in this sector have started to become more proactive to user needs. Previously, IS was totally reactive to user demands and poorly funded to meet the information systems needs of the organization. In the next two years, the respondents believe that their role will become more consultive and they will be providing more end-user access to authorized computer-based information.

EXHIBIT IV-97

MEDICAL/HEALTH CARE
DRIVING FORCES

- Changing Reimbursement Mechanisms
- Government Regulations
- Improving Productivity

EXHIBIT IV-98

## MEDICAL/HEALTH CARE ISSUES

- More Complex Accounting Systems
- Centralize Patient Information
- Provide Automated Tools to Assist/ Attract Physicians
- Automate Manual Processes to Improve Productivity
- Regulatory Reporting Compliance

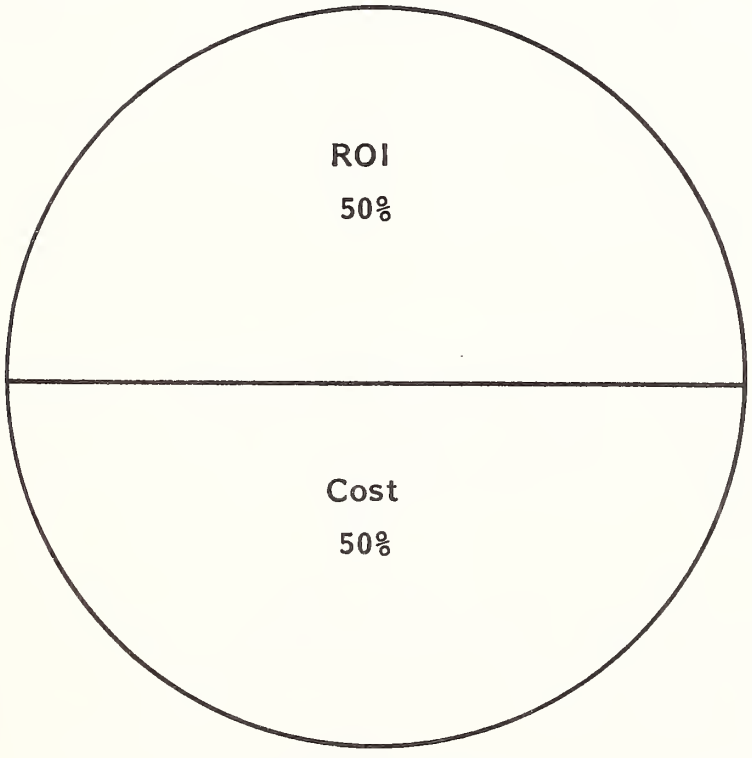
EXHIBIT IV-99

MEDICAL/HEALTH CARE
OBJECTIVES

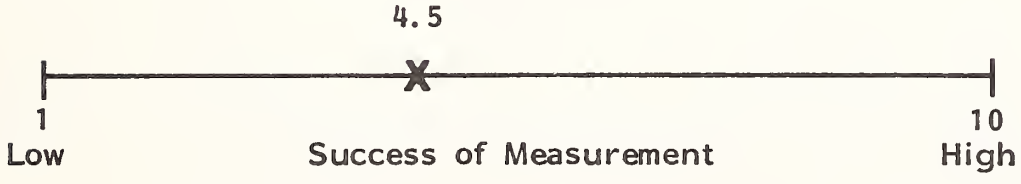
- Implement On-line Accounting Data Base for Regualtory Reporting
- Improve Confidentiality of Patient Information
- Attract Physicians by Providing Innovative Services through Technology
- Implement Integrated Patient Care System
- Begin Supporting End-User Computing

EXHIBIT IV-100

MEDICAL/HEALTH CARE
I.S. MEASUREMENT TO MANAGEMENT




Percent of Responses



- IS has become part of the corporate planning process in many institutions. It is the first indication that IS' role and status is increasing.

- The respondents believe IS can be used to improve the institution's competitive position, primarily by providing technological tools for physicians (e.g., diagnostic expert systems).

- Exhibit IV-101 shows that IS is very centralized in this sector. Corporate IS controls over 80% of the information expenditures. In 1986, the respondents project that there will be a slight shift in IS funding from corporate IS to end users. This will primarily be for microcomputers and end-user systems that are part of the end-user's budget.

d. Impact of Technology

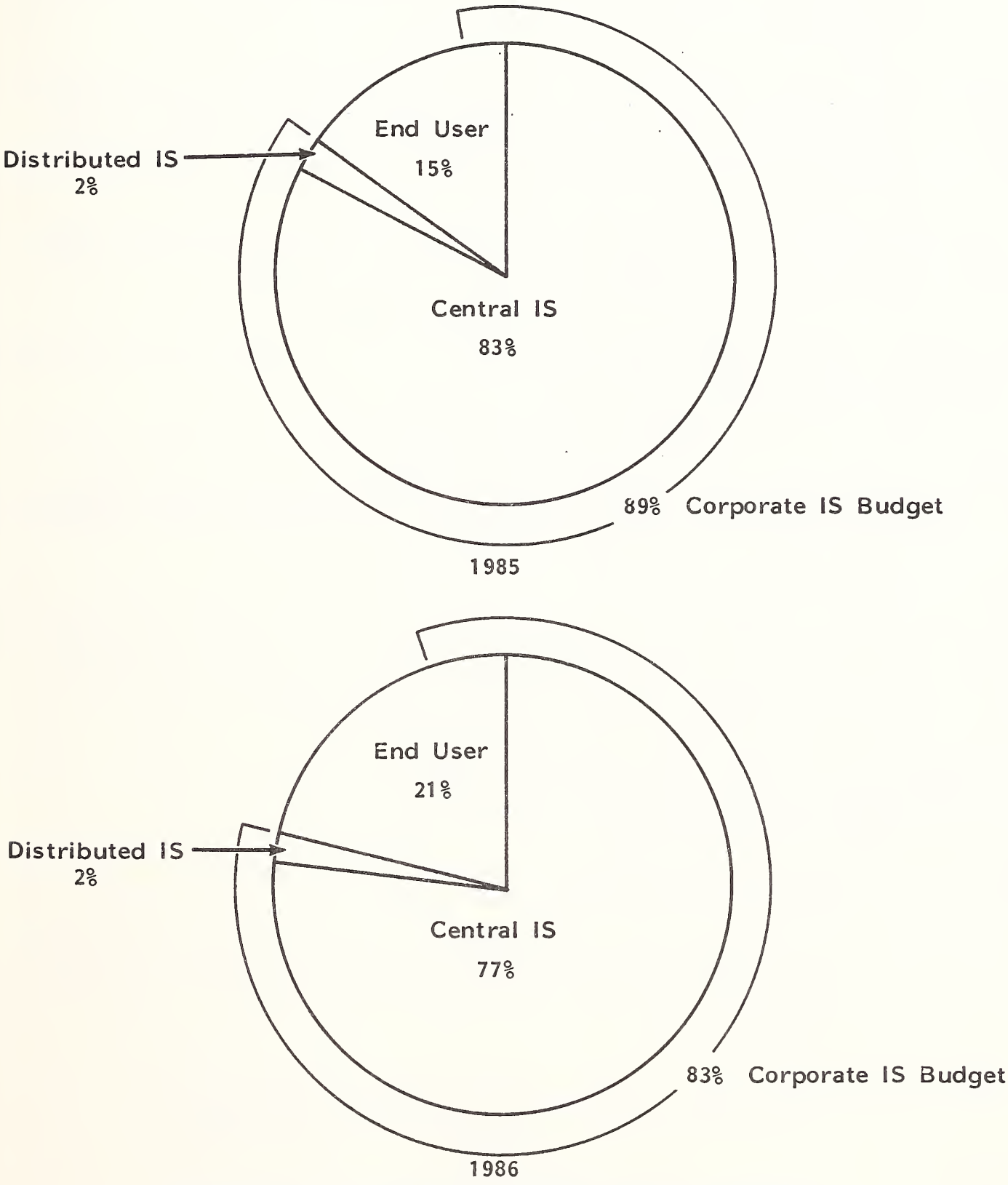
- End-user computing has reduced the workload in many respondent institutions. In most cases, however, end-user computing support has only existed for one year.

- Departmental processors have a high impact on this sector's IS departments. Many hospital departments have their own processors to run scientific applications. There is the potential to link this system with corporate information systems to provide office automation and administrative support systems locally.

- Distributed systems development should also have a high impact on this sector. The availability of departmental processors provides the opportunity to develop local systems that can be used by other units. Coordinating and controlling these efforts is a major management challenge. Most respondents are beginning to plan for distributed systems development. Actual implementation of this concept is at least three years in the future.

EXHIBIT IV-101

MEDICAL/HEALTH CARE
DISTRIBUTION OF CORPORATE COMPUTING EXPENSES




Percent of Corporate and Company-wide IS Budgets

- There are very few institutions that are planning to use relational data bases in this sector.

- Merging voice and data is being considered by some respondents but it has a low priority.

- There is a high demand for LANs in this sector. Networks need to be established linking corporate and departmental systems. Implementation has been delayed because of lack of LAN standards.

- Exhibit IV-102 summarizes the impact of the above technological issues on IS for the medical and health care sector.

e. End-User Computing

- End-user computing has great potential in this sector. The user community is well versed in the capabilities of computing. Departmental processing is being planned as is the integration of departmental processors with corporate mainframes.

- End-user support is just beginning in this sector. IS is doing some end-user training through the information center. Typically, respondent IS organizations are training the trainers in the end-user organization.

- Exhibit IV-103 summarizes IS' role in microcomputer support.

  - IS establishes guidelines for microcomputer acquisition.

  - The respondent IS department did very little micro systems development. Primarily, the IS department acted in an advisory capacity in this area.

  - IS primarily trains the trainers in the end-user departments.

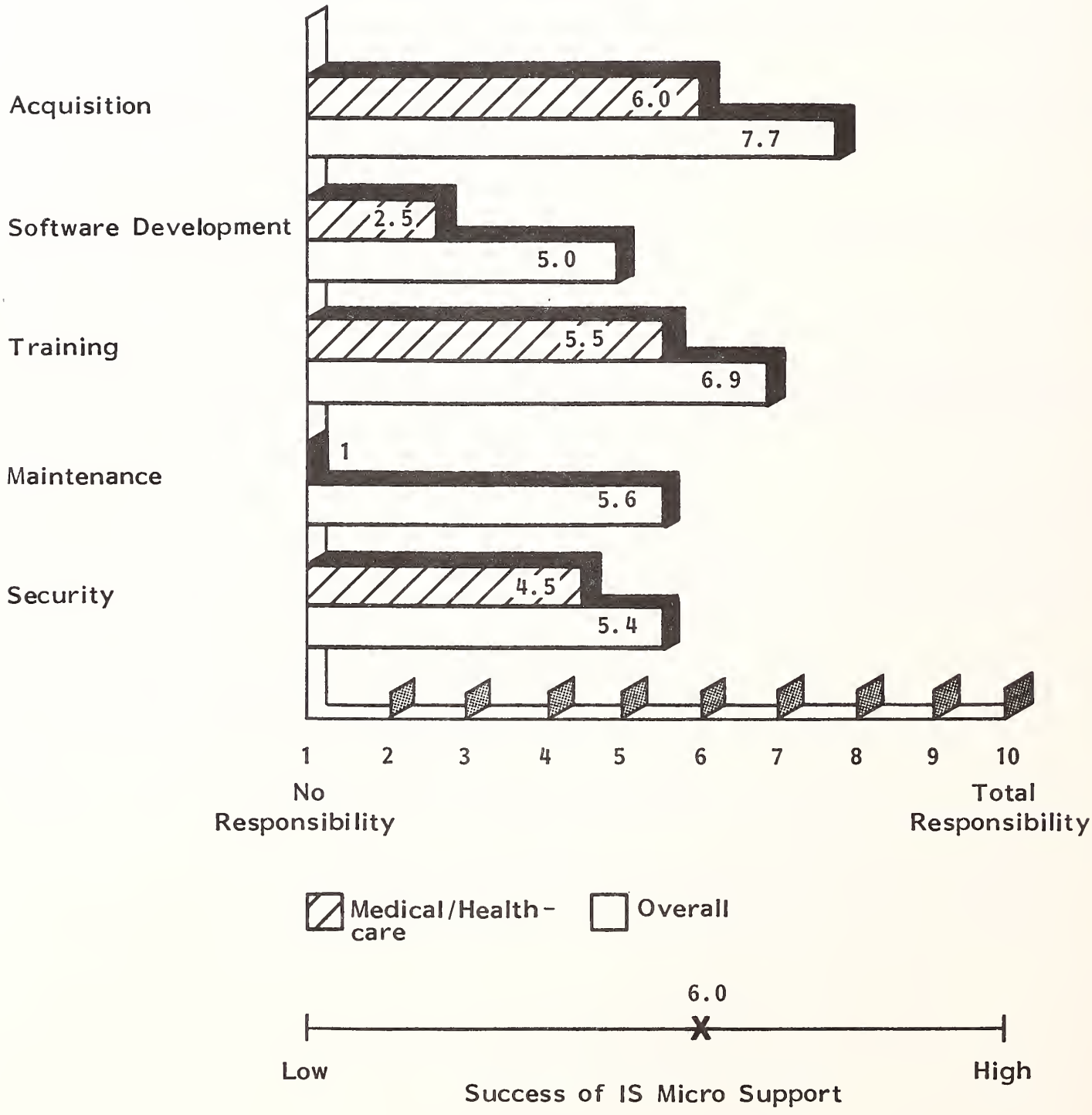
EXHIBIT IV-102

MEDICAL/HEALTH CARE
IMPACT OF TECHNOLOGY

| | IMPACT | COMMENTS |
|---|---|---|
| End-User Computing | Low/Medium | Potential to reduce IS workload. Most just beginning to support end users. |
| Departmental Processing | Medium/High | Many departments have their own processors - strategic need to integrate, support, and optimize benefits. |
| Distributed Systems Development | High | Heavy DDP environment with specialized computing needs. |
| Relational Data Bases | Low | Low activity. |
| Voice/Data Integration | Low | Not an immediate priority. |
| LANs | Medium/High | Lack of standards is delaying implementation, but the DDP environment requires a well-planned LAN strategy. |

EXHIBIT IV-103

MEDICAL/HEALTH CARE
I.S. ROLE IN MICROCOMPUTER SUPPORT



- IS takes no role in microcomputer maintenance in the respondent organizations.

- IS establishes security standards for the institution but it takes no role in enforcement.

- Although microcomputer support is just beginning, the respondents believe they are providing adequate microcomputer support.

## 2. NEW APPLICATIONS

- The major new applications identified by respondents centered on building a patient information data base and enhancing payment related systems (e.g., billing, claims, and finance and accounting).

- Contrary to other sectors, the medical and health care sector primarily uses external resources for development. This is because most patient information and payment systems are complex packages. Most institutions interviewed have relatively small development staffs and rely on software packages for major applications.

- Exhibit IV-104 lists the most important applications identified by the respondents.

## 3. BUDGET ANALYSIS

- The medical and health care sector's IS budgets grew slightly faster than IS budgets in general in 1985 and are projected to grow at a slightly slower rate in 1986. Most of the respondent companies were in the final phases of implementing patient information and payment systems. Thus, 1986 will focus on solving installation problems and making minor enhancement to these systems, so the growth in software and professional services will be reduced in 1986.

EXHIBIT IV-104

MEDICAL/HEALTH CARE
NEW APPLICATIONS IN 1985

Most Important Applications

Patient Information

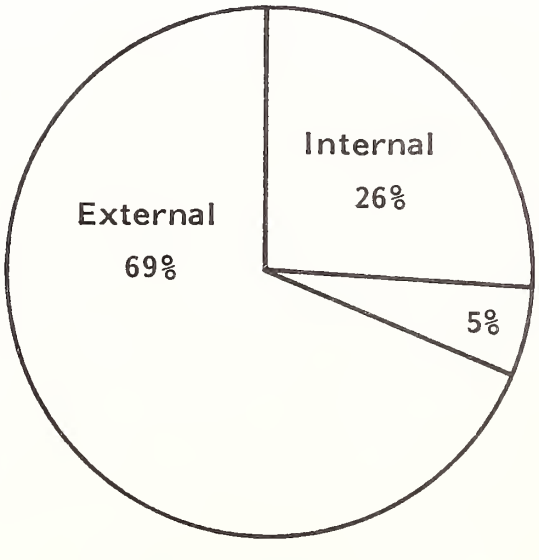
Billing

Office Systems and Decision Support

Finance and Accounting

Claims Processing

Source of Development (All Major New Applications)




Percent of Responses

Cost Range

$30K - $700K

The growing demand in end-user computing and the recognition of the important role microcomputers can play in this sector has caused microcomputer to be the highest budget growth area.

- Exhibit IV-105 shows the 1985 budget distribution and projects the growth of budget categories in 1986.

- Exhibit IV-106 compares this sector's IS growth in 1985 and projected growth in 1986 to the growth rates of IS budgets in general.

- Eighty-six percent of respondents project their IS budgets will increase in 1986, but most believe the budget will grow at a lower rate than 1985 (see Exhibit IV-107).

  - Factors contributing to increases in the IS budget include (in order of most frequently mentioned factors):

    . Software.

    . Hardware.

    . Personnel expense.

    . Regulatory requirements.

  - The main factor contributing to decreasing the IS budget is staff reductions.

- The medical and health care sector's IS budget is more dependent on the institution's revenue and profit than IS budgets in general (see Exhibit IV-108). Although management in this sector wants a state of the art technology, they are driven by the highly controlled and varied payment structure. IS budgets and other cost centers' spending must be limited by these revenue constraints.

EXHIBIT IV-105

1985 BUDGET DISTRIBUTION AND 1985/1986 CHANGES
IN THE MEDICAL/HEALTH CARE SECTOR

| BUDGET CATEGORY | 1985 PERCENT OF I.S. BUDGET | 1985-1986 EXPECTED BUDGET GROWTH |
|---|---|---|
| Personnel Salaries and Fringes | 37.8% | 7.9% |
| Mainframe Processors | 8.1 | 4.2 |
| Minicomputers | 5.6 | 0.0 |
| Microcomputers | 2.5 | 10.8 |
| Mass Storage Devices | 3.4 | 5.3 |
| Other Hardware | 9.6 | 0.0 |
| Total Hardware | 29.2% | 2.7% |
| Data Communications | 8.0% | 9.0% |
| External Software | 9.6 | 2.2 |
| Professional Services | 0.4 | 1.4 |
| Turnkey Systems | 3.0 | 0.0 |
| Software Maintenance | 1.0 | 4.4 |
| Hardware Maintenance | 5.9 | 6.6 |
| Outside Processing Services | 0.1 | 3.3 |
| Other | 5.0 | 10.0 |
| Total | 100.0% | 9.5% |

EXHIBIT IV-106

MEDICAL/HEALTH CARE

I.S. BUDGETS ARE GROWING AT THE SAME RATE AS ALL I.S. BUDGETS

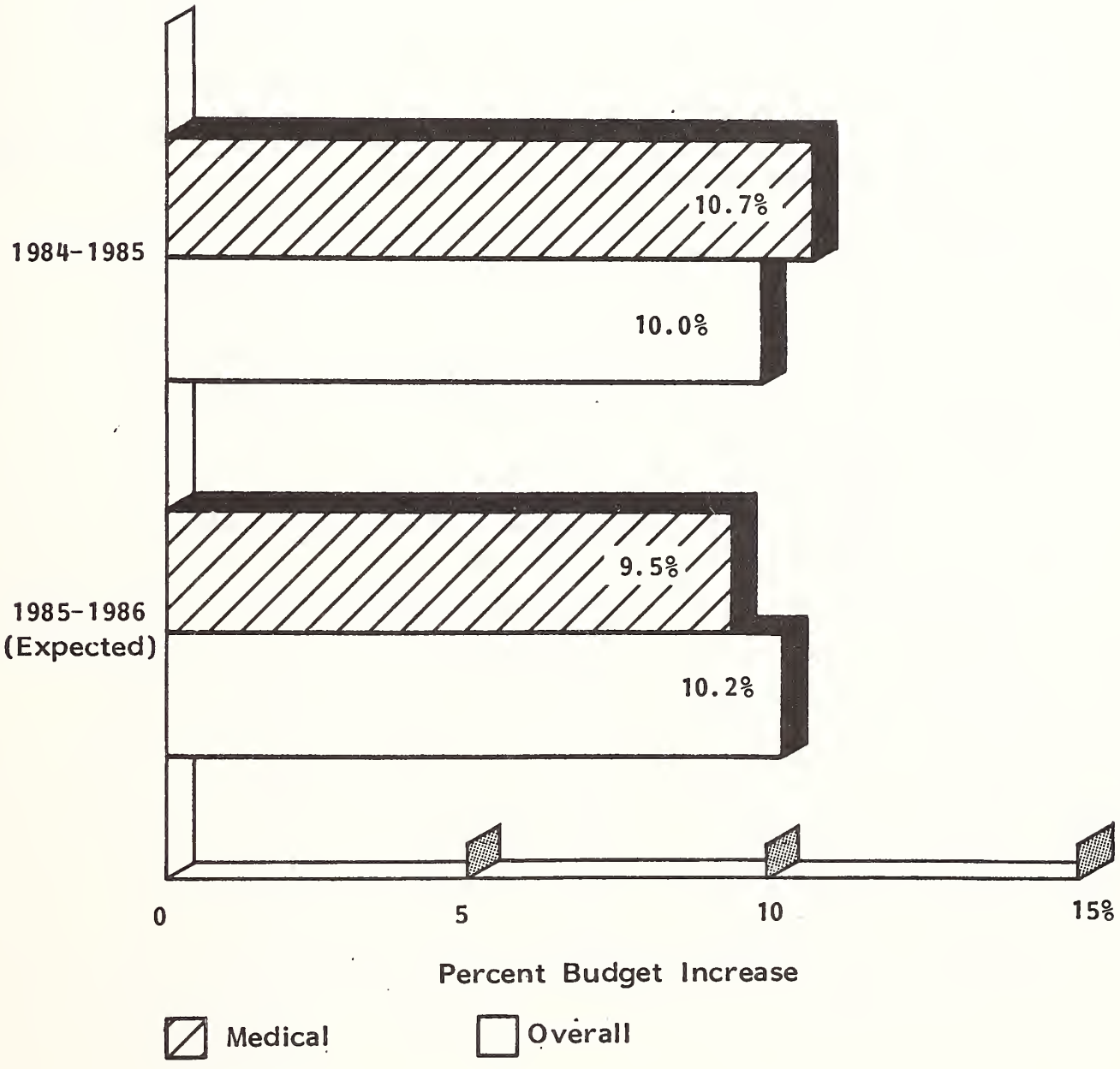
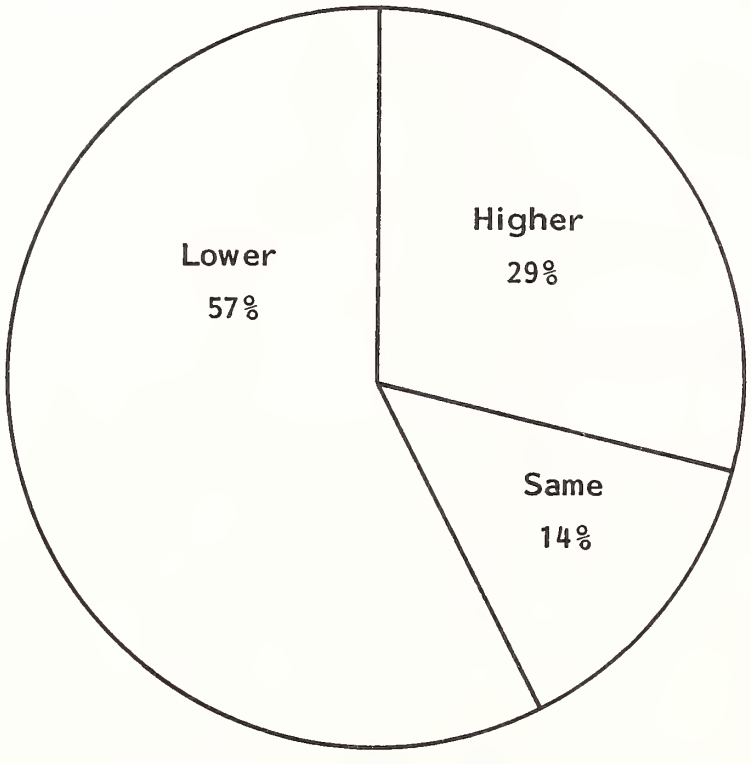


EXHIBIT IV-107

MEDICAL/HEALTH CARE

MOST BUDGETS ARE INCREASING BUT AT A LOWER RATE



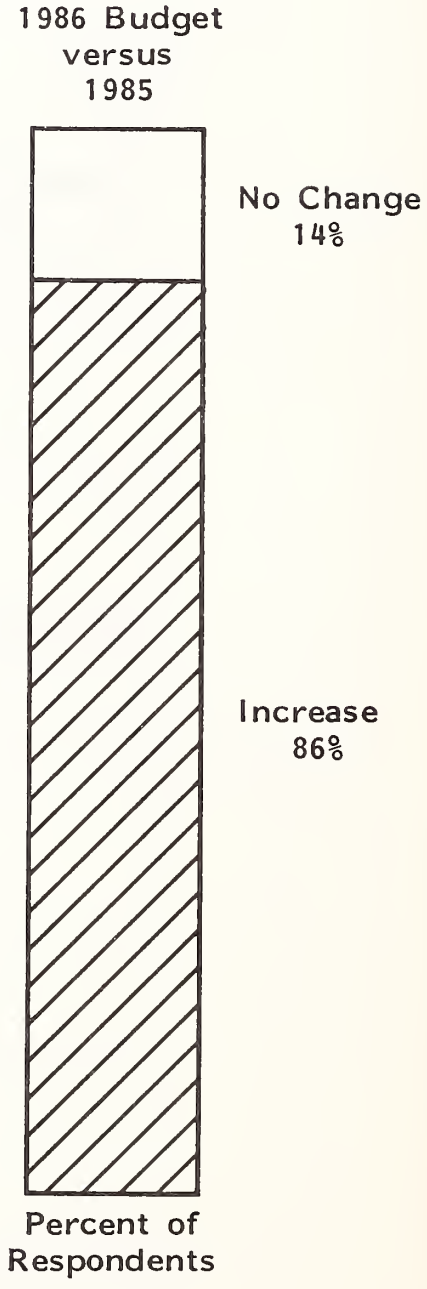
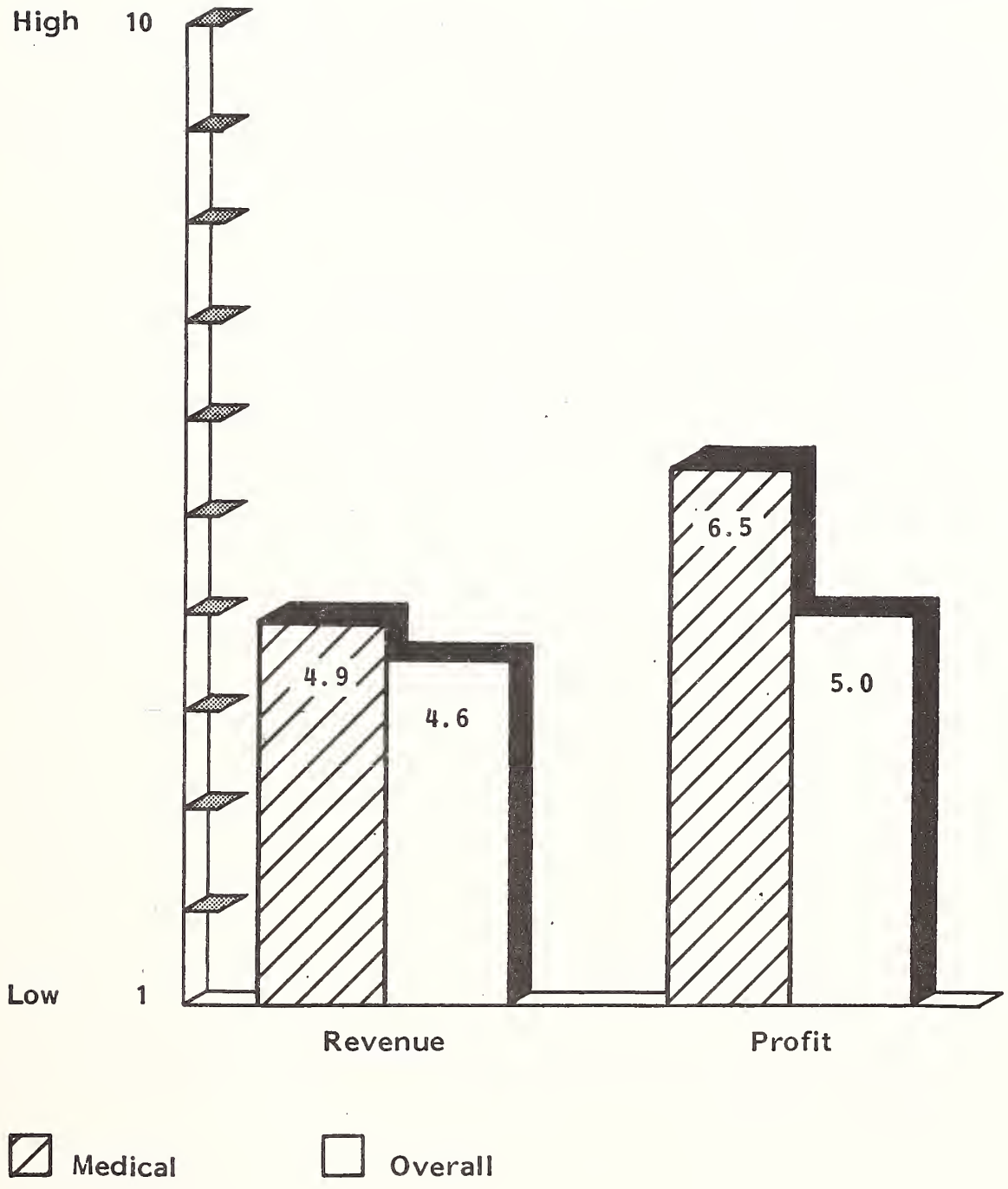



EXHIBIT IV-108

MEDICAL/HEALTH CARE
I.S. BUDGET DEPENDENCE



## J. EDUCATION

### I. MAJOR ISSUES

#### a. Driving Forces

- Administrative applications are being used to increase the efficiency of the business and administrative functions. Microcomputers are being used as an addition or supplement to larger computer systems. New administrative aplications should integrate with the basic administrative systems (e.g., budgeting, general ledger, payroll, etc.).

- Wide area networks will be developed extensively in order to link universities and other institutions around the country. These networks will permit universities to gain access to other schools' resources (e.g., library catalogs). This will require large telecommunictions and data administration efforts for network participants.

- The education sector is always under severe political pressure to cut costs. IS can provide a means to improve productivity in administrative departments, but it too is under severe cost constraints. IS' challenge is to produce beneficial systems while operating under tight budgetary controls.

- Exhibit IV-109 lists the driving forces affecting the education sector's IS departments.

#### b. Issues and Objectives

- The major issues and objectives being addressed by this sector can be categorized as follows:

EXHIBIT IV-109

EDUCATION
DRIVING FORCES

- Demand to Integrate Administrative Systems
- Inter-University Networks
- Expanded Use of Micros for Educational Systems
- Politics of Government and School Boards
- Cost Containment

- Reduce costs. IS must produce cost savings systems and yet keep its budget growth to a minimum.

- Improve and expand data communications. Communications within and outside the institution is required for document interchange and to link with academic systems. Incompatibility between computers and among networks is a major inpediment to achieving this goal.

- Establish centralized, integrated student information systems.

- Exhibits IV-110 and IV-111 summarize the issues and objectives identified by the respondents in this sector.

c. Management Perception and Organizational Issues

- Management views IS as an important resource, but its main emphasis is on IS as a cost controlling source. This sector's respondent does not believe that IS will be used for strategic purposes as long as management must comply with severe budgetary pressures.

- IS is measured by cost. The IS budget is compared to similar institutions' budgets. The key measure of IS effectiveness is staying within budget and providing satisfactory service levels. The respondents believe they do an adequate job of communicating IS performance to management. Exhibit IV-112 shows the measurement techniques used by respondents in this sector.

- In the past two years, the respondents have seen their management visibility improve and their user base expand. In the next two years the respondents see their role becoming more consultive, especially with the growing use of micros in the user community.

- IS takes a significant role in the planning process. One respondent stated that "IS controls the planning process." The need for systems puts IS into a major planning role in larger educational institutions.

EXHIBIT IV-110

EDUCATION
ISSUES

- Document Exchange among Various Computers
- Demand for Enhanced Telecommunication Networks
- Integrated Student Information System
- Reduce Paper Storage
- Expand Computing Use by End Users (Academic and Administration)

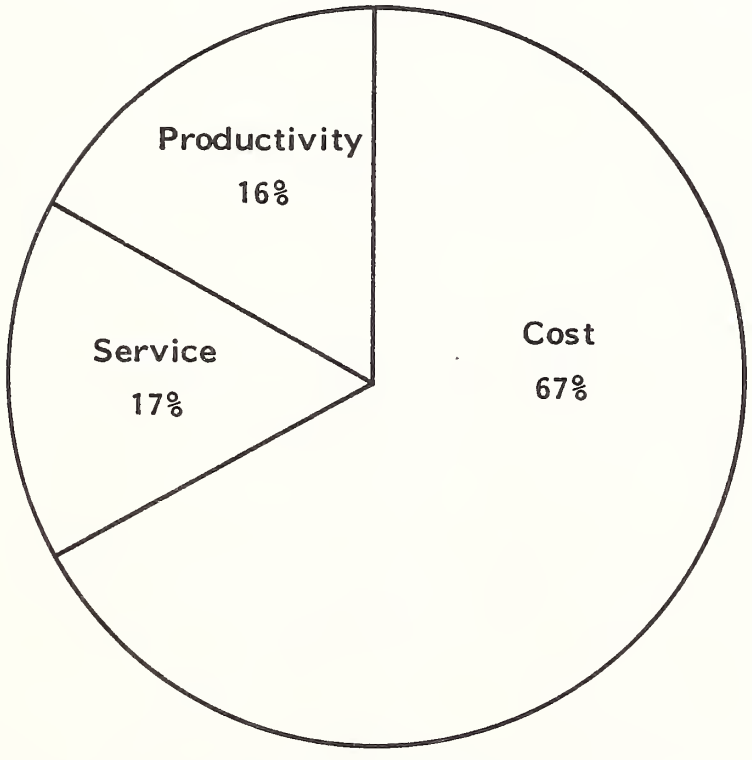
EXHIBIT IV-111

EDUCATION
OBJECTIVES

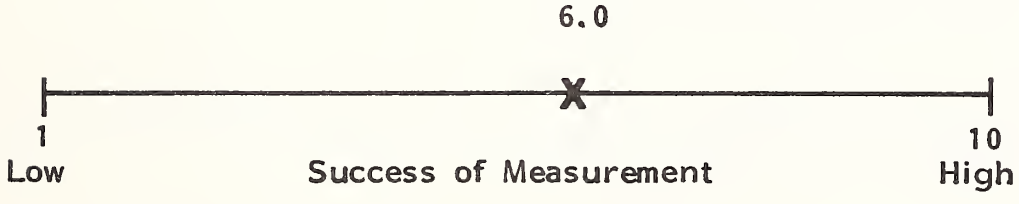
- IS Survival with Decreasing Budgets
- Resolve Incompatibility Among Computers and Networks
- Upgrade Hardware and Software
- Improve Productivity
- Establish a Central, Integrated Administration System

EXHIBIT IV-112

EDUCATION
I.S. MEASUREMENT TO MANAGEMENT




Percent of Responses



- End-user computing takes a major portion of IS resource. Exhibit IV-113 shows that about half of IS expenditures is spent on end-user computing, and this percentage is projected to continue to grow in 1986.

d. Impact of Technology

- End-user computing primarily centers on micro support and micro-to-mainframe applications. End-user computing accounts for about 50% of the IS expenditures in respondent institutions.

- Departmental processing is being actively studied by respondents, but most believe that micro-to-mainframe applications will be used instead of departmental processing.

- Distributed systems development (DSD) is not being used by respondents. Some are planning to use DSD for office systems development, but not in the next two years.

- There is little activity in the use of relational data bases other than using relational-like data bases with fourth generation languages.

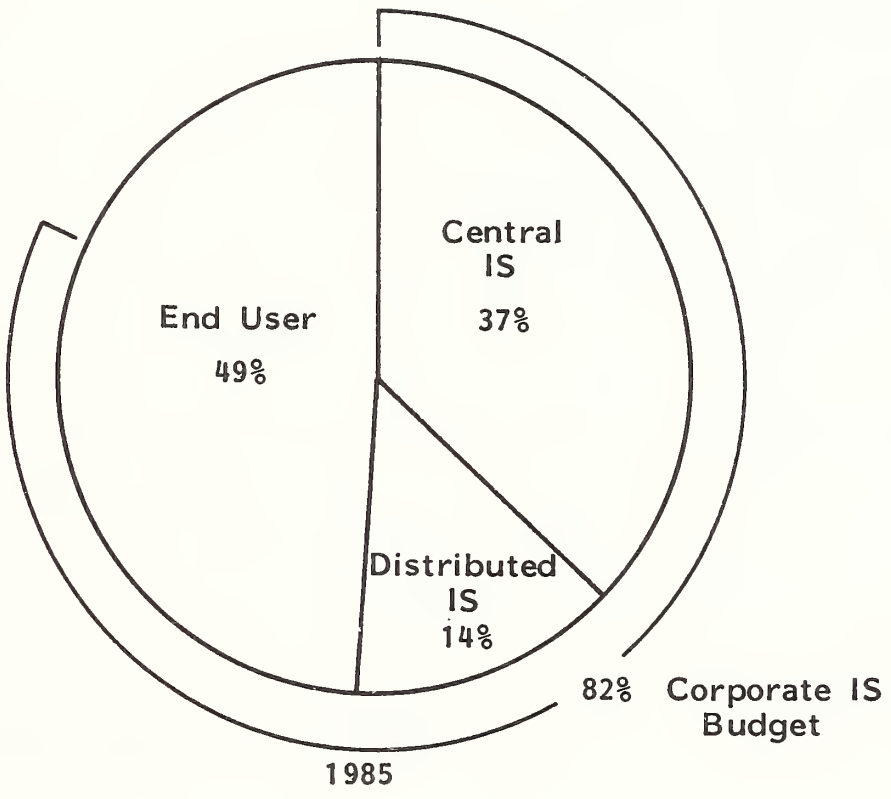
- The respondents thought it was technologically premature to consider merging voice and data communications. It is currently too expensive to even consider experimentally.

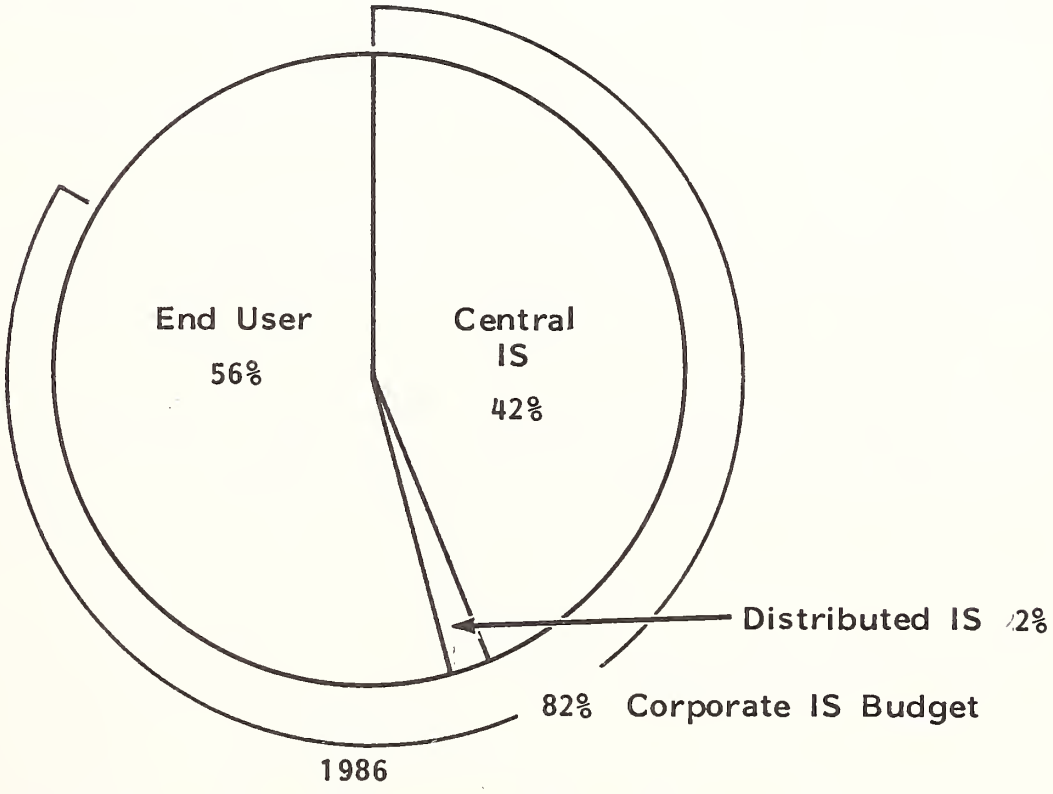
- There is some localized use of LANs on campuses but the lack of standards has inhibited its widespread use.

- Exhibit IV-114 summarizes the impact of the above technological issues in IS for the education sector.

EXHIBIT IV-113

EDUCATION
DISTRIBUTION OF ORGANIZATION'S COMPUTING EXPENSES




Percent of Corporate and Organization-wide IS Budgets

EXHIBIT IV-114

EDUCATION
IMPACT OF TECHNOLOGY

| | IMPACT | COMMENTS |
|---|---|---|
| End-User Computing | High | Requires increased IS support staff. Many M-M concerns. |
| Departmental Processing | Low/Medium | Primarily M-M storage requirements are too great for minis, although some application may exist. |
| Distributed Systems Development | Low | Primarily at OA level. |
| Relational Data Bases | Low | Only use is FGL. |
| Voice/Data Integration | Low | Technically premature. |
| LANs | Low | Lack of standards inhibiting growth. Some minor activity. |

e. End-User Computing

- The respondents have allocated a substantial portion of their IS resources to end-user computing. This has spurred growth in IS and shifted resources from data processing operations to end-user support.

- IS has established a formal training group to support end users. It conducts classes, controls purchases of microcomputers, publishes newsletters, and establishes workshops. IS does most of the end-user training in most respondent institutions.

- Exhibit IV-115 summarizes IS' role in microcomputer support.

  - IS establishes microcomputer acquisiton guidelines and in some cases controls the purchasing process for the entire institution.

  - The end user is primarily responsible for micro software development. If requested, IS will advise end users on software packages.

  - IS does most of microcomputer training in this sector.

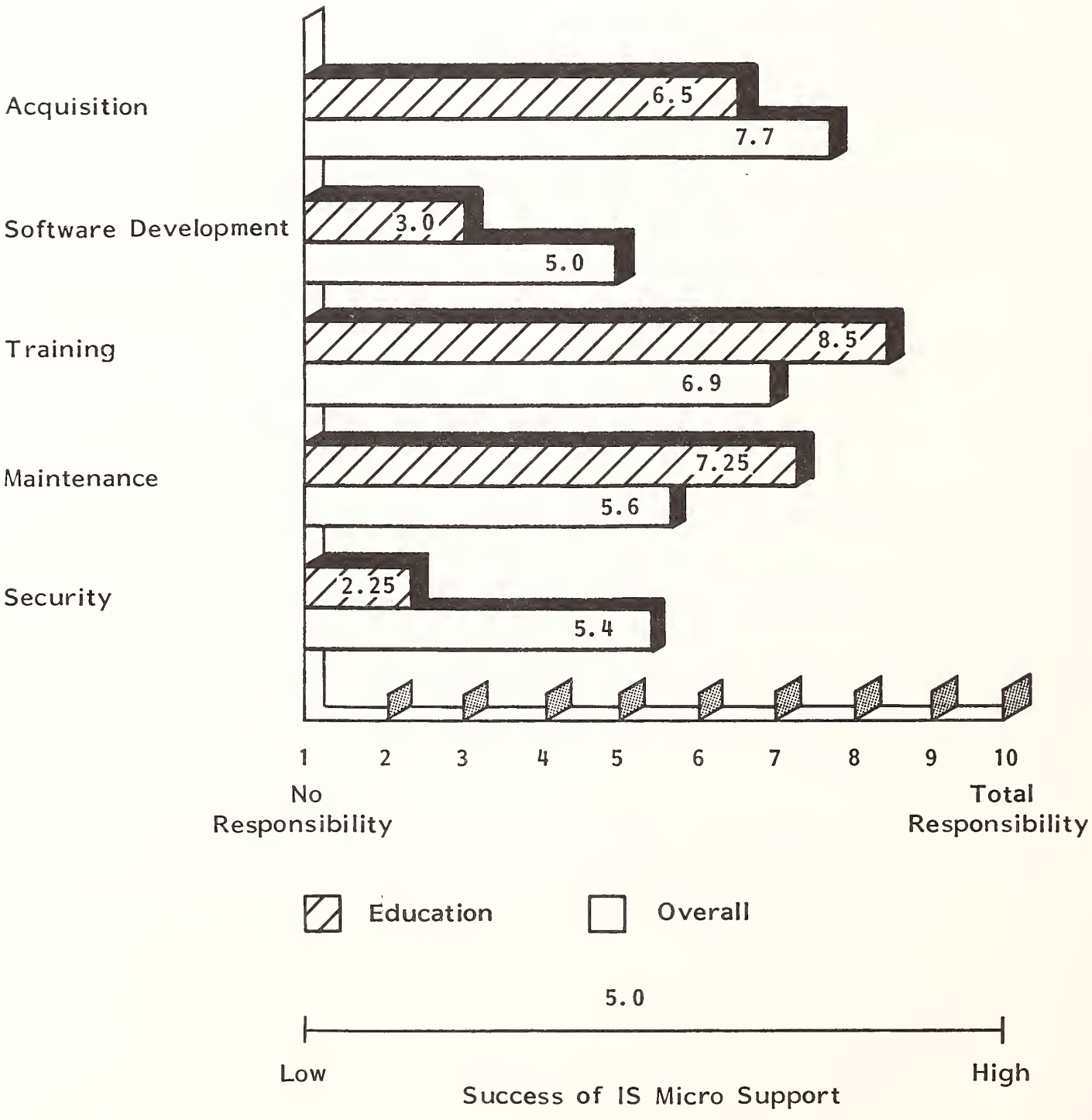
  - IS establishes and manages maintenance contracts for micros.

  - IS is only an advisor on microcomputer security. The end user is responsible for establishing procedures and compliance with these procedures.

  - The respondents believe they provide adequate microcomputer support. IS is limited by a lack of resources in providing better support.

EXHIBIT IV-115

EDUCATION
I.S. ROLE IN MICROCOMPUTER SUPPORT



## 2. NEW APPLICATIONS

- The major applications development thrust in this sector is to automated adminstrative systems. These systems are primarily being developed in-house, with selective use of software packages where economically feasible.

- Exhibit IV-116 shows the major new applications identified by respondent institutions in this sector.

## 3. BUDGET ANALYSIS

- In 1985, the respondents experienced significant growth in their IS budgets. This was primarily due to automating manual systems and establishing end-user support organizations. 1986 is projected to have a significantly slower growth as new applications started this year are implemented and end-user support groups maintain current staff levels.

  - Exhibit IV-117 shows the 1985 budget distribution and projects the growth of budget categories in 1986.

  - Exhibit IV-118 compares this sector's IS growth in 1985 and projected growth in 1986 to the growth rates of IS in general.

- Two-thirds of the respondents project that their IS budgets will increase in 1986, but over 80% believe the growth rates will be lower than 1985 (see Exhibit IV-119).

  - Factors contributing to increases in the IS budget include (in order of most frequently mentioned factors):

    . Hardware.

    . Personnel.

EXHIBIT IV-116

EDUCATION
NEW APPLICATIONS IN 1985

Most Important Applications

Finance

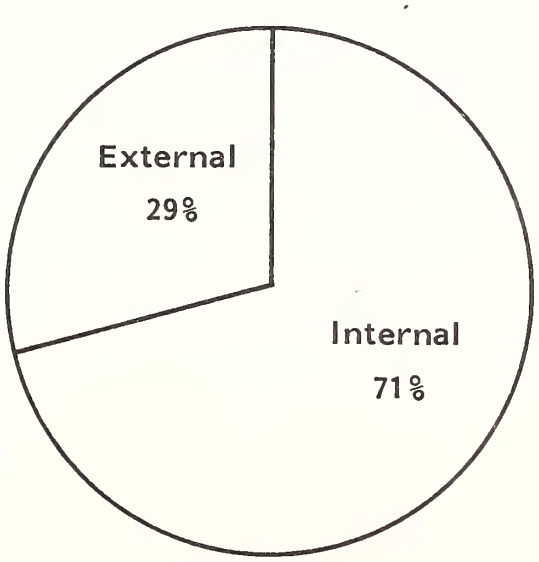
Human Resources

Student Information

Billing

Government Compliance

Source of Development (All Major New Applications)




Percent of Responses

Cost Range

$2K - $85K

EXHIBIT IV-117

## 1985 BUDGET DISTRIBUTION AND 1985/1986 CHANGES IN THE EDUCATION SECTOR

| BUDGET CATEGORY | 1985 PERCENT OF I.S. BUDGET | 1985-1986 EXPECTED BUDGET GROWTH |
|---|---|---|
| Personnel Salaries and Fringes | 43.5% | 9.0% |
| Mainframe Processors | 7.6 | NM |
| Minicomputers | 10.1 | NM |
| Microcomputers | 4.0 | NM |
| Mass Storage Devices | 1.9 | NM |
| Other Hardware | 2.9 | NM |
| Total Hardware | 26.5% | 0.0% |
| Data Communications | 11.9% | 0.0% |
| External Software | 7.9 | 1.7 |
| Professional Services | 0.2 | 0.0 |
| Turnkey Systems | 0.2 | 6.0 |
| Software Maintenance | 3.6 | 5.0 |
| Hardware Maintenance | 6.1 | 12.8 |
| Outside Processing Services | 0.1 | 0.0 |
| Other | NM | NM |
| Total | 100.0% | 7.0% |

NM = No Meaningful Data

EXHIBIT IV-118

EDUCATION
I.S. BUDGETS ARE EXPECTED TO GROW MORE SLOWLY
THAN ALL I.S. BUDGETS

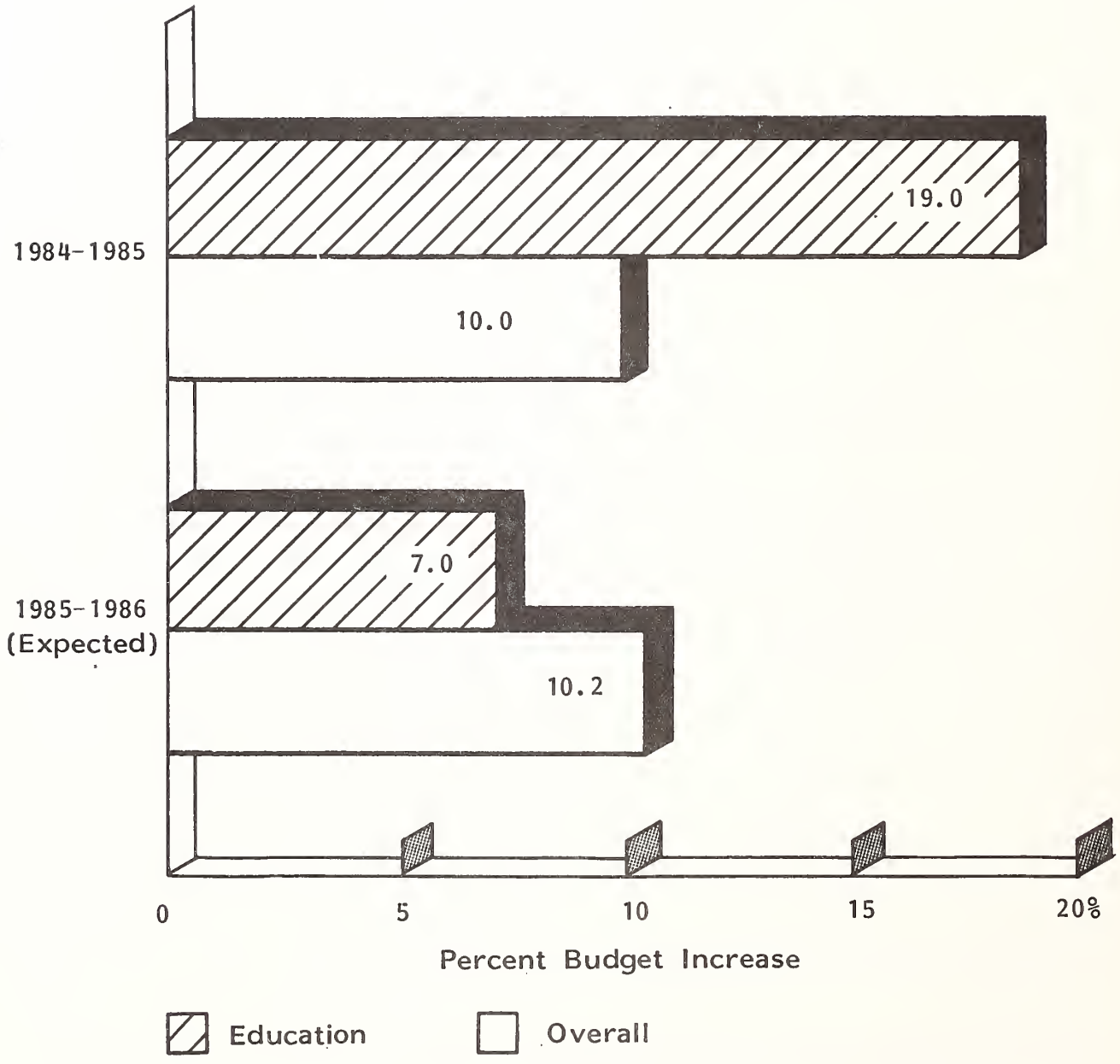
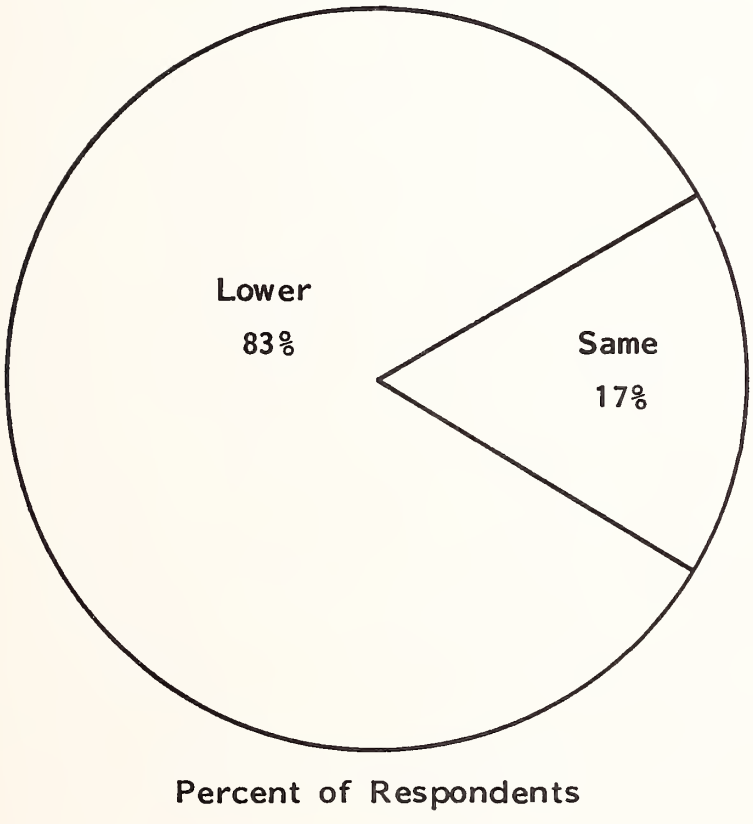
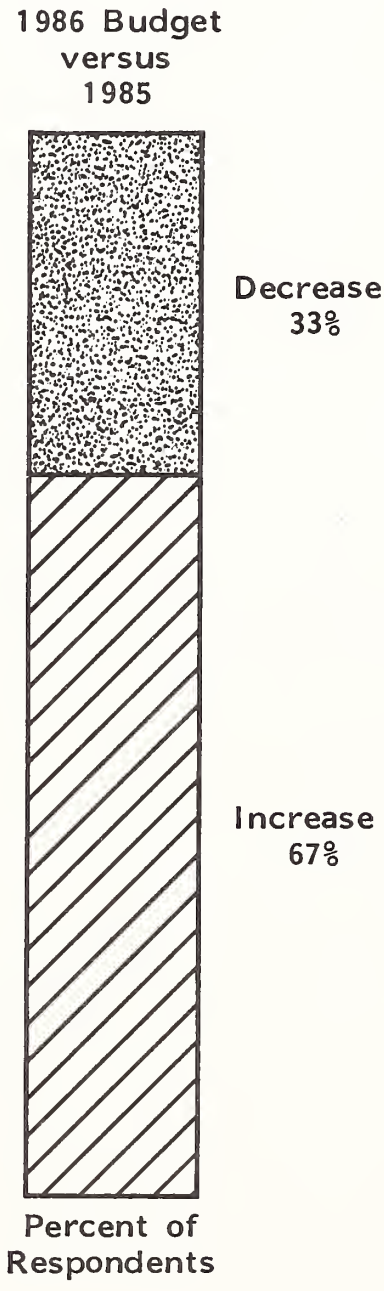


EXHIBIT IV-119

EDUCATION
MOST BUDGETS ARE INCREASING BUT AT A LOWER RATE



- Factors contributing to decreases in the IS budget include:

  . Government funding.

  . Reduced staff.

- The IS budget in the education sector is dependent upon government appropriations. Since most of this sector is controlled by public agencies, IS management must spend considerable portion of their time "lobbying" for funding. Thus, this sector IS organization usually lags in the use of new technology and systems.

# APPENDIX A: INPUT'S 1985 INFORMATION SYSTEMS EXECUTIVE PANEL

APPENDIX A

INPUT'S 1985 INFORMATION SYSTEMS EXECUTIVE PANEL

Name _____ (13)

Title _____ (14)

Company _____ (5)

Address _____ (6)

City _____ (7)

State _____ (8) Zip _____ (9)

Company's Major Products or Services _____

Revenue _____ (10)

Number of Employees _____ (11)

# INPUT'S 1985 INFORMATION SYSTEMS EXECUTIVE PANEL

1. What is your Information Systems Budget?

| | 1983 | 1984 | 1985 | 1986(est.) |
|---|---|---|---|---|
| ($000) | _____(16) | _____(17) | _____(18) | _____(19) |

2a. What factors caused your budget to (change/not change) in 1985?

1. _____ _____(20) Code

2. _____ _____(21) Code

b. What factors will affect your 1986 budget?

1. _____ _____(22) Code

2. _____ _____(23) Code

3. What percent of your 1985 and 1986 budget is for central site, remote site, and end-user processing?

| | 1985 | 1986 |
|---|---|---|
| Central Site | _____%(24) | _____%(27) |
| Remote Site | _____%(25) | _____%(28) |
| End User | _____%(26) | _____%(29) |

4. How much is spent outside your IS budget for computing in your company?

| | 1985 ($000) | 1986 ($000) |
|---|---|---|
| Other IS Organizations | $_____(30) | $_____(34) |
| End User | $_____(31) | $_____(35) |
| Other | | |
| _____ | $_____(32) | $_____(36) |
| _____ | $_____(33) | $_____(37) |

5. For your 1985 budget, what are your annual expenses and your anticipated changes in 1986 for the following categories:

| CATEGORIES | 1985 BUDGET AMOUNT ($000) | ANTICIPATED PERCENT CHANGE IN 1986 |
|---|---|---|
| Personnel Expense | $ (38) | % (54) |
| Computer Hardware Expense | $ | % |
| Mainframe | $ (39) | % (55) |
| Minicomputer | $ (40) | % (56) |
| Microcomputer | $ (41) | % (57) |
| Mass Storage Devices | $ (42) | % (58) |
| Other Hardware | $ (43) | % (59) |
| Total Hardware | $ (44) | % (60) |
| Data Communications Expense | $ (45) | % (61) |
| External Software Products | $ (46) | % (62) |
| Hardware Maintenance | $ (47) | % (63) |
| Software Maintenance | $ (48) | % (64) |
| Professional Services (Custom Programming, Consulting, Education) | $ (49) | % (65) |
| Turnkey Systems | $ (50) | % (66) |
| Outside Processing Services | $ (51) | % (67) |
| Other | $ (52) | % (68) |
| Total | $ (53) | % (69) |

6a. How many people work in your IS department in:

| 1984 | 1985 | 1986(est.) |
|---|---|---|
| _____(70) | _____(71) | _____(72) |

b. How is this staff allocated (in percent of total staff) among the following areas:

| | | | |
|---|---|---|---|
| Applications Development | _____%(73) | _____%(80) | _____%(87) |
| Technical Support | _____%(74) | _____%(81) | _____%(88) |
| End-User Computing | _____%(75) | _____%(82) | _____%(89) |
| Operations | _____%(76) | _____%(83) | _____%(90) |
| Management | _____%(77) | _____%(84) | _____%(91) |
| Clerical | _____%(78) | _____%(85) | _____%(92) |
| Other _____ | _____%(79) | _____%(86) | _____%(93) |
| | 100% | 100% | 100% |

7. During the next 12 months what are the 5 most important applications that you will be developing or contracting externally for?

| | | | Internal | External | Both | Estimated Cost |
|---|---|---|---|---|---|---|
| 1. | _____ | ____ Code(94) | ☐ (95) | ☐ | ☐ | _____(96) |
| 2. | _____ | ____ Code(97) | ☐ (98) | ☐ | ☐ | _____(99) |
| 3. | _____ | ____ Code(100) | ☐ (101) | ☐ | ☐ | _____(102) |
| 4. | _____ | ____ Code(103) | ☐ (104) | ☐ | ☐ | _____(105) |
| 5. | _____ | ____ Code(106) | ☐ (107) | ☐ | ☐ | _____(108) |

8a. Could INPUT's Director of Information Systems Research talk with you at more length about key information systems issues?

☐ Yes (109) ☐ No

b. Is there someone in your organization with whom we can discuss Mainframe Software Issues?

Name _____(110)

Title _____(111)

Phone _____(112)

Telecommunications Issues ?

Name _____(113)

Title _____(114)

Phone _____(115)

End-User Computing Issues?

Name _____(116)

Title _____(117)

Phone _____(118)

Thank you.

# APPENDIX B: QUESTIONNAIRE

# APPENDIX B

1. a. Do you agree that the above are key issues for your industry?

   b. What other key industry issues will you address this year?

2. To what extent* has management related investment in IS to improvements in company:

   Profitability _____ Why? _____

   Competition _____ Why? _____

   *(10 = very high, 1 = no relationship).

3. Does management view IS as an asset _____(Y/N)

   Unavoidable Cost _____(Y/N) Other _____

4. a. How successful have you been in measuring IS' value to your company?

   (10 = very successful, 1 = no success) _____

   b. What specific measurements do you use? _____

5. a. What results were you able to demonstrate to management in 1984?

   b. What improvements are you targeting for 1985?

6 a. How has the role IS plays in your company changed in the last 2 years?

   b. What changes do you anticipate in the next 2 years?

   Why?

   c. What role does IS play in the corporate planning process?

7. a. How can information systems be used as a competitive weapon in your industry?

   b. What is your company doing about this?

8. How has end-user computing affected your IS organization?

9. Training and support of end users are growing in importance. How is your organization satisfying this need?

10. IBM (System 36) and the major minicomputer vendors (WANG, DEC, DG) are marketing their products as departmental processors.

    a. Will departmental processing be an important part of your information systems strategy?

    _____(Y/N) Why? _____

    b. Which vendor will you install? _____

    Why? _____

11. a. To what extent* is IS responsible for personal computer:

    Acquisition _____* Why? _____

    Software Development _____ Why? _____

    Training _____ Why? _____

    Maintenance _____ Why? _____

    Security _____ Why? _____

    *(10 = total responsibility, 1 = no responsibility).

    b. How successful is your personal computer support? Why?

12. a. What impact is distributed systems development (DSD) having on your applications development strategy?

    b. How are you integrating distributed applications?

13. What impact is relational data base systems having on your data management strategy?

14. a. Do you believe that merging data and voice communications is required to support the information needs of your organization?

    Why?

    b. Are these functions merged into one organization unit in your company?

    c. Do you have plans to do this?

15. What impact has the lack of LAN standards had on the use of LANs in your company?

16. Will the CBX be used for both data and voice communications within the next 2 years in your organization?

    Why?

17. What is the most important issue that IS will address in 1985?