CONTROLLING USER-OPERATED SYSTEMS AND EQUIPMENT

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INPUT Planning Services for Management

CONTROLLING USER-OPERATED SYSTEMS AND EQUIPMENT

JULY 1981

CONTROLLING USER-OPERATED SYSTEMS AND EQUIPMENT

CONTENTS

CONTROLLING USER-OPERATED SYSTEMS AND EQUIPMENT

EXHIBITS

1 INTRODUCTION

I INTRODUCTION

- This report is produced by INPUT as part of its Management Planning Program in Information Systems. The report presents information based on interviews with 30 users of computers. In six cases, information from vendors was used to supplement user interviews.

- Information from related INPUT studies, Selling Personal Computers to Large Companies and Trends in Delivery of Remote Computing Services, has been used to illustrate and amplify specific points throughout the report.

- Additional organizations, clients, and vendors were polled to review findings and future directions relevant to the study.

- The results of the study are intended to serve the planning functions of clients by suggesting trends and changes that are occurring in strongly centralized data processing organizations, discussing problems that occur, and presenting approaches for addressing them.

  - They should not be taken as predictive of any individual organization's results under a different set of circumstances.

  - However, they do present a compendium of approaches that has been tried and found to be successful in specific situations.

- Client inquiries on the report are invited.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

A. BACKGROUND

- Increasing amounts of total organization EDP expenditures are made directly by end users, and include not only the direct use of remote computing services, but also the acquisition of computing equipment and operation of systems.

  - Large standalone minicomputers can be found in user areas running applications that could have been handled in a central installation or with distributed data processing (DDP).

  - Smaller computers and office automation systems have frequently been acquired by users to meet local office or departmental needs.

  - Data, voice, and image communication systems are now being acquired by users as well.

- These user-operated systems and equipment may have been obtained because they provide the most economic means of serving needs, whether considered in the local context or in that of the entire organization.

  - However, it is more likely that there was no review by the EDP staff or a steering committee to guide these acquisitions.

- Expenditures for information systems by user areas and EDP cannot be totally or easily aggregated, as the INPUT study Changing Economics in the Information Organization found earlier this year.

- Most organizations are leaning more heavily on EDP as a result of the increasing use of computing for both the survival and growth of the organization.

  - On-line systems magnify this reliance on computing since they change the methods of doing business.

- While reliance on EDP systems is increasing, uncoordinated expansion of the number and size of user systems has led to difficulties and even an inability to plan the continued EDP support of business objectives of the total organization.

- EDP and corporate management in some organizations have already taken steps to alleviate the situation, including:

  - Increases in procurement controls.

  - Changes in organization.

  - Improvement in the services and methods of the EDP organization.

- Results of these approaches are detailed and analyzed in the report.

B. FINDINGS

- The existence of user-operated systems and equipment was reported by all 30 respondents to the study and is common in most large companies.

- Estimates of the relative size of user expenditures compared to the budget of the EDP department are shown in Exhibit II-1 together with the type of user-operated equipment that is found in each of the classes shown.

  - As the exhibit indicates, remote services and standalone computers are the most prevalent user-operated systems. Each was mentioned by 26 respondents.

    . However, the level of use of remote services was reported to be shrinking at a number of organizations who were converting work to internal timesharing.

  - Thirteen of the 26 respondents with standalone computers have micro- as well as minicomputers.

- Internal timesharing is the prevalent or only user-operated system more often where user expenditures are relatively small.

  - Internal timesharing services priced at the level of higher cost vendor services (and also sold externally) are not the user-operated system of choice as often as where internal timesharing is priced closer to cost, and better service is provided.

- User operated systems and equipment are almost as apt to have been justified by a cost/benefit analysis as by arguments that the user could not wait for assistance by EDP or required rapid development of a system. Both reasons were used by about 80% of the respondents.

- However, problems are frequently encountered with user-operated systems and equipment, as listed below:

  - User needs are not met.

  - Corporate accounting conventions are not met.

EXHIBIT II-1

DISTRIBUTION OF
COMPUTING CAPABILITIES EMPLOYED IN USER SYSTEMS

CATEGORY	SIZE OF USER COMPUTING BUDGET COMPARED TO EDP DEPARTMENT BUDGET							
	<1%	1-5%	5-10%	10-20%	20-30%	30-40%	>40%	TOTAL
NUMBER OF RESPONDENTS	7	10	3	3	4	1	2	30
NUMBER WITH NO CONTROLS	1	–	2	1	3	–	1	–
NUMBER USING REMOTE SERVICES	6	7	3	3	4	1	2	26
NUMBER WITH DDP OR INTERNAL NETWORKS*	4	5	0	2	3	1	1	16
NUMBER WITH STAND-ALONE COMPUTERS	3	10	3	3	4	1	2	26
NUMBER WITH INTERNAL TIMESHARING	4	5	2	3	1**	1**	1	17

* OTHER THAN INTERNAL TIMESHARING

** PRICED AT LEVEL OF HIGHER COST VENDOR SERVICES AND SOLD EXTERNALLY.

- User applications cannot be moved or used elsewhere in the company.

- Operating problems are encountered in running jobs.

- Equipment and software problems are encountered.

- Software packages recommended by the firm, such as a standard DBMS, cannot be used.

- Users of these systems become a burden to EDP management.

- Problems were more frequently mentioned by respondents where users spend a relatively greater amount or where there are no controls in effect, as shown in Exhibit II-2.

- Avoiding problems was mentioned as a reason for increasing controls by 67% of the respondents who had done so, but it was not the most important reason. Ninety-one percent of respondents felt that serving business strategies was a more important objective, and 83% felt that supporting EDP plans was second in importance.

- Types of controls that were increased can be categorized as:

  - Technical standards for equipment, software, data communication, and development tasks (requirements phase through documentation phase).

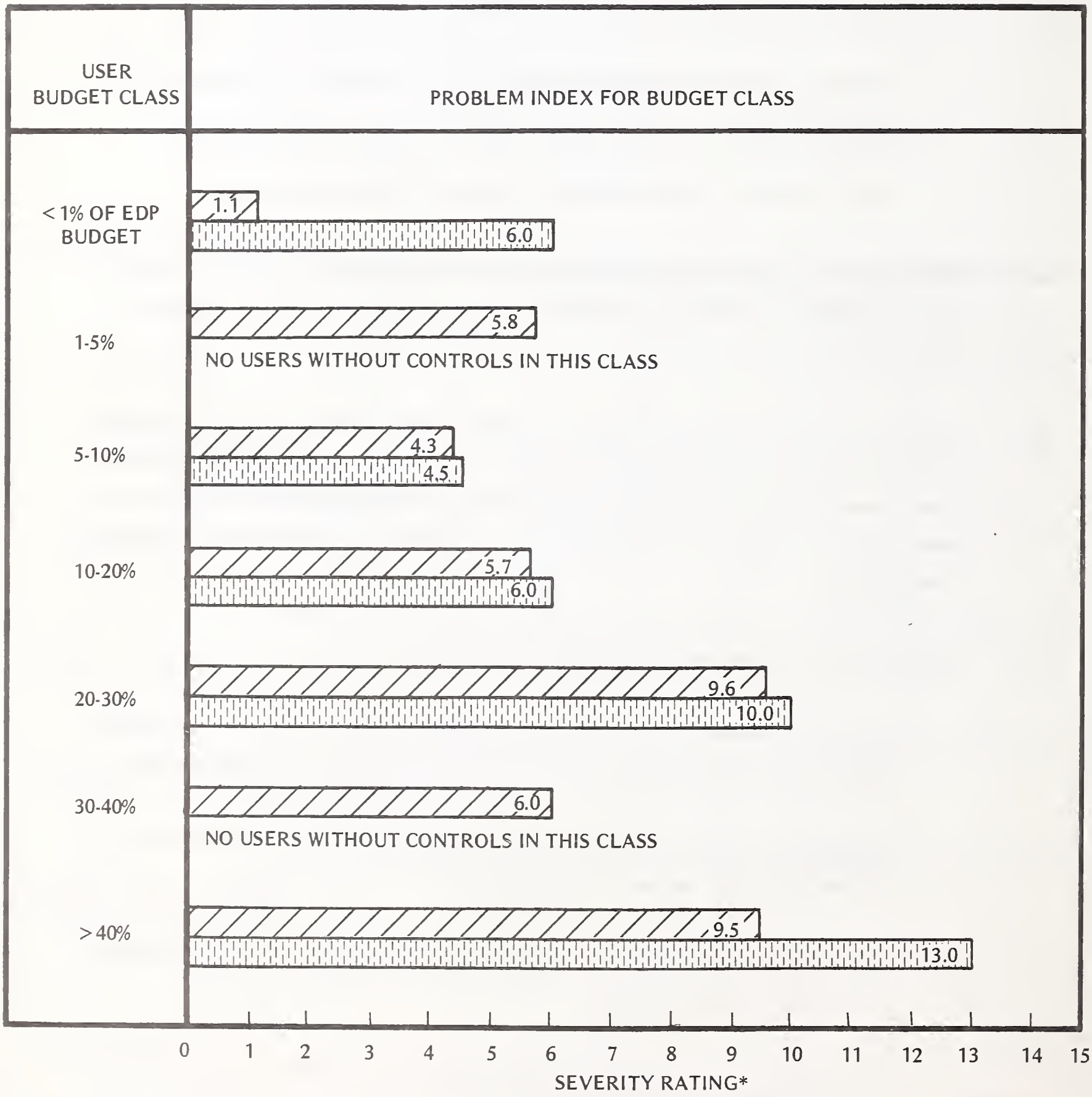
  - Budgetary or financial controls on all computer-related expenditures, or at least on those above a certain level.

  - Independent review of all computer-related expenditures and requests for computing capabilities.

  - The provision of consulting and "marketing" of other services and aid available from the EDP department.

EXHIBIT II-2

PROBLEM OCCURRENCE IN USER SYSTEMS



ENTIRE CLASS

THOSE WITHOUT CONTROLS

* $\frac{\text{SUM OF PROBLEMS TIMES WEIGHT OF PROBLEMS}}{\text{NUMBER OF USERS IN CLASS}}$ (HIGH = 3, MEDIUM = 2, LOW = 1)

- The latter two approaches are referred to collectively hereafter as "other techniques."

- Seventy-five percent of respondents considered budgetary or financial controls and review techniques to be highly effective in guiding or controlling user activities.

  - All those who felt their overall success with controls is wholly or better than partially successful considered financial controls to be highly effective.

- How well each of the objectives of increased controls are met is shown in Exhibit II-3.

  - No respondent felt that controls are a failure or counterproductive.

- As shown in Exhibit II-4, the control process is aided by other factors, particularly in those organizations which reported the greatest degree of success.

  - The nature of these contributing factors indicates that increased controls alone may not be sufficient to alleviate all problems associated with user-operated equipment.

- Ninety-one percent of respondents anticipate that future technological developments and accompanying demands of users will require definite limitations on the choice of applications and data communication software and hardware capabilities.

- The anticipated developments include lower cost computers (mini and micro) with advanced communications data base capabilities and storage devices performing development work on internal timesharing, and personal computers that will be more powerful, smaller, less expensive and that will provide features of interest to users as individuals.

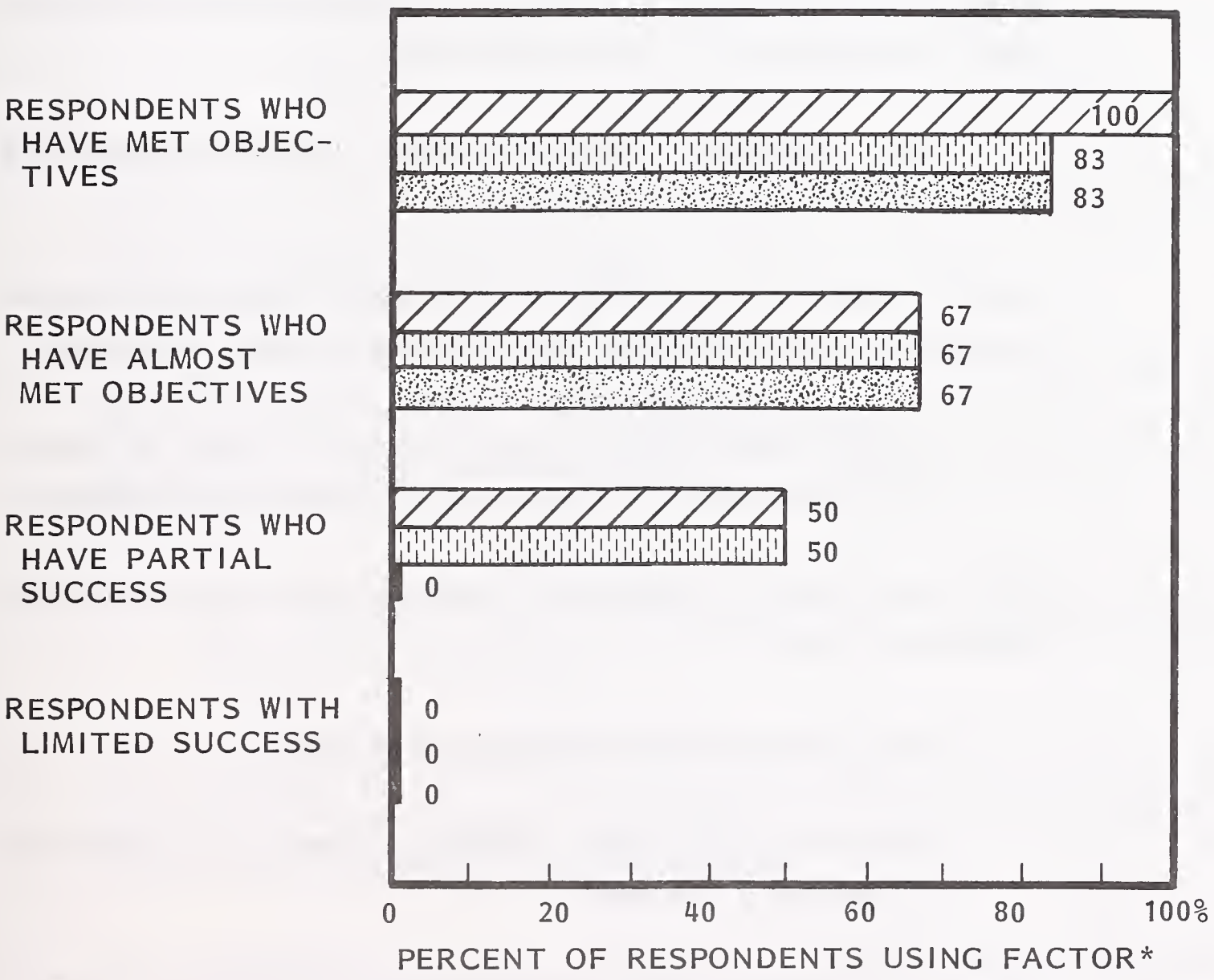
EXHIBIT II-3

EVALUATION OF SUCCESS OF INCREASED CONTROLS
BY PERCENT OF RESPONDENTS WHO INCREASED CONTROLS

OBJECTIVES ARE MET	USER NEEDS BETTER MET	BUSINESS GOALS SUPPORTED	PROBLEMS ALLEVIATED	IMPROVED VIEW OF EDP
75% SAY WHOLLY OR ALMOST	75% SAY YES	75% SAY YES	80-90% SAY YES	NEGATIVE COMMENTS DROP
25% SAY PARTIALLY OR SOMEWHAT	25% SAY POSSIBLY	25% SAY MAYBE/ NOT SURE	10-20% SAY NOT SURE	FROM 54% TO 3% OF ALL COMMENTS ON EDP

EXHIBIT II-4

FACTORS AIDING THE CONTROL PROCESS



* FACTOR

- DEVELOPMENT OF A MISSION STATEMENT
- MARKETING ATTITUDE UTILIZED BY EDP
- INTERNAL TIMESHARING AVAILABLE

C. RECOMMENDATIONS

- Where users are already operating systems and acquiring equipment, the EDP organization and/or top management must find out why.

  - The EDP department may have a backlog of work that inhibits the submission of worthwhile user requests. EDP might need more budget or personnel, or might need to become more productive. Internal timesharing, or DDP, or the ability to use remote services could allow users to meet some of their own needs as well.

    . These approaches need not threaten the EDP department's control, and often can aid it.

  - The EDP department may not be working closely enough with users to stay aware of and participate in their plans for the use of computing.

    . The EDP department may have to revise its budget, or improve both its willingness to cooperate or its "salesmanship" approach.

  - EDP may consume an excessive amount of time and/or cost for development work.

    . Productivity methods and tools might be explored.

    . Measurement and costing techniques may need to be investigated and changed or developed.

  - EDP may not have up-to-date knowledge of the technology or software packages that are available to meet user needs.

    . Education as well as contact with users who may have already become aware of new techniques are needed.

- On their part, users may want to avoid a justification of their requests, where the request represents an unannounced strategy, an experiment, or a status need rather than a cost-justified need.

  - Users may be demanding the right to be responsible for all aspects of their business plans and feel encumbered by EDP "second guessing" or previous bad experiences.

    . Stronger executive management or a clearer organization-based information policy must give direction to these efforts, considering both the problems that can result as well as the opportunities that can be met by local systems development.

- None of the steps that has been suggested may succeed. EDP management may have to accept a compromise in organizational strength or controls as a result of management policy decisions.

- The objective of EDP management should be to have the widest span of influence possible in regard to user-operated systems and equipment, even if control is not being exercised directly by a steering committee or top management.

  - EDP management should be recognized as the spokesman for the effective use of computing.

- The development of a workable control process assists EDP to achieve this higher objective, even though it may appear to be giving up something (i.e., the operation and development of EDP systems).

- Line management should also be prepared for and encourage the introduction of a control process since it produces rapprochement between end users and EDP, and furthers the overall information objectives of the organization.

- Where EDP management cannot convince higher levels of management or users that a control process should be introduced, a strategy should be developed to aid users as much as possible to meet their computing objectives in those activities brought to the attention of the EDP organization.

- The strategy should bring the following elements to the attention of users:

  - Methods of defining and ranking needs.

  - Methods of performing a feasibility analysis to determine whether applications are justified.

  - Steps or phases in analyzing and developing a system.

  - Recognition of corporate accounting and other conventions.

  - Languages, software packages, and techniques that can make development easier.

  - Limitations in equipment and vendor services that could prevent data communication, the portability of data or applications, successful operation of a system, growth or movement to more powerful systems, etc.

- These elements should be brought to user attention through the best organizational or marketing approaches possible. Newsletters, seminars, outside education, and other avenues can be explored.

- The need for organizational changes to strengthen EDP management in its quest for improved services, methods, and development of staff capabilities should not be overlooked.

- Recommendations for an effective control process are summarized below:

- The control process should be an ongoing review that involves cooperative work between users and EDP staff under corporate overview.

- The process is best initiated with the participation of corporate management.

- A strategy or mission statement should be developed to support the control process, but possibly after the process has started in order to reflect problems or adjustments encountered in the learning phase.

- The control process has to encompass a combination of budgetary and financial controls, as well as other techniques of guidance and review. All needs for computing, and plans to satisfy them, should be documented and subject to technical review.

- Plans (including forecasts of needs) should be prepared with the aid of the EDP staff to the extent possible.

- Formal reviews of specific items might be held only where there are disagreements about the benefits, priorities, solutions, resources to be utilized, costs, etc., which cannot be resolved, or when the costs involved exceed a substantial, predefined threshold.

- When the EDP department cannot meet high priority user needs in the time required, solutions that involve user-operated systems and equipment may be permitted by the control process. The selection of hardware and software vendors, data communication techniques, application languages, etc. should be constrained to a predetermined set of technically acceptable alternatives, or be subject to review. The objectives of EDP management should be to exercise a wide sphere of influence and advice, even if direct control in certain user areas has to be compromised.

- A "marketing" or consulting attitude on the part of EDP staff members is a valuable aid to the control process.

- The user department may sometimes come into contact with new technology or techniques which should be fed back and shared with the EDP staff.

- The control process should be adaptive and respond to changes in technology and techniques as well as to the increasing knowledge level of users.

- An expansion of equipment capabilities can provide users the opportunity to meet their needs internally, while supporting the control process as well. Both DDP and internal timesharing routes appear meaningful, but both could be challenged by lower cost, perhaps specialized, minicomputers or large microcomputers. EDP management should be prepared for new trade-off considerations.

III USER-OPERATED SYSTEMS AND EQUIPMENT

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A. SOURCES FOR EDP SERVICES

- A profile of the sources of data processing capabilities for users in 45 companies is shown in Exhibit III-1. These data were obtained from the study, Selling Personal Computers to Large Companies, published by INPUT in September 1980.

  - Departmental systems cited in this exhibit include minicomputers under the control either of a user department or a decentralized EDP group. These systems may be connected to a network and/or form part of a DDP system.

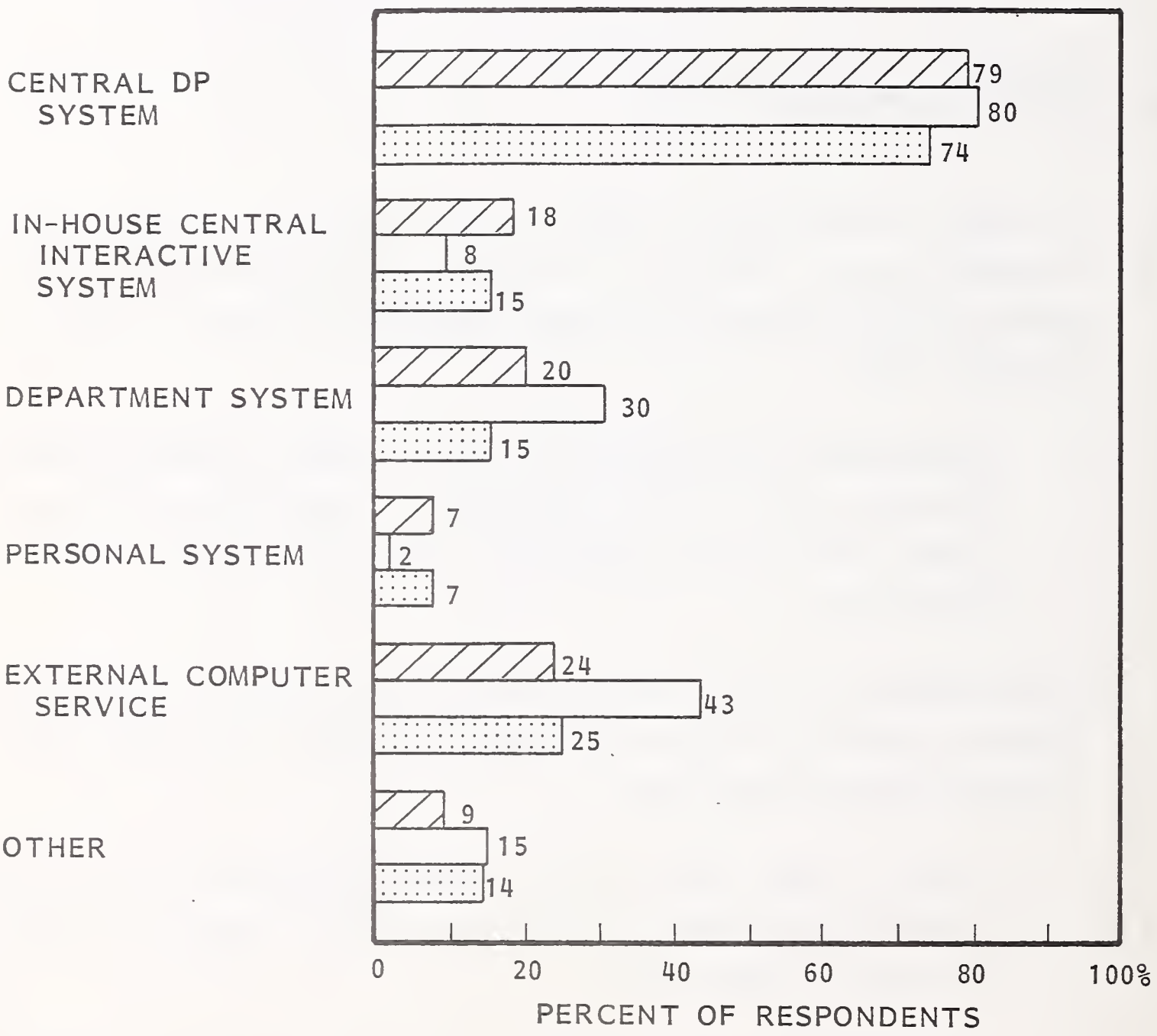
- User respondents to the study had been contacted directly by vendors for external computing services, minicomputers, and even a few larger microcomputers (above $15,000 in cost).

  - Users had been able to order computing equipment or the use of services below certain budget levels without a review from EDP purchasing or another office.

  - Some users were identified who called their computers "statistical analyzers," "pipeline controllers," etc., so that they could avoid a review of computer acquisitions.

EXHIBIT III-1

SOURCES OF DATA PROCESSING SERVICES
FOR USERS IN FORTY-FIVE COMPANIES*



NOTE: TOTALS MAY BE GREATER THAN 100% DUE TO MULTIPLE SOURCES OF SERVICE.
* TAKEN FROM 1980 INPUT STUDY PERSONAL COMPUTERS IN LARGE COMPANIES

- Vendors of remote computing services were also willing to provide service under various names to avoid review.

- These data confirm and extend the evidence for a phenomenon INPUT termed "leakage" earlier this year in the report entitled Changing Economics in the Information Organization.

- Although INPUT believes (and recommends) that most organizations attempt to control, or at least direct, information-related expenditures for the benefit of the total organization, it is apparent that these efforts are not entirely successful.

- Three companies among 30 respondents contacted for this study have not tried to keep track of user operated systems and equipment. (Two of these companies are in the Fortune 100.)

- The other 27 respondents used the techniques listed in Exhibit III-2 to stay aware of user-operated systems and equipment. When user activities at their companies were mentioned during an interview, two of the respondents to this survey added the items mentioned by the interviewer to lists of user activities which they had previously compiled.

- Yet, most respondents (26 out of 30) could not readily provide an estimate of the total expenditures for user operated systems, as shown in Exhibit III-3.

  - Some user expenditures are included in the EDP budget, but may or may not be billed back to users, either with or without allocations or other costs added.

  - Most user expenditures for computing are not classified as such.

  - When EDP management prepares aggregations of computing, external service, data and voice communication costs for different purposes, expenditures for user-run systems alone are not readily available.

EXHIBIT III-2

HOW EDP MANAGEMENT TRACKS USER ACTIVITIES

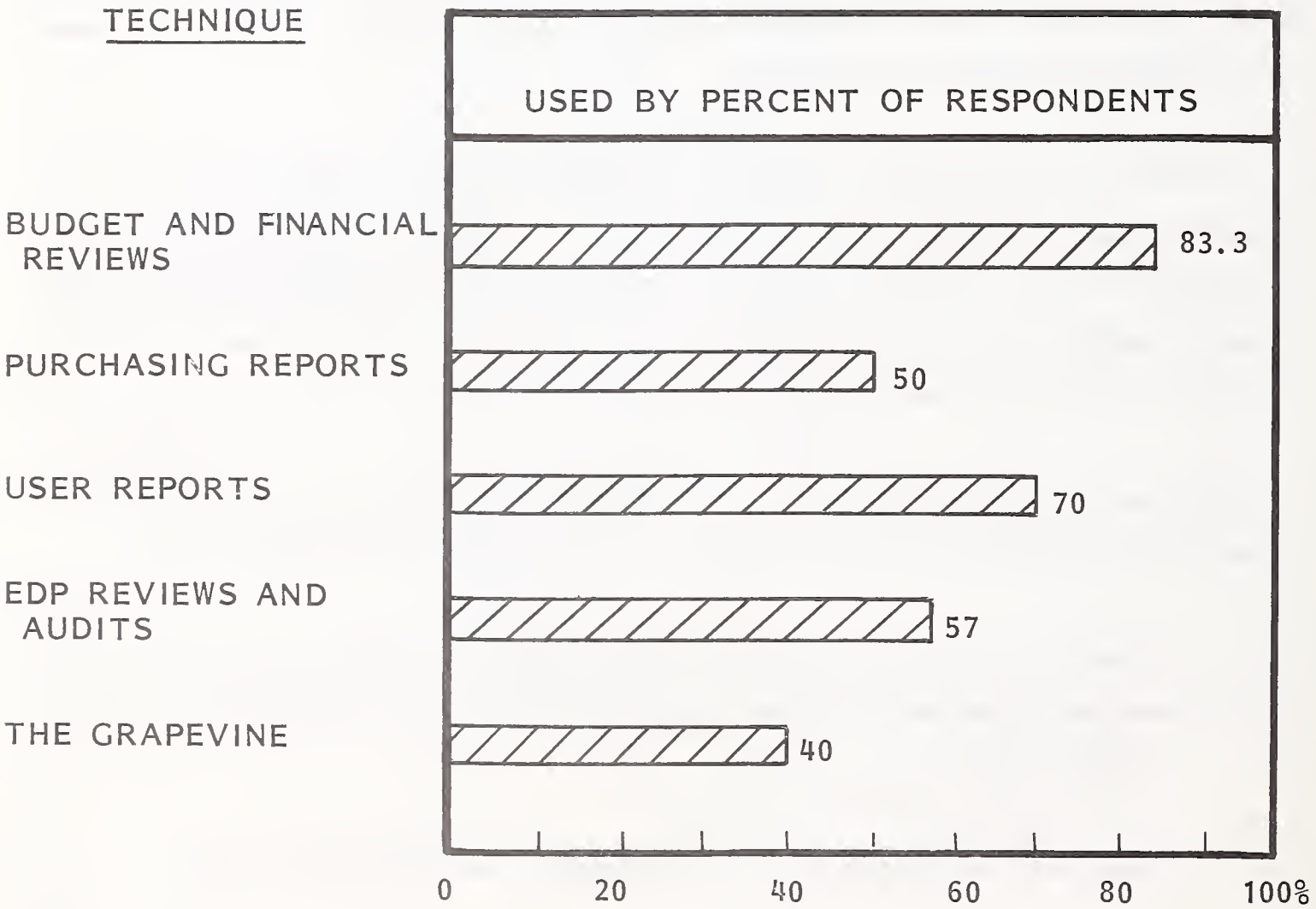


EXHIBIT III-3

ABILITY TO AGGREGATE
USER EXPENDITURES

- Further questioning of respondents, combined with vendor-supplied data, produced the agreed upon estimates of the expenditures for user activities compared to the budgets of the EDP departments, at the respondents' companies, as listed in Exhibit III-4.

B. CLASSIFICATIONS OF USER-OPERATED SYSTEMS AND EQUIPMENT

- Information on the departments where user-operated systems and equipment might be found is shown in the bottom five rows of Exhibit III-5, which was obtained from the 1980 research study on 45 users noted in Exhibit III-1.

- Among 30 respondents and separate contacts made during the current study, the following classes of user operated systems and equipment were formed:

  - Terminals and remote job entry stations (RJE) connected to external timesharing and remote services companies.

  - Internal timesharing systems that are provided to users at, or slightly above, actual cost, and offer such aid and flexibility that they are perceived as a vehicle for user-run systems.

    . For instance, some companies encourage users to acquire word processing systems or micros with communication features so that they can connect to the timesharing system and use existing files and data bases.

    . Internal timesharing systems that are the only permitted timesharing or computer capability available (other than the central facilities) are not generally thought of as user-run systems.

  - Minicomputers solely under user control, either standalone or connected to networks.

EXHIBIT III-4

USER EXPENDITURES FOR COMPUTING COMPARED TO BUDGET OF EDP DEPARTMENT

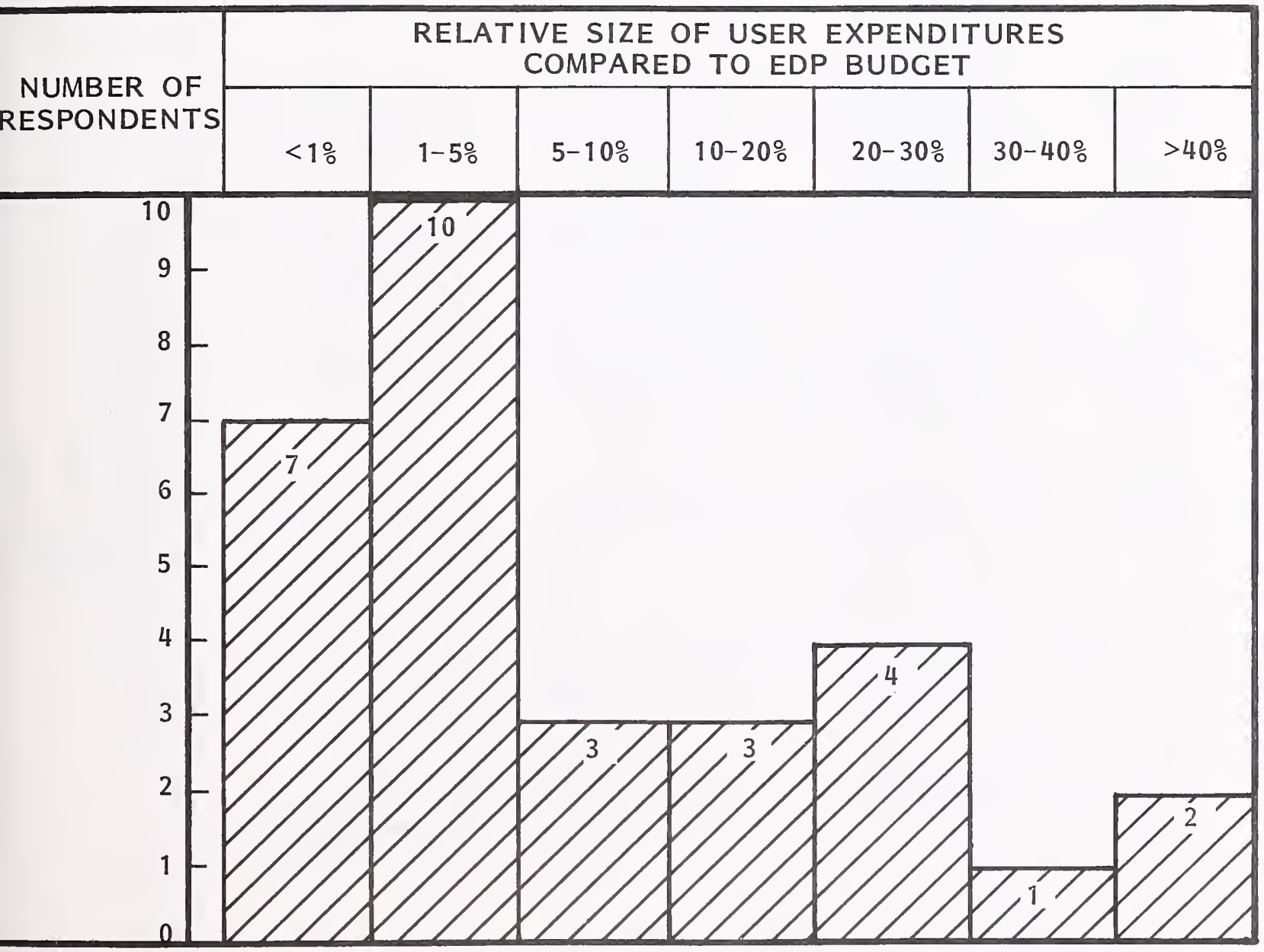


EXHIBIT III-5

DEPARTMENTS OBTAINING COMPUTING SERVICES*

SOURCE OF COMPUTER SERVICES	PERCENT OF RESPONDENTS BY DEPARTMENT								
	MARKET-ING	MANU-FACTUR-ING	PLAN-NING	EN-GINEER-ING	LEGAL	PER-SONNEL	FI-NANCE	OPERA-TIONS	OTHER
CENTRAL DATA PROCESSING SYSTEM	76%	75%	80%	71%	55%	86%	87%	84%	78%
IN-HOUSE CENTRAL TIMESHARING SYSTEM	17	19	23	29	3	6	21	23	6
EXTERNAL COMPUTER SERVICES	36	6	49	37	18	17	28	26	22
DEPARTMENT SYSTEM	21	31	14	29	12	11	28	26	28
PERSONAL SYSTEM	10	13	3	17	0	0	5	0	0
OTHER	5	13	11	14	21	3	5	3	0

NOTE: TOTALS MAY BE GREATER THAN 100% DUE TO MULTIPLE SOURCES OF SERVICE

* TAKEN FROM 1980 INPUT STUDY PERSONAL COMPUTERS IN LARGE COMPANIES

OVER 50%

30-49%

15-29%

0-14%

- Dedicated minicomputers authorized by the EDP organization for users, whether operated on a standalone or DDP basis.

  . These computers may appear on the budget of either the user or the central EDP department. The computer may seem to be only partially under user control, but if the user regards it as his system, it has been classified as user-controlled.

- Micros or personal computers given or provided economically by corporate or EDP management to users.

  . Four companies were found who were engaged in doing this. Three of the companies had provided in excess of 50 units.

- Micros bought by users with or without knowledge of EDP or corporate management.

  . Vendors could usually identify a substantial number of installations of personal computers at large companies.

- Office automation as well as word processing systems being used to run system applications.

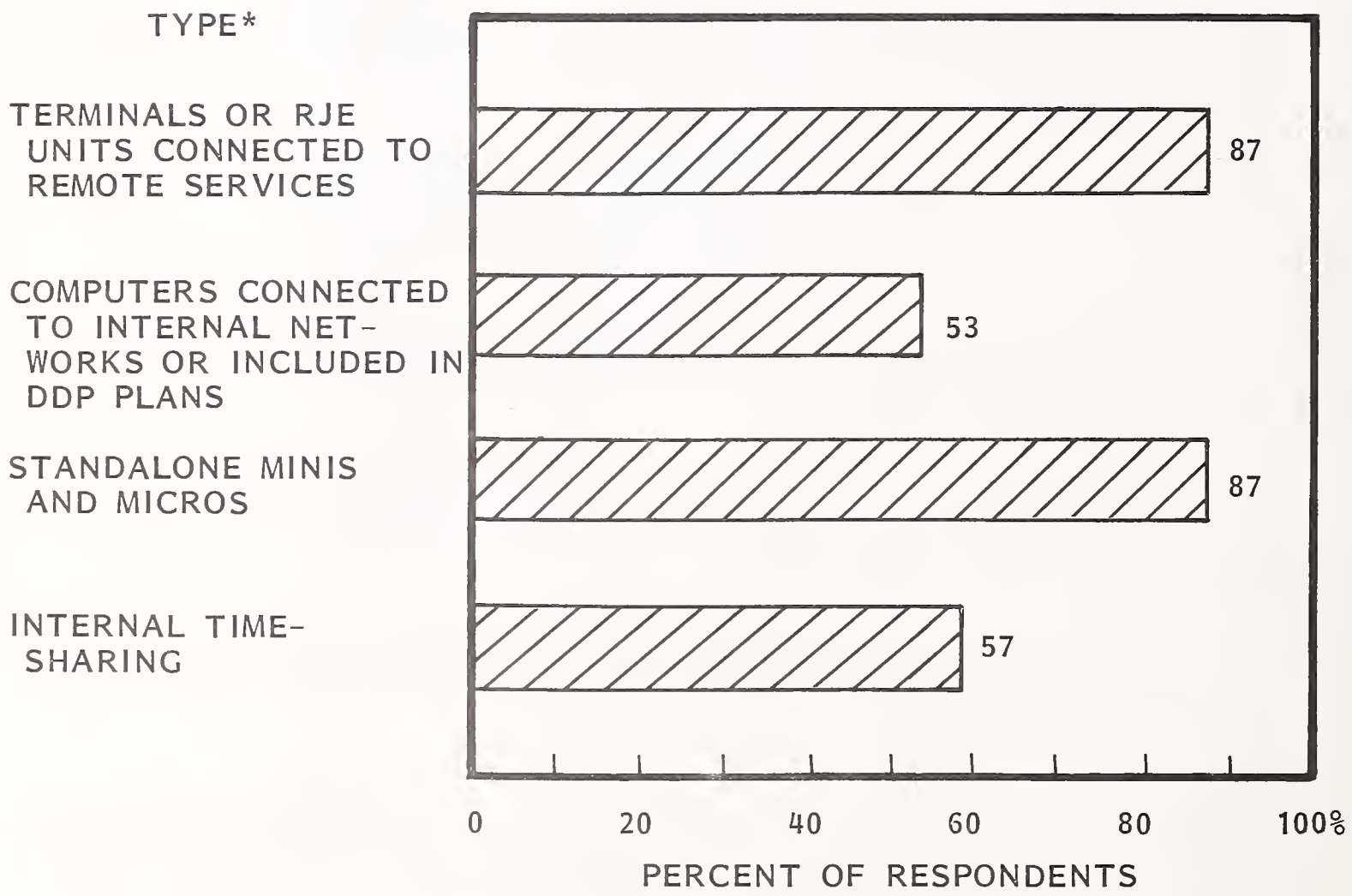
  . This equipment is generally under the control of and on the budget of the user.

- Data, voice, and image communication systems being designed and installed by users.

- Several of these classes of user operated systems and equipment were present at all companies that were respondents to this study. Exhibit III-6 lists the types that were mentioned by these respondents.

EXHIBIT III-6

TYPES OF USER-OPERATED SYSTEMS



*USERS MAY HAVE MORE THAN ONE TYPE

- Users are becoming more capable of developing and installing application systems and of operating systems on their own computing equipment, as Exhibit III-7 indicates.

  - However, they are quite likely to have aid from vendors and consultants in developing and installing applications.

  - Although vendors and consultants have sometimes created problems for users and the EDP organization, EDP management seemed less prone to worry about the work of vendors versus that of users, since vendors would generally follow some set of standards.

- EDP management varied in its authority to require vendors to follow internal corporate standards and guidelines, including the choice of equipment and programming language.

  - In some cases, EDP management had project control responsibility over vendor work for users.

  - Some were found who had applications being developed, installed and run by more than one source at a given time, complicating the tasks of project management and coordination.

C. USER-PERCEIVED BENEFITS

- Users attribute two sets of benefits to their systems and equipment, as shown in Exhibit III-8. The first set covers the traditional benefits which EDP departments use for justification. These benefits and the percent of respondents mentioning them are shown on the left half of the exhibit. The right half shows other benefits which motivate users to operate their own systems and equipment.

EXHIBIT III-7

PROVIDERS OF AID FOR USERS TO DEVELOP, INSTALL, AND OPERATE SYSTEMS

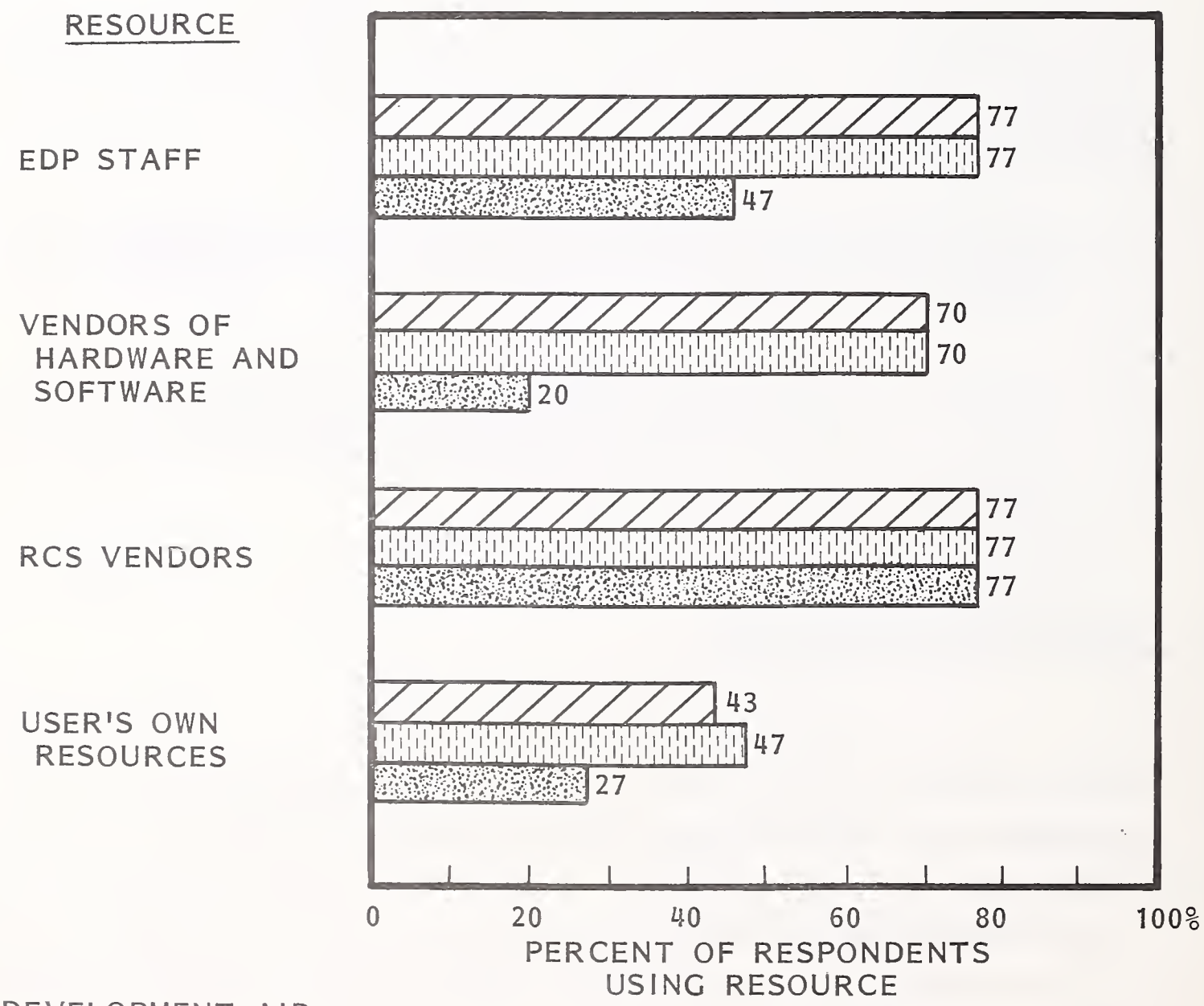


EXHIBIT III-8

BENEFITS ATTRIBUTED BY USERS TO THEIR SYSTEMS

TRADITIONAL BENEFITS	PERCENT OF RESPON-DENTS	OTHER BENEFITS	PERCENT OF RESPON-DENTS
COST SAVINGS	87%	DID NOT WAIT FOR ASSISTANCE FROM EDP	80%
REVENUE IMPROVEMENT	87	RAPID DEVELOPMENT	80
SUPPORT OF BUSINESS FUNCTIONS	50	SYSTEM EASILY MODIFIED	63
CONTROL	33	MORE ECONOMIC THAN EDP DEPARTMENT	50
OTHER BUSINESS REASONS	3	MORE FLEXIBLE OPER-ATING ENVIRONMENT	40
		SYSTEM DEVELOPED WITH MORE QUALITY OR CAPABILITY	15

- The traditional benefits are more apt to be reviewed or audited, although EDP management and users agree in most cases that these benefits did not provide sufficient reason to act.

- EDP departments may agree that the queue of work to be done, or personnel shortages, make it valid for users to act more quickly, but a review or audit of the need to act rapidly is not generally conducted.

- Exhibit III-8 also reveals that a few users mention better quality or capability as a benefit.

  - The INPUT study, Improving the Productivity of Systems and Software Implementation, demonstrated that a concern with quality is one of the characteristic stages of increasing productivity, leading to improved payback on the use of EDP. Users who cite improved quality as a benefit of having their own systems may indicate that their thinking and experience with computing may be more mature than that of the EDP organization itself.

D. PROBLEMS ENCOUNTERED

- The fewest problems were mentioned by those respondents who have strong controls.

  - Users at such companies may still feel that they cannot obtain service or have work done, but simply did not mention it. Consequently, the absence of problems may not be an adequate indication of the effective use of data processing.

- The most problems, on the other hand, were mentioned both by users and EDP management of the eight respondents who had no controls covering user-operated systems and equipment (as shown in Exhibit II-1), and particularly by the three respondents who did not track EDP expenditures by users at all.

- The middle group, comprising organizations who had recently strengthened or are now implementing controls, cited the occurrence of problems as a reason for strengthening controls.

- Other than by the subjective evaluation of the respondent, it was impossible to relate levels of problems to intrinsic technical factors of user systems. However, the litany of problems shown in Exhibit III-9 and the reaction of respondents to each problem are indicative of the difficulties that user operated systems and equipment encounter.

E. EMERGING METHODS OF CONTROL

- The growth of user-operated systems and equipment, and the problems accompanying them, has led to an increase in the methods of control and guidance for user activities at 12 of the 30 respondents' companies.

- Most respondents from the companies who reported that they were relying on present controls did, however, indicate increased efforts to enforce those controls or supplement them with other services.

- A summary of the types of controls implemented or increased is shown in Exhibit III-10.

- INPUT notes that one of the most effective methods of control; i.e., management of the corporate data base, was not mentioned by any of the respondents to this study.

EXHIBIT III-9

PROBLEMS ENCOUNTERED WITH USER-OPERATED SYSTEMS AND EQUIPMENT

PROBLEM	PROBLEM INDEX*
USER NEEDS WERE NOT MET	32
NETWORK STRATEGY WAS NOT SUPPORTED	22
USER APPLICATIONS COULD NOT BE MOVED TO SERVE OTHER USERS OR TO LOAD SHARE	21
SOFTWARE PROBLEMS WERE ENCOUNTERED	18
OPERATING PROBLEMS WERE ENCOUNTERED	17
CORPORATE ACCOUNTING AND OTHER CONVENTIONS WERE NOT FOLLOWED	16
EQUIPMENT PERFORMANCE WAS POOR	15
USERS BECAME A BURDEN TO EDP	12
AVAILABLE SOFTWARE PACKAGES SUCH AS DBMS COULD NOT BE USED	9
DATA INCONSISTENCIES	5
MISCELLANEOUS OTHER	10

* INDEX CONSTRUCTED BY SUMMING WEIGHTED RESPONSES FROM RESPONDENTS.

HIGH MAGNITUDE PROBLEMS = 3
MEDIUM MAGNITUDE PROBLEMS = 2
LOW MAGNITUDE PROBLEMS = 1

EXHIBIT III-10

CONTROLS IMPOSED OR INCREASED FOR USER-OPERATED SYSTEMS AND EQUIPMENT

CONTROL METHOD	PERCENT OF RESPONDENTS WHO IMPOSED OR INCREASED CONTROL
STANDARDS FOR ACCOUNTING CONVENTIONS	75%
STANDARDS FOR DATA COMMUNICATIONS	67
STANDARDS FOR EQUIPMENT	58
CONTROLS THAT REQUIRE REPORTING OF ALL COMPUTING EXPENDITURES	58
TECHNIQUES CONTROLLING/GUIDING USERS THROUGH CONSULTATION	58
CONTROLS ON THE LEVEL OF COMPUTING EXPENDITURES THAT COULD BE OBTAINED WITHOUT REPORTING	50
TECHNIQUES REQUIRING THE APPROVAL OF ALL COMPUTING RELATED EXPENDITURES BY THE EDP DEPT., A COUNCIL,OR EDP STEERING COMMITTEE	50
STANDARDS FOR SOFTWARE	42
STANDARDS FOR DEVELOPMENT, IMPLEMENTATION, TESTING, ETC. OF APPLICATIONS	42
TECHNIQUES GUIDING USERS THROUGH AUDITS OF THE BUDGETS, PLANS, AND ACTIVITIES RELATED TO EDP	33

- This observation accords with the findings of the study, Improving the Productivity of Systems and Software Implementation, that fewer than 1% of all EDP organizations have reached the fourth stage of productivity.

- The fourth stage is characterized by independent user access to a centrally controlled data base (along with a number of other productivity factors).

- However, INPUT does not dispute the value of those controls that were reported, insofar as their scope of effectiveness is concerned.

IV REVIEW OF CONTROLS

IV REVIEW OF CONTROLS

A. WHO INTRODUCES CONTROLS, AND WHY?

- EDP and corporate management are involved more often than users in the decision to impose or increase controls, as shown in Exhibit IV-1.

- The users' role should not be discounted, however. Half the respondents reported user involvement in the decision to impose controls, and more users than any other group were involved in the crucial role of auditing benefits.

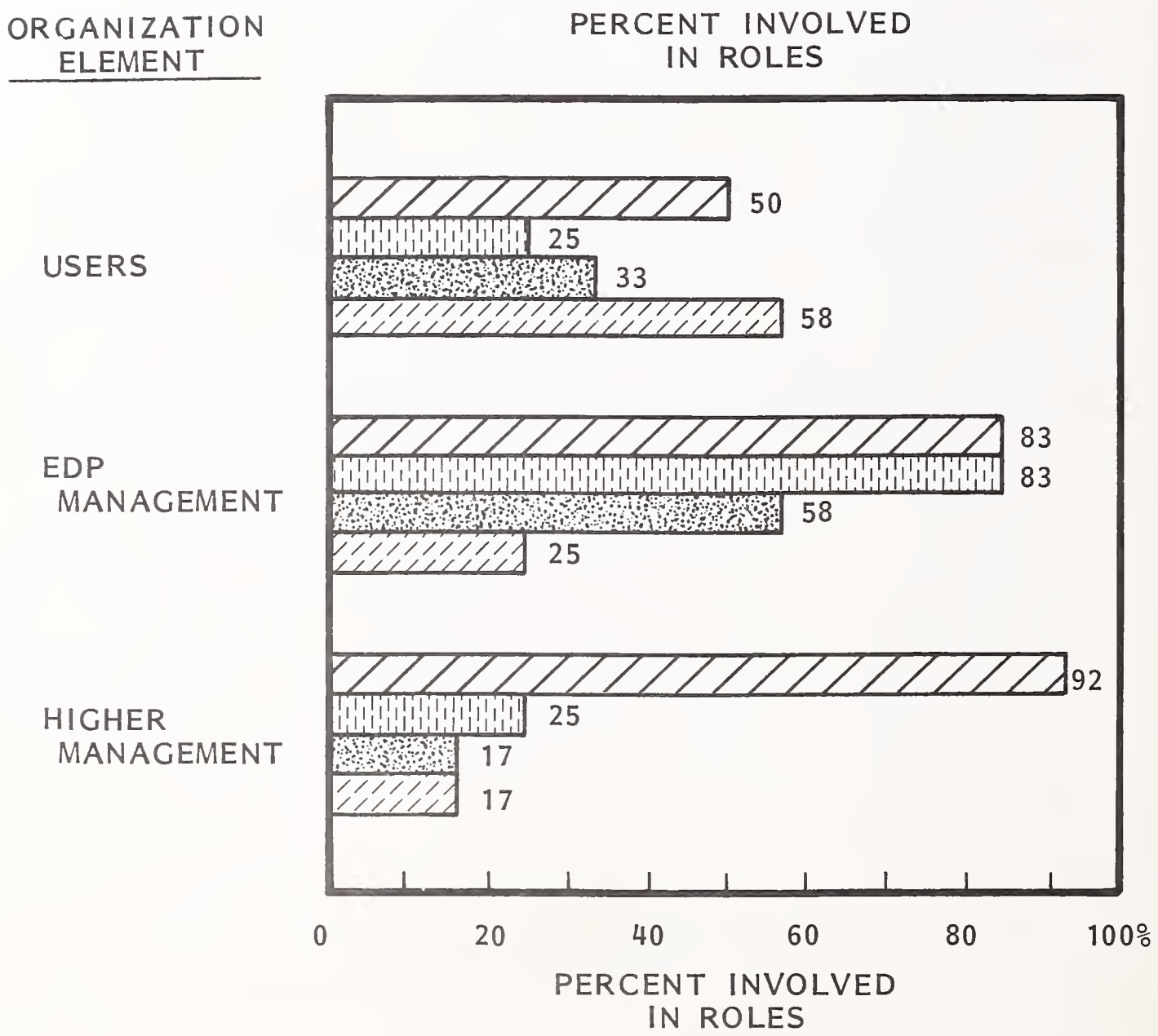
- Although the concern is that users will not be conservative in regard to justifying their need for computing capabilities, comments by 75% of respondents who had imposed or increased controls on user-operated systems and equipment showed that the simple existence of justification procedures and the review of benefits mandated by the control process promoted a satisfactory level of compliance.

- Responses from EDP management emphasized that providing a role for users in the control process established a feeling of ownership which resulted in a closer user review of requests.

- EDP management clearly has a strong role in introducing and enforcing controls, as shown in Exhibit IV-1. The EDP department is generally involved in the documentation of controls as well.

EXHIBIT IV-1

ORGANIZATION ROLES IN RELATION TO CONTROLS



- Corporate management is involved heavily in both the decision to impose controls and the introduction of controls, and assists in the enforcement at over half of the respondent organizations.

- Top management's involvement, however, appears to have been frequently a reaction to a prior bad experience, rather than a positive leading step to facilitate effective user access to computing. The following hypothetical dialogue illustrates the contention that frequently exists between user and EDP management, which top management must resolve:

  - User statements:

    . "We should have certain EDP needs recognized and met so that we can meet our business objectives."

    . "We should have more control over resources that are used primarily to serve local needs."

    . "We should be given a good explanation for EDP costs allocated to us. (Why should we pay more for an internal resource?)"

  - EDP management statements:

    . "Users should not expect and or be given resources for needs that cannot be defined or justified."

    . "Users should not implement solutions that are technically unwise or not cost effective."

    . "Users must take more responsibility for requested EDP activities."

- "Plans that will significantly increase the corporate information processing capabilities should have priority over certain local user applications."

- Where this contention exists, top management has been successful in introducing a control policy to alleviate the contention and bring users and EDP together in a more productive framework.

  - A longer range view takes the position that top management ought to lessen contention but not end it, since contention can aid results. EDP management will scrutinize user needs to make sure business objectives are served and users will make sure EDP management does not commit resources unnecessarily for upgrades of technological capability.

- In either case, EDP management needs to maintain a dialogue with users where contention for resources is present. Simply knowing what users are planning may help to prevent future incompatibilities.

- Comments made by the 12 respondents who had imposed or strengthened controls suggest that controls were first thought of in reaction to the problems encountered with user-run systems and equipment. Two-thirds of the respondents mentioned problem avoidance as a reason for increased controls, together with the other objectives shown in Exhibit IV-2.

B. EFFECTIVENESS OF CONTROLS

- Two-thirds of the respondents thought that increased controls achieved a success that could be called entirely or mostly acceptable, as shown in Exhibit IV-3. No respondent thought that controls were a failure or counter-productive.

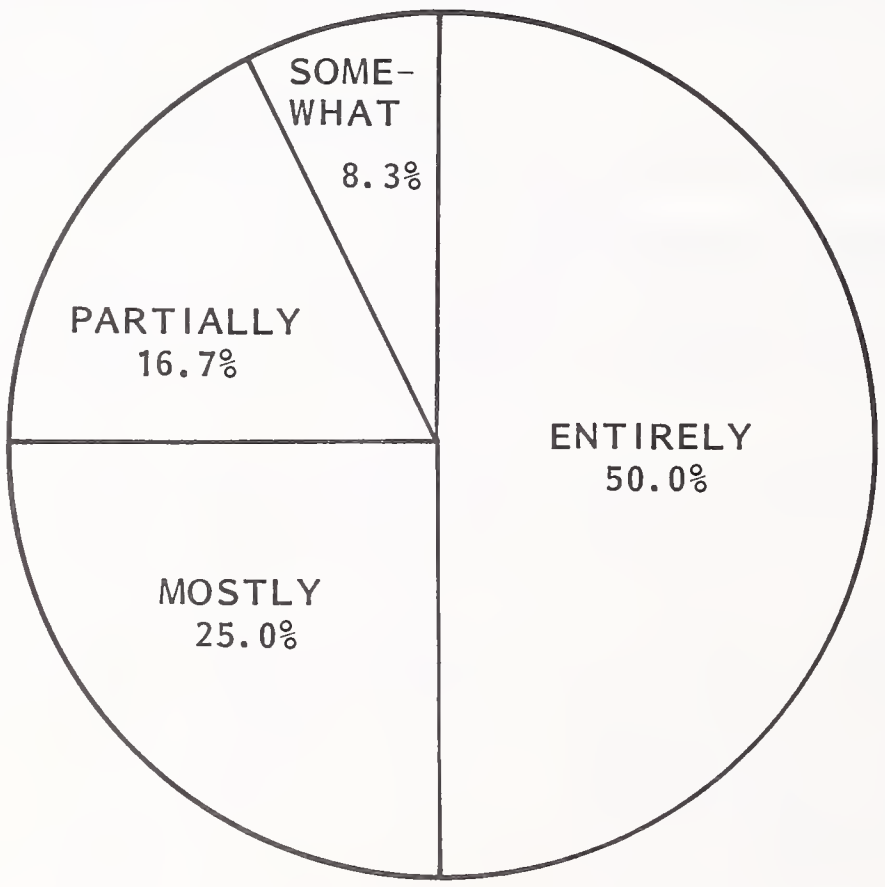
EXHIBIT IV-2

WHAT OBJECTIVES CONTROLS ARE SUPPOSED TO ACHIEVE

OBJECTIVES	NUMBER OF RESPONDENTS	MENTIONED AS THE PRECURSOR OF CONTROLS
SERVE BUSINESS STRATEGIES	11	NO
SERVE EDP STRATEGIES	10	NO
AVOID PROBLEMS	8	YES
AID USERS	6	YES
REDUCE COSTS	2	YES
REDUCE DUPLICATE COSTS	1	YES
MAKE SENIOR MANAGEMENT AWARE OF GOALS	1	NO
HAVE USERS TAKE OWNERSHIP OF ACTIONS	1	NO

EXHIBIT IV-3

SUCCESS OF CONTROLS IN ACHIEVING OBJECTIVES



- One company without controls had twice failed to install controls successfully, but the respondent from this company noted that a new effort would be made since the objectives to be attained warranted it.

- Comments from respondents indicated that both users and EDP management were willing to accept limitations in order to achieve the objectives of the control program. The most vehement contrary response was from the member of an EDP staff who thought data base activities would be delayed for up to two years by the need to review work with users (although EDP management had agreed to do it).

- Exhibit IV-4 indicates the methods that were available to "measure" effectiveness. (Comments on the success of controls seemed to be based entirely on the subjective reactions of respondents rather than on using these methods, however.)

- In discussions with respondents, comments were made that controls and/or a process were needed to:

  - Make users review their needs and set priorities based upon business reasons.

  - Allocate available EDP department resources to meet needs.

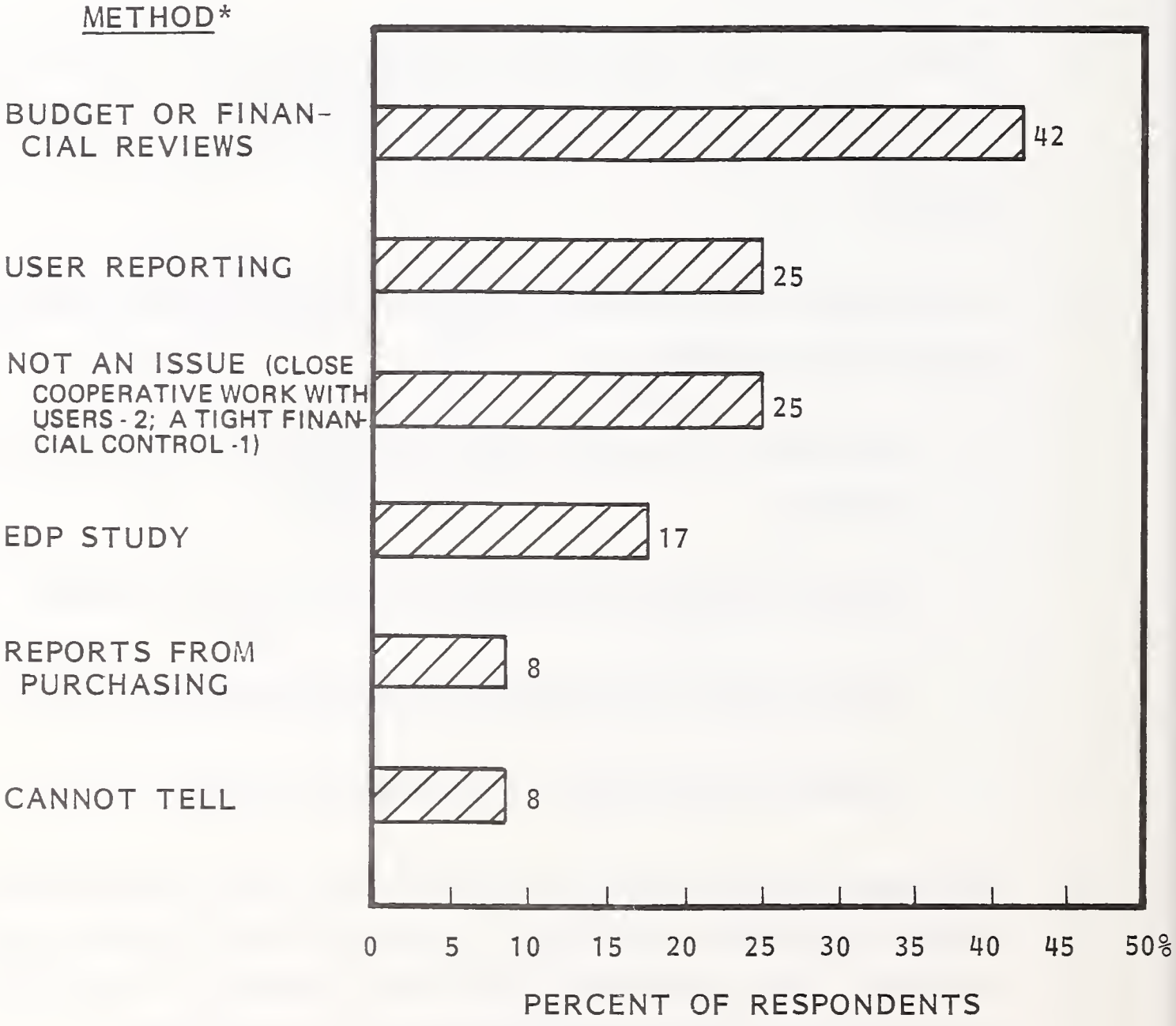
  - Select vehicles for meeting the remaining, qualified user needs.

  - Control the use of EDP in a cost effective manner.

- The above comments sound more like the basic set of controls for the use of central computing, rather than an increased set of controls to guide user activities. Five respondents who were contacted to review this point confirmed that this observation was true for their companies.

EXHIBIT IV-4

TECHNIQUES USED FOR MEASURING THE EFFECTIVENESS OF CONTROLS



*MORE THAN ONE METHOD MAY BE USED.

- The respondents felt that EDP management at these organizations should have been trying to communicate these objectives before the succession of user-run systems, problems, and controls took place.

- Where these objectives cannot be communicated, top management-imposed controls for user systems and equipment can force the issue, but sometimes to the detriment of the central EDP organization.

- Respondents rated the relative effectiveness of various control methods, as shown in the top half of Exhibit IV-5. (The specific items that compose each method were listed in Exhibit III-10.)

- A more interesting indication of effectiveness is shown in the bottom half of Exhibit IV-5, which portrays how effective individual categories of controls were thought to be by the respondents who achieved the greatest success with controls.

- Budget and financial controls, which assure the visibility of all relevant expenditures and provide the opportunity to review expenditures, were thought to be most effective in controlling user systems and equipment.

  - However, respondents commented that budget controls should be supplemented with other services of the EDP staff.

- One respondent without controls had failed in two attempts to introduce budgeting controls. This company plans to introduce budget controls again, together with consulting aid to users, an EDP mission statement, and more of an EDP marketing attitude toward users.

- Technical standards were viewed as a less effective control, and EDP management seemed satisfied to wait to promote standards until after a budget control process was established. However, several respondents were willing to have users observe general standards or any standards as a first step.

EXHIBIT IV-5

EFFECTIVENESS OF CONTROL METHODS

CONTROL METHOD	PERCENT OF RESPONDENTS RATING EACH METHOD AS*		
	HIGH	MEDIUM	LOW
TECHNICAL STANDARDS	25%	33%	8%
BUDGETS/FINANCIAL REVIEWS	75	17	8
OTHER TECHNIQUES	58	17	8

*DIFFERENCE BETWEEN 100% AND ROW TOTALS DUE TO "NO ANSWER" OR "NOT USED"

ACHIEVEMENT OF OBJECTIVES VERSUS RATING OF CONTROL METHOD

WHERE OBJECTIVES WERE OBTAINED	CONTROL METHODS RATED AS HIGH IN EFFECTIVENESS
ENTIRELY	BUDGET/FINANCIAL REVIEW -100% OTHER TECHNIQUES - 75% TECHNICAL STANDARDS - 8%
MOSTLY	BUDGET/FINANCIAL REVIEWS - 100% OTHER TECHNIQUES - 100% TECHNICAL STANDARDS - 67%
PARTIALLY	NONE RATED HIGH BUDGET AND FINANCIAL REVIEWS WERE RATED MEDIUM BY 100%
SOMEWHAT	NONE RATED HIGH OR MEDIUM

- Internal timesharing or DDP standards were often the first ones introduced.

C. IMPROVEMENT ATTRIBUTED TO CONTROLS

- Two-thirds of the respondents listed problem avoidance as an objective of increased controls, as shown in Exhibit IV-6. However, other reasons were mentioned more often. Of the total count of reasons, problem avoidance accounted for only 20% of responses.

  - The exhibit also shows that problem avoidance was identified as one of the two most important objectives by only 13% of respondents who had increased controls.

- In fact, problem avoidance diminishes in importance as soon as there begin to be discussions about the introduction of controls.

  - Comments from user and EDP personnel suggest that the control process itself, by bringing users and EDP together to address problems, cannot help but alleviate outstanding problems.

  - Exhibit IV-7 illustrates the types of improvement respondents reported.

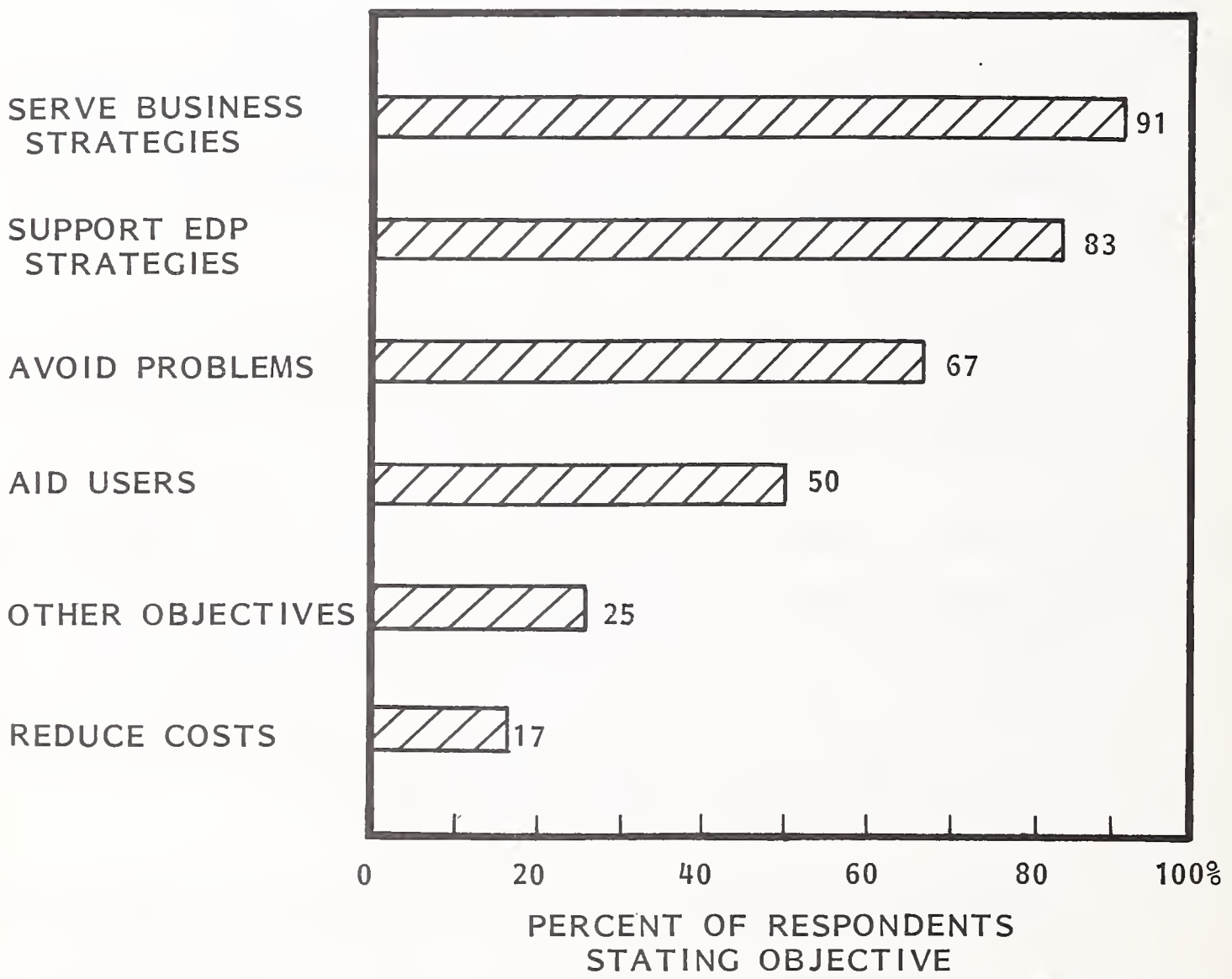
- Even when users obtain equipment and run their own systems, EDP management should remain in contact with them to provide aid, promote standards, and enlarge a sphere of influence.

- Users reported benefits from controls, as shown in Exhibit IV-8. Forty-two percent noted a definite increase in the ability to meet their needs, and every respondent indicated that there was at least a possible increase in this ability.

  - All respondents felt that there was improvement in the selection of hardware and software for user systems.

EXHIBIT IV-6

PROBLEM AVOIDANCE IN PERSPECTIVE



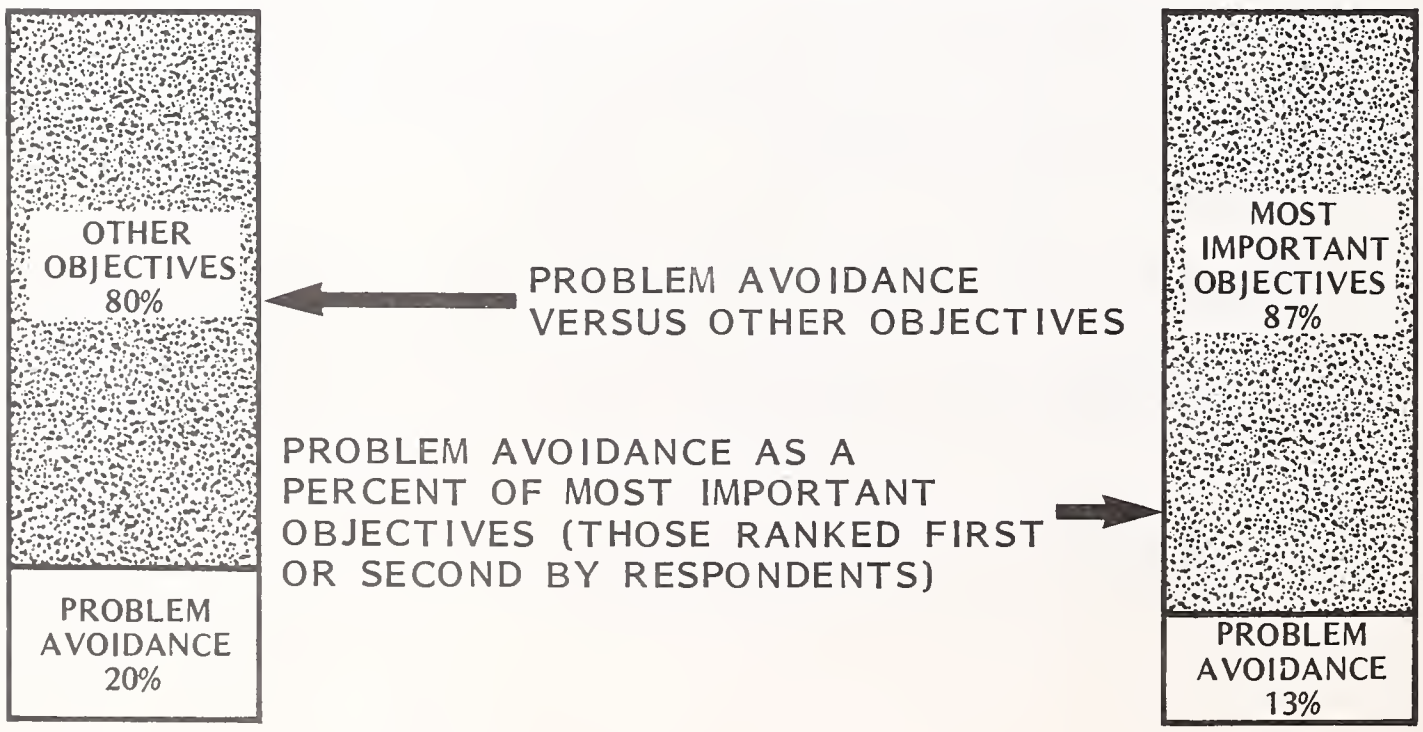


EXHIBIT IV-7

PROBLEMS ALLEVIATED THROUGH CONTROLS

PROBLEMS MENTIONED MOST OFTEN	PERCENT OF RESPONDENTS NOTING IMPROVEMENT THROUGH INCREASED CONTROLS
USER NEEDS NOT MET	100% EXPERIENCED SOME IMPROVEMENT 42% HAD A DEFINITE RESULT 58% HAD LIMITED GAINS
CORPORATE ACCOUNTING AND OTHER CONVENTIONS NOT FOLLOWED	91% NOTED THAT THE QUALITY OF SPECIFICATIONS HAS IMPROVED
EDP NETWORK STRATEGY NOT SUPPORTED	67% EXPERIENCED MORE SUPPORT
USER APPLICATIONS COULD NOT BE MOVED TO LOAD SHARE OR SERVE OTHER USERS	58% FELT THE CAPABILITY HAD BEEN GAINED AND 33% HAD ACTUALLY DONE IT
OPERATING PROBLEMS ENCOUNTERED IN RUNNING JOBS	91% FELT THE OPERATION OF USER SYSTEMS HAD IMPROVED IN QUALITY
SOFTWARE PROBLEMS ENCOUNTERED	75% FELT THE QUALITY OF SOFTWARE MAINTENANCE HAD IMPROVED

EXHIBIT IV-8

INCREASED USER ABILITY TO MEET NEEDS

PERCENT NOTING IMPROVEMENT

- Users benefited from an increased ability to use systems developed at other sites. Seven of 12 respondents noted that this capability now existed, and four had actually done it.

- The necessity to impose or increase controls often had the effect of clarifying the circumstances under which users could (and should) develop their own systems. Therefore, it became less likely for users to try to get around a control process that explicitly recognized their needs.

- To test this assumption, users at five responding companies that had not increased controls, and at four responding companies that had, were asked about their desire to get around or subvert controls.

  - As expected, the former group was more likely to subvert controls if they could. Several users in these organizations had obtained computers or services that had not been reported to the EDP department.

- Nine of the 12 respondents who had increased controls noted that this change had resulted in steps to address user applications which supported long-range EDP plans.

  - A list of other improvements in the use of computing attributed to increased controls is shown in Exhibit IV-9.

- The control process helps, encourages, or forces users to evaluate their needs and plans through review meetings and/or paperwork with the EDP organization or a related committee (steering, MIS, etc.). This process improves familiarity and lessens the feeling of contention that might otherwise exist between users and the EDP organization.

- As noted, the control process improves the selection of projects and the use of computing to meet corporate and user objectives, whether central EDP or user resources are utilized. This supports the mission of the EDP organization.

EXHIBIT IV-9

IMPROVEMENTS IN THE USE OF COMPUTING

IMPROVEMENT	NUMBER OF RESPONDENTS WITH THIS IMPROVEMENT		
	DEFI-NITELY	SOME-WHAT	POS-SIBLY
EVALUATION OF HARDWARE	12	—	—
EVALUATION OF SOFTWARE	12	—	—
QUALITY OF CONVERSION	11	—	—
QUALITY OF DOCUMENTATION	11	—	—
QUALITY OF ENHANCEMENT PROCEDURES	11	—	—
QUALITY OF OPERATION OF SYSTEM	11	—	—
QUALITY OF PROGRAMMING	11	—	—
QUALITY OF SPECIFICATIONS	11	—	—
QUALITY OF SYSTEM DESIGN	11	—	—
QUALITY OF TESTING	11	—	—
QUALITY OF MAINTENANCE OF SOFTWARE	9	—	—
SUPPORT OF NETWORK OR DDP STRATEGY	8	3	—
INCREASED USE OF SOFTWARE PACKAGES SUCH AS FINANCIAL MODELING OR DBMS	4	—	2
INCREASED USE OF PRODUCTIVITY AIDS	3	—	—
IMPROVEMENT IN EQUIPMENT MAINTENANCE	1	—	—

- The perception of the role of the EDP organization shows a marked change when controls are introduced, as shown in Exhibit IV-10.

  - The characterizations of the EDP department as "cumbersome" or "too busy" were not mentioned after controls were introduced.

- After controls, there is significantly more involvement of end users in the centralized development of systems as well.

- From a management perspective, the control process focuses more attention on meeting the business objectives of the firm. Seventy-five percent of respondents noted that controls resulted in the selection of user applications which supported business objectives.

- Management in some cases felt that controls encouraged users to become less involved in routine computing jobs and more in their own jobs.

- Users were more apt to utilize efficient techniques to meet their needs, such as higher level languages, application packages, and better development techniques.

- The control process provided better documentation of business needs, priorities, resources used, costs, etc.

D. OTHER FACTORS

- The development of a strategy for imposing controls was undertaken by two-thirds of the respondents. Only two developed a statement before controls were introduced. The others did it during the period controls were introduced.

- A strategy or mission statement establishes the reasons and objectives for control or guidance. It usually establishes the fact that the controls are

EXHIBIT IV-10

PERCEPTION OF THE CENTRAL EDP STAFF BY USERS

BEFORE CONTROLS		AFTER CONTROLS	
DESCRIPTION	NUMBER OF RESPONDENTS	DESCRIPTION	NUMBER OF RESPONDENTS
CUMBERSOME	4	PARTICIPATION IN USER ACTIVITY	6
TOO BUSY	6	ASSISTANCE WITH CONTROLS	11
HELPFUL	11	HELP IN CONTROLLING VENDORS	5
TOTALLY INVOLVED WITH USER	2	EDUCATING USERS	7
ONLY IN FAVOR OF A CENTRAL SOLUTION	1	CONSULTING WITH USERS	11
		HELPFUL ATTITUDE	5
		NOT FULLY INVOLVED	1

concerned with utilizing EDP effectively for the corporation and not simply for controlling or limiting users.

- This creates a positive climate for the use of controls.

- It also establishes the premise that this is why controls or guidance were established.

- It could also be used as part of a presentation to users or management to support the review and guidance of user plans under existing procedures.

- A marketing attitude by EDP representatives was mentioned as a factor in the introduction of controls by half the respondents. Comments by other respondents also indicated that a positive, helpful attitude was a necessary one for EDP to adopt during the introduction of controls.

- Respondents also noted that the EDP staff may have to increase its knowledge of new technology to aid users who are learning about computing development from leading companies in their industry or from the many industry trade publications which feature them.

E. WHAT CONTROLS MAY CONCEAL

- Although a control process may aid an organization to improve its use of computing, it may conceal past or present problems.

- The EDP organization may have had:

  - Long queues of outstanding work.

  - Inefficient and costly development.

  - An uncooperative attitude or unwillingness to listen or study alternative methods.

  - A lack of current knowledge, particularly of small system techniques.

  - A lack of budget or organizational strengths.

- Users may not have been cooperative or willing to subject their plans to review.

- Rather than study these problems through a "climate" survey, management's direct approach is to set up a control process that will encourage or force users and EDP to work together.

- There are, unfortunately, no guarantees that the control process will ensure better discussions.

  - Selection of equipment and development tasks in some organizations suggests that users are having their way and taking short-term steps to solve immediate problems.

  - In other cases, EDP management is dominating the situation and upgrading central capabilities at the expense of other pressing business needs.

- Either "solution" may have achieved meaningful results, of course. The question for management is whether the control process allows those situations to take place without providing an opportunity for management review.

- Organizations that find themselves overpopulated with smaller computers in certain user areas or with large expenditures for newer technology in a central area should compare their information processing capabilities and expenditures with those of similar firms.

- INPUT's User Planning Service Annual Report is a good source for comparative budget figures. Exhibit IV-11 is a composite of data from that report that illustrates typical expenditures in each industry sector.

EXHIBIT IV-11

OUTSIDE SERVICES AND SOFTWARE PURCHASED BY NON-EDP DEPARTMENTS*

INDUSTRY GROUP	PERCENT BUYING OUTSIDE SERVICES	AVERAGE PURCHASE ($ THOUSAND)	AVERAGE 1980 EDP BUDGET ($ MILLION)	PERCENT OF OUTSIDE SERVICES PURCHASED BY:						
				FINANCE	CORPORATE	PERSONNEL	R&D ENGINEERING	OPERATIONS MANUFACTURING	MARKETING AND SALES	OTHER
DISCRETE MANUFACTURING	23%	$291	$10.58	20%	2%	1%	41%	14%	-	5%
PROCESS MANUFACTURING	30	270	4.38	16	5	5	24	22	4%	3
TRANSPORTATION	30	255	14.08	20	-	2	13	38	-	13
UTILITIES	40	308	25.81	16	4	-	34	14	-	13
BANKING/FINANCE	36	113	4.76	30	13	9	3	13	1	12
INSURANCE	24	36	3.30	6	17	5	2	1	-	32
MEDICAL	8	90	1.12	33	7	7	40	-	-	13
EDUCATION	20	139	1.93	18	5	1	5	5	-	65
RETAIL	33	120	2.49	16	18	1	6	9	-	16
WHOLESALE	29	50	1.15	43	2	12	16	8	-	7
FEDERAL GOVERNMENT	6	2,000	3.61	-	-	-	-	-	-	100
STATE AND LOCAL GOVERNMENT	25	55	2.62	11	7	-	32	6	-	44
SERVICES	25	42	2.36	15	3	2	27	6	-	13
OTHER	12	110	1.30	-	-	-	-	-	-	85
COMBINED FIGURES FOR ALL SECTORS	26%	$181	$5.90	19%	7%	3%	21%	12%	1%	19%

*COMPILED FROM INPUT'S USER PLANNING SERVICE 1980 ANNUAL REPORT

V THE NEED TO DEVELOP CONTROLS

V THE NEED TO DEVELOP CONTROLS

A. DEMAND FOR AND GROWTH OF USER SYSTEMS

- As Exhibit V-1 illustrates, 97% of respondents expect increased demand from users for their own systems and equipment, but only 50% expect to see growth take place. The latter group expects to guide and control users within present plans.

  - Expansion is seen in the use of minicomputers, microcomputers, office automation and data communication systems.

  - There is an expectation that lower priced minicomputers and microcomputers will have videodisk and other new storage technologies as well as data base capabilities and advanced communication interfaces.

- These smaller computers could have chip capabilities that will aid program development by producing coding that is compatible with larger machines.

- INPUT projects that the use of micros will exceed the expectations of most respondents.

- A study performed by INPUT in September 1980 provided information on sales of microcomputers below $15,000 in total price; the results are shown in Exhibit V-2. The figures in this exhibit are conservative and based upon

EXHIBIT V-1

DEMAND FOR AND GROWTH OF USER SYSTEMS AND EQUIPMENT FORESEEN BY RESPONDENTS

COMMENT	PERCENT OF RESPONDENTS
EXPECT MORE OR A GROWING DEMAND	97%
EXPECT GROWTH OF USER SYSTEMS AND EQUIPMENT	50 (INCLUDES THE GROUP BELOW)
EXPECT A LARGE OR SURPRISING GROWTH	30
THINK PRESENT PLANNING DOES NOT PROVIDE FOR THE POSSIBLE CHANGES IN TECHNOLOGY	20

DETERMINATION OF ESTIMATED NUMBERS OF VERY SMALL SYSTEMS SOLD TO LARGE CORPORATIONS IN THE U.S. BY 1982 AND 1985*

INDUSTRY	1980 ESTIMATED EMPLOYEES** IN LARGE CORPORATIONS (THOUSANDS)	ESTIMATED PERCENT WHO WILL BUY VERY SMALL SYSTEMS WITHIN 2 YEARS	ESTIMATED NUMBER OF VERY SMALL SYSTEMS TO BE BOUGHT WITHIN 2 YEARS (THOUSANDS)	1985 ESTIMATED EMPLOYEES** IN LARGE CORPORATIONS (THOUSANDS)	ESTIMATED PERCENT WHO WILL BUY VERY SMALL SYSTEMS WITHIN 5 YEARS	ESTIMATED NUMBER OF SMALL SYSTEMS TO BE BOUGHT BETWEEN 1982 AND 1985 (THOUSANDS)
MINING	40	3.8%	1.5	45	11.9%	5.4
CONSTRUCTION	60	3.8	2.3	75	11.9	8.9
MANUFACTURING	1,015	3.6	36.5	1,225	10.2	125.0
TRANSPORTATION AND UTILITIES	230	3.8	8.7	275	11.9	32.7
WHOLESALE AND RETAIL	180	3.8	6.8	220	11.9	26.2
BANKING	100	5.4	5.4	120	16.1	19.3
INSURANCE CARRIERS	100	3.4	3.4	120	12.3	14.8
OTHER FINANCIAL	15	3.8	0.6	20	11.9	2.4
SERVICES	1,295	3.8	49.2	1,555	11.9	185.0
TOTAL	3,035	3.8%	114.4	3,655	11.9%	419.7

*TAKEN FROM INPUT'S 1980 REPORT, SELLING PERSONAL COMPUTERS TO LARGE COMPANIES, VOL. II

**PROFESSIONAL, TECHNICAL, MANAGERIAL, & ADMINISTRATIVE

assumptions of the number of technically competent people who would be available in corporations to use these microcomputers.

- Experience during the last six months suggests that there will be a great demand for the use of microcomputers to handle small or simple local user requirements, and a marketing effort by personal computer manufacturers to sell them for this use will intensify.

  - A number of large corporations have already started to distribute microcomputers to their staffs as routine "supply room" items.

- A personal computer "show" attended during the study demonstrated the appeal that "user friendly" software, simple applications, and a financial model had for a number of business attendees who were not technically trained.

  - One hundred thousand copies of the microcomputer-based financial modeling package, VISICALC, have now been sold.

  - A marketing manager at this show had a list of customers for the personal computers that included 20 names in the Fortune 500.

- An EDP manager of a major firm where marketing people were buying micros was contacted and asked whether he knew this was happening. He was not surprised and expected more such instances. He referred to this action as a step beyond a calculator.

- During this study INPUT visited a corporation which had just ordered 200 personal computers. One user reported a savings of $60,000 with one of these units.

- More powerful micros with canned programs, DBMS, macrolanguages, and data bases will become common in many offices and local systems within the next year.

- Micros connected to a typewriter or word processing unit will expand the use of computing still further.

- More business application packages will be available through word processing and office automation systems. A developer was contacted who has implemented an advanced financial modeling system for a word processing vendor (as well as for a new micro).

- Three respondents felt that micros were little more than toys and should be discouraged from use. One company claimed that one will soon feel limited with a micro or even with a mini. An executive in charge of management science applications at a large firm, who expressed this idea, was interviewed.

  - When asked to identify small applications that were now being done on a repetitive basis in marketing and operations areas, he noted present value and purchase/lease calculations, among other applications.

  - Asked to compare the cost of doing these jobs on internal timesharing over a period of months versus the cost on a personal computer, he agreed that there would be a justification for personal computers in many offices on this basis, and modified his position to refer to serious applications of computing.

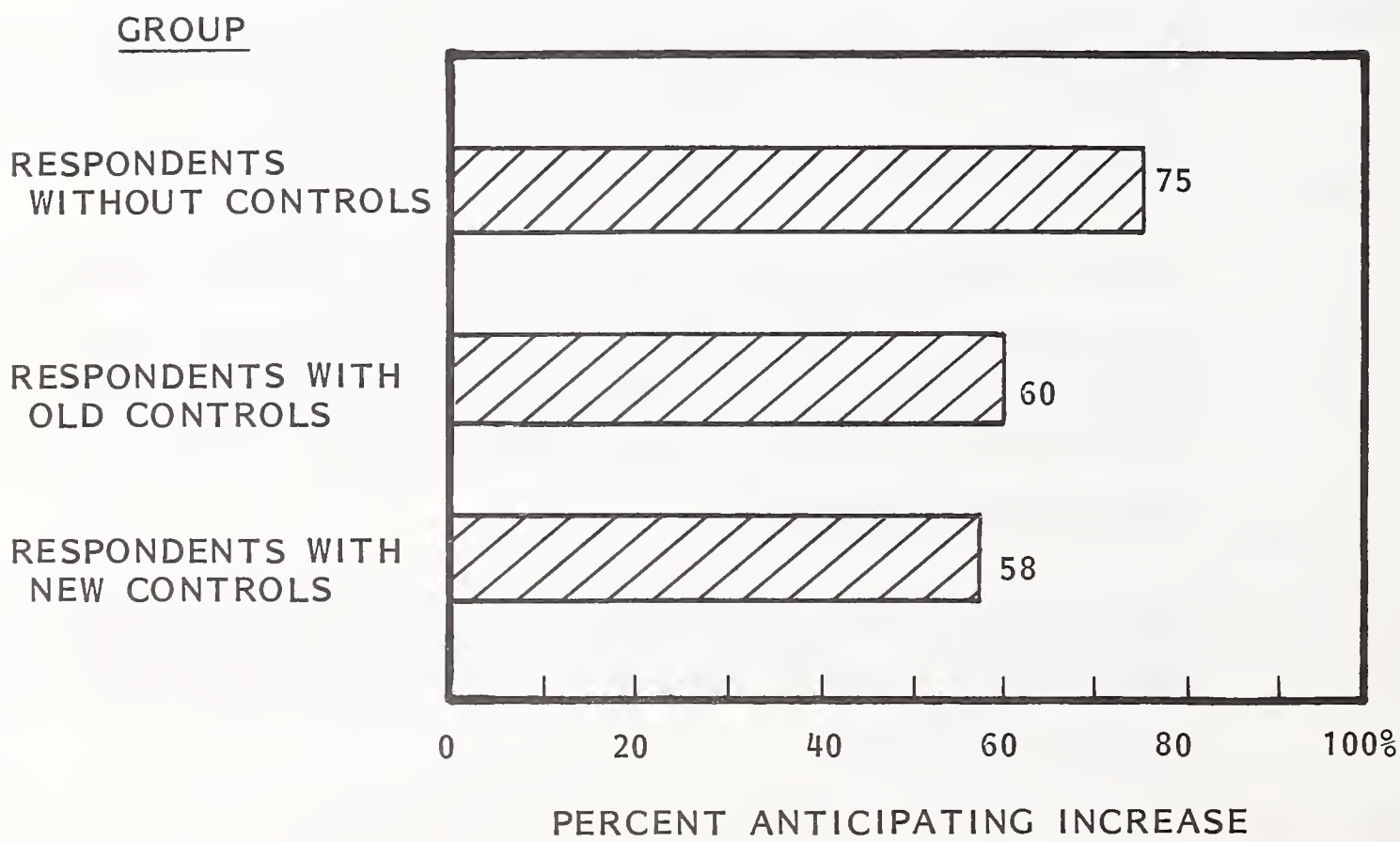
  - After reviewing data base capabilities and languages now available on some micros, he expressed concern that users could consider these tools for larger applications.

B. REACTION TO GROWTH

- A high percentage of respondents feel that there will be more control and guidance of users and expect an increase in controls, as noted in Exhibit V-3.

EXHIBIT V-3

ANTICIPATED INCREASE IN CONTROLS/GUIDANCE



- Respondents also emphasized that there will be a need for new strategies and techniques in working with users. They suggested that EDP management will have to develop more presentations and education that will guide users.

- Two respondents emphasized that study was needed on the potential security problems and misuses of information and equipment that could take place with small user systems.

- Respondents were particularly concerned with limiting what users could do, as shown in Exhibit V-4. A significant point is that respondents wanted to limit users in the future, as shown, whatever controls existed or came into effect. It was felt that limitations might not be stated as succinctly as this in a control process, but that EDP management would need these controls to ensure that computing was used effectively.

- Respondents did not express the opinion that users should be denied access to new technology, however.

- Many respondents noted that EDP management might have more effect in limiting users if EDP management was recognized as the source of aid or help in the future, whenever users heard about new equipment or software.

C. ARE CONTROLS NECESSARY?

- Respondents from 93% of the companies that were interviewed, including six companies that do not have any controls now, felt that controls in some form would be necessary in the next few years, if not immediately.

- Sixty-three percent of all respondents expect existing controls to increase.

EXHIBIT V-4

FUTURE LIMITATIONS
DESIRED BY RECIPIENTS

LIMITATION ON USERS	ILLUSTRATION	PERCENT OF RESPONDENTS WHO MENTIONED
APPLICATION	SHOULD NOT BE CORE APPLICATIONS SUCH AS PAYROLL OR GENERAL LEDGER OR COMPLEX IN NATURE	77%
DATA COMMUNICATIONS	SHOULD BE COMPATIBLE TO CENTRAL FACILITY	67
EQUIPMENT	SHOULD BE RESTRICTED TO A LIST OF TROUBLE FREE AND WELL USED COMPUTERS	63
SOFTWARE	SHOULD USE HIGHER LEVEL APPLICATION LANGUAGES	67

- Managers fear that lower cost minis or micros with data base and higher language capabilities could lead users to repeat the gruesome learning experience of early data processing organizations unless guidance is provided.

- EDP management must stay aware of user plans and attempt to control or guide the use of computing.

  - This should be considered to be part of the mission of EDP.

  - If not done, one user respondent executive noted that users are apt to feel EDP is at fault when problems occur, even when users act on their own.

  - Attempting to work with users or staying close to them can lessen the impact of problems and extend the influence of EDP, as shown in this study.

- If EDP management observes that problems are occurring with user-operated systems, or that good practices and standards are not being followed, steps should be taken to change the situation.

  - The first step should be to persuade or educate the user to follow good practices and standards.

  - It could also be necessary to reinforce older controls or attempt to introduce new ones.

- There are situations where older controls (such as the controls that apply to expenditures through a purchasing department) have continued to work. Other factors are often operative in these situations, as Exhibit V-5 illustrates.

  - Six respondents with older controls offered low-cost internal time-sharing to users, combined with consulting aid.

EXHIBIT V-5

EFFECT OF OTHER FACTORS
WHERE CONTROLS HAVE NOT INCREASED

PROBLEM LEVEL* REPORTED BY RESPONDENT	AVAILABILITY OF INTERNAL TIMESHARING	HOW EDP WORKS CLOSELY WITH USERS
0	–	HAS VENDORS INSTALL MINIS FOR USERS
9	X	
0	X	
6	X	
2	–	INSTALLS MINIS FOR USER SYSTEMS
2	X	
8	X	
0	–	EMPHASIZES DDP AND WORKING CLOSELY WITH USERS
0	X	OFFERS DDP WITH AID TO USERS
1	–	PROVIDES SOFTWARE FOR DECEN- - TRALIZED MINIS

*AS DEFINED IN EXHIBIT III-9

  - Two of these respondents had high problem levels, however.

- In a situation with older controls, one respondent was instructed by his management to make one last try to serve users through the data processing organization. If it did not work, the users were going to be given the authority to run their own systems. This respondent worked closely with users to make sure their priorities were met and that backlogs were reduced. His actions produced the rapprochement with users that a new control process has produced elsewhere.

- This suggests that EDP management can try other steps before attempting to increase controls.

- The introduction or increase of controls occurred at most companies where respondents had found problems resulting from user activities.

  - At those companies, the control process became the method by which users and the EDP organization began to work on problems together.

  - The business objectives of the user and longer range concerns for the use of computing came to the surface through the control process as well.

D. A PROGRAM FOR CONTROLS/GUIDANCE

- This section is based upon the assumption that a decision is being made to increase or impose controls or guidance by corporate management and/or EDP management.

- The elements of the program that were identified during this study include:

  - Participation and role of users.

- Participation of corporate management.
- Role of the EDP department.
- The process used to enforce or administer the controls.
- The controls chosen.
- A strategy or mission statement for the control process.
- A marketing role or attitude by the EDP organization.
- Supplementary equipment capabilities.
- Letting users acquire their own capabilities when needed.

- Selections or choices in regard to these elements are shown in Exhibit V-6 for respondents who rate their success as entirely or mostly acceptable.

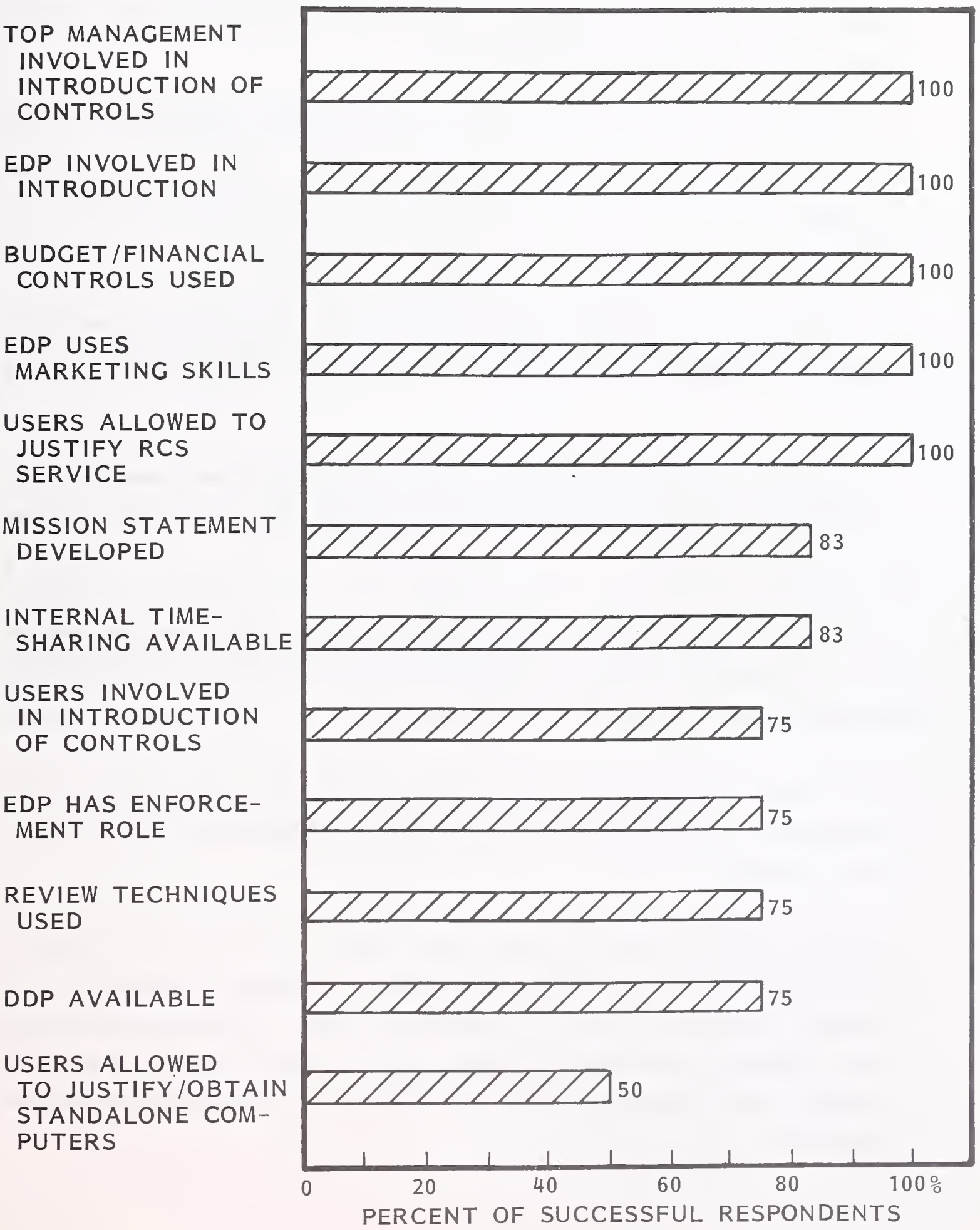
- It may be difficult for EDP management to bring about the participation of users without "selling" corporate management first. A presentation to users (and corporate management) has been used to note the benefits of a control process. Benefits such as those noted in Chapter IV have been stressed.

- Corporate management has to give its blessing to the control process to ensure that users realize they will be aided by the process and that they should conform with it.

- Users should feel that their business needs will be served in a timely fashion, according to their own and overall business priorities, or that other solutions can be considered.

EXHIBIT V-6

ELEMENTS OF A CONTROL PROCESS



- Users should also feel that efforts will be made to support a long-range EDP plan for the corporation, and that they will be made aware of that plan and the costs associated with it.

- Based on the general experience of respondents, the administration of the control process may resemble Exhibit V-7.

- The strategy or mission statement for controls/guidance was written by 75% of respondents after the controls were instituted. This may be a wise precedent, since it provides an opportunity to answer initial criticisms or problems.

- The marketing or consulting role of EDP could be satisfied by assigning systems-trained people to work with users or actually transferring them to the user staff.

- This role and the mission statement should incorporate the theme that the EDP organization is the spokesman for the effective use of computing within the entire organization.

- The control process should be structured so that it can adapt itself and change to meet changing technology, the business needs of the firm, or the progress and development of the EDP organization.

- The control process and any organizational change that takes place to guide users should try to improve the effectiveness of computing for the organization as a whole.

- This means that the control process must support a planning and budgeting function carried out by EDP management, a steering committee, or a corporate planning function at the executive level. It should coordinate and direct computing and communications plans to meet longer range EDP strategies and to ensure that they are in support of and justified by business objectives.

EXHIBIT V-7

POSSIBLE ADMINISTRATION OF THE CONTROL PROCESS

Users document requests for application development (other than budgeted maintenance) with a review of benefits and an indication of priority. The EDP or MIS department aids/consults as needed and helps to prepare a forecast of future needs. An equipment capability may be recommended if EDP will not be able to accommodate the request.

Requests are submitted for review by a group including EDP, corporate, and user management representatives who construct an overall list of priorities and planned expenditures. The EDP department compares requests to forecasts of needs.

Regular (monthly, etc.) meetings are held to review all requests, or just those that the review group selects for review (which might include items not included in forecasts, or user plans for equipment that appeared incompatible, risk prone, etc.).

APPENDIX A: PROFILE OF RESPONDENTS

APPENDIX A: PROFILE OF RESPONDENTS

• Airlines	1
• Commercial Banks	4
• Chemical Manufacturers	1
• Drug Manufacturers	1
• Electrical Manufacturers	3
• Food Manufacturers	1
• Government	1
• Insurance	4
• Petrochemical	2
• Photographic Equipment	1
• Publishers	2
• Security Industry and Brokerage Firms	4
• Transportation	3
• Utilities	2

APPENDIX B: QUESTIONNAIRE

CONTROLLING USER OPERATED SYSTEMS & EQUIPMENT QUESTIONNAIRE

1. What methods does your company employ to track or stay aware of user operated systems and equipment?

IF YES, PLEASE GIVE AN EXAMPLE OR COMMENT

We don't try to.
( ) YES ( ) NO _____

Budgeting/Financial
( ) YES ( ) NO _____

Purchasing (control of vendors such as an approved list).
( ) YES ( ) NO _____

User reporting.
( ) YES ( ) NO _____

EDP activity such as audits.
( ) YES ( ) NO _____

"The grapevine".
( ) YES ( ) NO _____

Other. _____

2a. How extensive are user operated systems and equipment in your company compared to the EDP budget?

Please check the figure which is appropriate.

( ) Less than 1%
( ) 1-5%
( ) 5-10%
( ) 10-20%
( ) 20-30%
( ) 30-40%
( ) More then 40%

2b. What is the actual figure, if it is available.

_____

2c. Is this figure:
(Please check all that are appropriate.)

Included in user budgets. ( )
Included in the EDP budget. ( )
Provided by your accounting system rather than a best estimate. ( )

3. A question on the type of departments using such equipment or services and its size would be answered by an update or manipulation or the results of question 3a in source A.

4. How would you classify your user operated systems? (Check the classes that apply to your system.)
NOTE: Please refer to the definitions that follow or ask for comments.

( ) Part of a network.
( ) Part of a DDP plan (where users have local control of a computer with its own storage of files that is connected to a network).
( ) Uncentralized or standalone.
( ) Computers or terminals connected to a vendor service.
( ) Other. _____

5. A question on the classification of user operated equipment will be answered by question 2a in the source noted for question 3 above.

6. Who has been assisting users to develop systems and install and operate computers? Please check all that apply.

	DEVELOP	INSTALL	OPERATED
No one.	( )	( )	( )
EDP organization	( )	( )	( )
Vendors of equipment and software.	( )	( )	( )
Vendors of time sharing and remote computing services.	( )	( )	( )
Consultants.	( )	( )	( )

7. What traditional benefits do users attribute to user operated systems and equipment? Please check all that apply; then check the column that applies to each benefit category in general and note who audited the benefits (if anyone did).

		Benefits Were Less Than Costs	Benefits Were Equal To Or Above Costs	Benefits Were Much Greater Than Costs	Who Audited The Benefits
( )	Cost savings	( )	( )	( )	( )
( )	Revenue	( )	( )	( )	( )
( )	Support	( )	( )	( )	( )
( )	Control	( )	( )	( )	( )
( )	Other	( )	( )	( )	( )

8. Do users also attribute any of the following benefits to these systems and equipment? Check as many as apply.

( ) Didn't wait for assistance from EDP.
( ) Development was rapid.
( ) It is easy to modify, change, or experiment with the system.
( ) It was more economic than using EDP.
( ) The system was built with more quality or capability.
( ) The operating environment is more flexible.
( ) Other._____

_____

CATALOG NO. UCUE

9. What problems have been encountered with these systems? Please check the column that describes the magnitude of each problem.

	NOT AT ALL	LOW	MEDIUM	HIGH	(PLEASE COMMENT ON ANY HIGH ANSWERS)
User needs weren't met	( )	( )	( )	( )	_____
Corporate accounting and other conventions weren't followed	( )	( )	( )	( )	_____
EDP network strategy wasn't supported.	( )	( )	( )	( )	_____
There was an uncontrolled flow of international data.	( )	( )	( )	( )	_____
User applications couldn't be moved to load share or serve other users.	( )	( )	( )	( )	_____
Software packages used or recommended, owned by the firm such as DBM's couldn't be used.	( )	( )	( )	( )	_____
Operating problems were encountered in running jobs.	( )	( )	( )	( )	_____
Equipment performance was poor.	( )	( )	( )	( )	_____
Software problems were encountered.	( )	( )	( )	( )	_____
Users of these systems and equipment became a burden to EDP.	( )	( )	( )	( )	_____
Other. Please list below.					
_____	( )	( )	( )	( )	_____
_____	( )	( )	( )	( )	_____

10. If the cost of overcoming the problems listed for question 9 were exhorbitant, what did you do? Please check the answer that applies most.

( ) Threw out the system.
( ) Lived with the system as it was.
( ) Paid the exhorbitant cost.

11. Have controls been imposed or increased for user operated systems and equipment?

( ) Improved
( ) Increased
( ) No change, there are controls in effect.
( ) We have no controls.

12. Who has been involved with the controls and what role did they play? Please indicate the roles of each party listed at the left by checking the columns noting their roles.

	Involved In Decision To Increase A Impose Controls	Introduced Controls	Enforced Controls	Developed A Strategy For Imposing Controls
User areas	( )	( )	( )	( )
Corporate management	( )	( )	( )	( )
Controller	( )	( )	( )	( )
EDP management	( )	( )	( )	( )
Outside consultant	( )	( )	( )	( )
Other. Please list below				
_____	( )	( )	( )	( )
_____	( )	( )	( )	( )
_____	( )	( )	( )	( )

13. What was the perception of the EDP organization before controls were established? Check all that apply.

( ) Cumbersome
( ) Too busy to ask for aid.
( ) Educational/helpful
( ) Passive
( ) Other. Please describe.

_____

_____

14. What objectives were controls supposed to achieve? Check as many as apply; try to limit the number.

( ) Reduce costs.
( ) Avoid problems.
( ) Aid users.
( ) Serve business strategies.
( ) Support EDP strategies.
( ) Other. Please list below.

_____

_____

_____

15. If more than two of the above answers were checked, which two objectives were most important?

16. Could any of the control methods that were introduced be characterized as the following? Please check all that apply.

EXAMPLES/COMMENTS

( ) Standards for the equipment that may be used. _____

( ) Standards for the software that may be acquired or used for development. _____

( ) Standards for the actual or potential communication of data. _____

( ) Standards for accounting and other business conventions. _____

( ) Standards for the development, implementation, testing, operation, documentation, training etc. for applications. _____

( ) Budgetary controls on the level of EDP expenditures that can be made without approval. _____

( ) Budgetary controls that require reporting of all EDP expenditures. _____

( ) Budgetary controls that add overhead charges to all EDP expenditures. _____

( ) Techniques of controlling or guiding users through user aid or consulting. _____

( ) Techniques of requiring the approval of the EDP Dept. or another office or council for all EDP related expenditures. _____

( ) Techiques of using an approval process for EDP expenditures by users that has delays or required justification forms which provide an opportunity to review user plans

( ) Techniques of guiding users though audits of their budgets, plans, and activities related to EDP.

17. What other methods of control were used?

18. How was the effectiveness of control measured? More than one may be checked.

( ) User survey.
( ) Budget review.
( ) EDP study.
( ) Consultant study.
( ) Reporting from user.
( ) Reporting from purchasing.
( ) Other. Please describe.

19. How would you rate your success in controlling user systems and equipment? Please check the appropriate column for each method.

	HIGH	MEDIUM	LOW	NOT USED
Standards	( )	( )	( )	( )
Budgets	( )	( )	( )	( )
Techniques	( )	( )	( )	( )
Other	( )	( )	( )	( )

20. Were your objectives for users obtained? Please check the answer that is most appropriate and provide us some comment/example.

( ) Wholly _____

( ) Partially _____

( ) Somewhat or in some cases _____

21. Did you develop a strategy for imposing control methods? Please indicate when it was developed.

( ) Before the control methods were chosen.

( ) Before they were imposed.

( ) During the period that they were introduced.

( ) After their introduction.

( ) No strategy was utilized.

22. What role has EDP taken since controls were introduced? Check as many as apply.

( ) Report on user activity.
( ) Administer controls.
( ) Control access to vendors.
( ) Educate users.
( ) Consulting aid.
( ) Marketing attitude.
( ) Other.

Did the increase in controls result in the following?

23. Increased user ability to meet needs. Please check the appropriate comments.

( ) Definitely

( ) In some cases.

( ) Possibly

( ) No impact.

24. Support of network or ADP strategy.

( ) YES ( ) NO
( ) Somewhat

25. Growth or decrease of user operated systems and equipment:

( ) Large growth.
( ) Same growth.
( ) No change.
( ) Decrease.

26. The desired growth or decrease in user systems and equipment was obtained.

( ) YES ( ) NO
( ) Not sure or don't know.

27a. Increase in the capability of moving applications from all user site to another. Please check the appropriate answer.

( ) Yes, it was achieved and done.
( ) Yes, but it was not done.
( ) No, it wasn't achieved.
( ) We always had this capability.

27b. If "d" is checked, please let us know how you verified the capability.

28. Selection of user objectives that support the following.

( ) Business objectives.
( ) Long range EDP plans.

29. Less diversion of user personnel from important functional assignments to routine EDP job. Please check the one most appropriate.

( ) Definitely
( ) Possibly
( ) No change
( ) Dont' know

Was this result what was desired?

( ) YES ( ) NO

30. Better evaluation and selection of hardware and software. Both may be checked.

( ) Hardware
( ) Software

31. Increased or decreased the support burden for EDP.

( ) Definitely increased.
( ) Possibly increased.
( ) No change.
( ) Definitely decreased.
( ) Possibly decreased.

32. Increased the quality of any of the following:

( ) Specifications for user job.
( ) System design.
( ) Programming.
( ) Testing.
( ) Conversion.
( ) Operation of system.
( ) Documentation.
( ) Maintenance of equipment.
( ) Maintenance of software.
( ) Procedure for enhancing or changing the system.

33. Increased the use of software packages such as financial modeling, DBMS, etc., in user systems. Please check one of the following; list the type/name if YES.

( ) YES _____

( ) NO

34. Increased the use of productivity aids. Please check one of the following.

( ) YES

( ) NO

35. What do you think that the future holds for user operated systems and equipment? Please comment if you have opinions or ideas.

36. Should users be limited in regard to applications, data communication size of equipment, use of software to a further extent than controls presently allow? Please add comments where appropriate.

( ) Applications _____
( ) Data communication _____
( ) Size or type of equipment _____
( ) Software _____
( ) Other. _____