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STUDY BY THE STAFF OF THE U.S.

General Accounting Office

Non-Federal Computer Acquisition Practices Provide Useful Information For Streamlining Federal Methods

GAO's study of 18 non-Federal organizations showed that their managers are committed to using the computer effectively as a tool for achieving business goals. Their strategies and plans provide a framework and operational direction for computer acquisitions. Their practices and procedures are understood, followed, and consonant with normal business practices. GAO found that the 18 organizations studied normally completed computer equipment acquisitions in under a year.

This study discusses their practices and procedures. While GAO does not endorse the specific procurement practices, we believe Federal agencies should consider using the other practices to streamline their acquisition processes within the context of current laws and regulations.



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Preface

This study describes how 18 non-Federal organizations acquire computer equipment. The information was developed to identify such organizations' practices and procedures that contribute to their short acquisition periods. This study was published to give Federal managers insight into how they might streamline and improve internal practices and procedures.

GAO recognizes that the organizations studied have more latitude in their practices than most Federal agencies. We do not necessarily endorse these practices, but believe they deserve consideration as working examples. We believe that management control, planning, accountability, and specific procurement practices to be discussed, work together as an integrated whole to reduce the total acquisition time and complexity. Adopting only one or a few of these practices without the others may not promise or provide any improvement. However, we hope our discussion of how these organizations employ strategies and plans interacting with management controls and user responsibilities and accountability will stimulate positive changes in the Federal community.

Computer equipment acquisitions at the 18 large organizations we studied are not difficult and are not time consuming. The acquisition procedures are understood, followed, and consonant with normal business planning and funding practices. Managers perceive computers as an indispensable tool and an integral part of daily business.

Computer acquisitions start when the user is defining requirements and end at contract award. At the organizations we studied, this period is normally completed in under a year. Small, peripheral equipment acquisitions take about 2 months. Large, simple acquisitions, such as central processor upgrades, take about 5 months. Large, complex acquisitions, which include major software development efforts, take about 22 months. As a result, these organizations are able to plan for and obtain current computer technology. Also, they can respond quickly to user demands for new or increased data processing capability.

The primary factors contributing to a short overall acquisition time frame (planning, approving, and procuring) are:

- Overall strategies and plans provide direction for computer equipment acquisition and usage.
- Policies and practices make the information user responsible for defining and paying for information system requirements.
- Management controls computer acquisitions through formal technical and funding approval processes that involve early

informal communication and technical assistance and guidance.

--Procurement practices of a central procurement office.

Automatic data processing (ADP) strategies and plans are critical to most organizations' computer acquisition processes. Strategies reflect top management's attitude that computers can improve productivity, lower overall operating costs, and set parameters for how information processing is to support business objectives. Long and short range plans are used to implement the strategies and to support the annual budget process.

These non-Federal organizations make the users responsible for their information requirements. This involves a determination of current requirements, a forecast of future needs, and a periodic revalidation of the existing workload. In addition, users are held accountable through the budget process for the beneficial and cost-effective use of the computer, and they must pay for support through a charge-back system.

Management exercises strong control over the acquisition of computer equipment. Technical feasibility and compliance with overall strategies must be approved by a central review group prior to requesting funds. Funding approval must then be obtained the same as for other capital assets. Approving officials encourage early informal communications with the user and provide needed guidance and technical assistance.

Specific contracting practices enable these organizations to procure computer equipment within short time frames. Central procurement offices are responsible for either conducting or coordinating the computer equipment procurement. Their limited use of both full competition and benchmarking shortens and simplifies the procurement. Equipment selections are made by a technical staff with some competition among third-party and plug-to-plug compatible vendors if the incumbent manufacturer is not the preferred selection. Instead of benchmarking, reliance is placed on published information and the experience of others.

This study was made possible through the cooperation and assistance of officials at the organizations we visited. (See app. II.) We greatly appreciate their contributions to our work.



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ABBREVIATIONS

ADP Automatic Data Processing
GAO General Accounting Office

CHAPTER 1

INTRODUCTION

Computer equipment acquisitions at non-Federal organizations (14 private corporations, 3 State governments, and a county government) are not considered difficult and are not time consuming. Most of the 18 organizations we visited during our study of computer equipment acquisition processes have procedures that are understood, followed, and consonant with normal business planning and funding practices. Acquisitions normally take under 1 year. As a result, these organizations are able to plan for and obtain current computer technologies and can quickly respond to user demands for new or increased data processing capability.

The ability to acquire modern computer equipment appears to depend on several key management attributes. At the organizations we visited, the attributes varied but those that appeared most frequently were:

- Overall automatic data processing (ADP) strategies and plans provide the framework and direction for computer equipment acquisition and usage.
- Policies make the information user responsible for defining and paying for information system requirements.
- Management controls computer acquisitions through a formal technical and funding approval process that involves early informal communication, technical assistance, and guidance.
- Procurement practices such as a centralized procurement office, limited competition, and limited benchmarking.

THE COMPUTER IS AN INDISPENSABLE TOOL

Managers at the non-Federal organizations we visited perceive computers as an indispensable tool and an integral part of daily business. For example, organizations rely on the computer to provide specific services to their customers, make their sales personnel more effective and competitive, maintain current accounting records, or track the shipment of raw materials. Without the computer's support, many of these functions would come to a halt or be very difficult and time consuming. In fact, one organization estimates that it would lose \$100 million for each day that their most important application is not operated.

These organizations are aware of the current cost of performing specific business tasks. If the computer, like any other business tool, can lower a task's cost, management will normally consider the reduced cost reason enough to acquire a computer system. However, acquisitions are also justified solely on the basis that automation is the only means of satisfying the information requirement. At one

of the organizations we visited, the opportunities for substituting computer for manual effort were projected to be increasing by 30 to 40 percent per year. Such a change makes a greater number of prospective applications justifiable and provides faster paybacks on existing applications. Also, reworking the older, existing applications probably will very often save money because their original designs generally used a higher ratio of people to computers than is now economically appropriate.

Computer applications are increasingly integrated into daily business activities, even those activities that are unstructured. A reason for this is an increasing awareness of the computer's capability and a rising level of "computer literacy." As information processing tools become more familiar and user-friendly, requests for and use of these tools rise.

COMPUTER EQUIPMENT ACQUISITION TIME FRAMES ARE SHORT

The organizations are able to complete all but the most complex computer equipment acquisitions in less than 1 year. In many cases they are completed in a matter of months with equipment installation shortly thereafter. The more complex acquisitions take over a year. To measure the length of the acquisition process, we defined it as beginning with the start of the user requirements definition and ending with the award of a contract. The following summary of acquisition times is based on estimates provided by non-Federal organization officials and the case studies they provided.

Small acquisitions, such as printers and terminals, average almost 2 months, with a range of 1 week to 6 months. Large, simple acquisitions, such as central processor upgrades, average almost 5 months, with a range of 2 to 18 months. Except for one 18-month time frame, all large, simple acquisitions took 1 year or less. Complex acquisitions, such as acquiring an entirely new computer system and involving, in some cases, complex software development, average about 22 months. Here the range goes from a low of 6 months to a high of 6 years. Most of the complex acquisitions were completed in less than 3 years. In most cases, equipment is installed shortly after contract award. This is possible because tentative orders are placed with expected equipment suppliers before specific acquisitions are approved.

Almost all of the organizations' acquisitions are in the categories of small procurements and large, simple procurements. Large, complex acquisitions were rare. With short acquisition time frames, users' needs can be effectively planned for and met. Also, management decisions can be based on more precise estimates and can more readily support user growth.

OBJECTIVES, SCOPE, AND METHODOLOGY

Eighteen large, non-Federal organizations and some of their subsidiaries participated in our study. The organizations were

selected because they had formal acquisition approval processes and were willing to participate. The annual ADP budgets of these organizations compare to all but a few of the largest Federal civil agencies and the military services. The non-Federal budgets were close to or exceeded the 1981 ADP budgets of the Departments of Agriculture and Transportation, which were \$154 and \$109 million, respectively.

We interviewed almost 90 individuals, including officials responsible for establishing computer acquisition policies and executives having approval authority as well as those who prepare the acquisition studies and supporting documents. The organizations provided their published ADP policies, directives, and guidelines. We were given copies of, or access to, information on requirement analyses, feasibility studies, approval documents, and other supporting documents. The scope of the acquisition cases we reviewed ranged from new information system design and implementation efforts to small acquisitions of additional equipment, such as disk units and terminals.

We assured participating officials that the material they provided would be handled without attribution.

CHAPTER 2

ADP STRATEGIES AND PLANS PROVIDE THE FRAMEWORK AND DIRECTION FOR COMPUTER EQUIPMENT ACQUISITION AND USE

ADP strategies and plans are important in an organization's process for acquiring computer equipment. Strategies reflect management's philosophies and goals regarding how information processing is to support overall business objectives, and set parameters that guide the acquisition and use of computer equipment. Strategies are supported by plans that identify actions for implementing express management philosophies and goals. Both the strategies and the plans are critical to most non-Federal organizations' computer acquisition processes.

ADP STRATEGIES SET PARAMETERS FOR HOW INFORMATION PROCESSING IS TO SUPPORT OVERALL BUSINESS OBJECTIVES

Organizations establish ADP strategies to set parameters on how information processing is to support overall business objectives. The strategies reflect top management's basic attitude that computers can improve productivity and lower overall operating costs. In addition, strategies limit the types of computer equipment that can be installed and the software that can be operated on the computer equipment. However, deviations from the strategy can be approved if the user can adequately justify the requirement. Some of the most common strategies we observed involved

- using technology improvements to obtain productivity increases,
- upgrading within compatible mainframe computer equipment to maintain proven support and to avoid conversion and multivendor costs, and
- using central computer centers to reduce cost and improve the quality and effectiveness of ADP support.

Each of these is discussed below.

Technology improvements provide opportunities for productivity increases at a lower cost

Most managers encourage upgrading or augmenting their computer equipment with new technology if price/performance (dollars spent per million instructions processed per second) improvements can be achieved. These managers see new computer technology as an opportunity to improve productivity, reduce cost, and stay with or ahead of the competition. Using new technology also helps to reduce any problems caused by obsolescence of personnel and

equipment. With computer equipment costs decreasing and personnel costs increasing, it is generally considered cost effective to add new computer equipment rather than personnel.

Officials at one organization told us that their strategy is to acquire computer equipment that is close to state-of-the-art because each new generation of equipment gives a better price/performance ratio than the previous generation. New equipment requires less floor space and consumes less energy, thus reducing both space and electrical costs (operation and cooling).

Another organization uses the newest equipment because it is less costly and easier to move to more advanced computer systems in the future. This organization prefers to make the transition to new technology one step at a time instead of waiting until the computer equipment is obsolete and then starting from scratch.

Some organizations allow vendor announcements regarding future products to influence the timing of computer acquisition decisions. These organizations will hold off buying equipment in anticipation of new vendor announcements of equipment with more power, greater capacity, and a better price/performance ratio.

These organizations are generally committed to the effective use of information systems to achieve productivity improvements. For example, the following are the types of comments that reflect management's commitment at two of the organizations we visited.

--Top management's primary concern is to make a profit. It is looking for the most cost-effective way to do business. The purpose of ADP is to reduce the cost of doing business. (Emphasis added.)

--It is the responsibility of top management to ensure that ADP applications assist in management decision-making, and serve to improve service, reduce cost, or increase productivity.

Compatible mainframe computer upgrades allow the retention of proven vendor support and control of conversion and multivendor costs

Non-Federal organizations often stay with the incumbent manufacturer's new computer equipment or a compatible mainframe system when upgrading old equipment. Management's desire to maintain the support of a proven manufacturer's system or technology and to control operational cost increases is of primary importance. These organizations reduce software conversion costs, encourage greater use of commercial software packages and standard systems, and avert the increased cost of operating and maintaining multiple mainframe computers by staying with compatible computer systems. However, no single manufacturer totally controls the data processing environment at any of the organizations we studied.

Organizational managers allow the desire to avoid a software conversion to influence their selection of computer equipment. They view conversion as a costly, high risk situation which, from experience, should be avoided. We found these organizations accept the costs and risks associated with conversion as reasonable justification for staying with an incumbent vendor's product line or compatible equipment. At one organization, specific computer equipment was selected partly because it allowed the organization to avoid an extensive conversion. Another organization's selection of computer equipment was influenced by the fear that a future massive conversion effort might have to occur within a short period.

The availability of business and operational software packages from the marketplace is an important factor that is considered when computer equipment is being selected. At one organization the decision to begin acquiring a different manufacturer's line of computer equipment was partly based on the availability of more commercial software packages that could be easily used with the equipment. Another organization, in a technology forecast, predicted that the advantages of purchasing or revising commercial packages will be dominating the system architecture selection in the future.

Managers see the cost of developing and maintaining a software application increasing. These managers often prefer to acquire software from the hardware vendor or third party sources rather than develop it. One organization specifically ranked software acquisition methods as follows:

1. Acquire a software package and use it without making changes.
2. Obtain a software package and modify it to meet user requirements.
3. Develop the software application.

At that organization, if a software package does not completely meet the user's requirements, discussions are held with the user to determine if the information requirements can be modified to fit the package's capabilities. If not, a cost estimate for the needed software package modifications is made. This organization's experience has shown that 80 percent of a user's requirement usually can be met by an available commercial software package. However, the final decision on what will be done is based on how much the user is willing to pay. Usually the user can and will modify the requirement.

The development of standard software applications for use organizationwide also provides a major influence on the spectrum of computer equipment that can be selected. When software applications are to be run at multiple locations, the use of the same kind of computer equipment is generally required. At one organization over 400 standard applications are available to the various operating units. However, in order to use a standard system, the

prescribed computer equipment has to be acquired. Another organization's published ADP strategy states that the implementation of common software and computer equipment at multiple locations reduces software development and maintenance costs.

Other organizations also see the additional cost of operating and maintaining multiple vendor mainframe computer facilities as something to avoid. They believe that a single manufacturer's equipment will provide better support and that their cost to operate and maintain the computer equipment will be less.

For example, one organization acquires all computer equipment upgrades for its business computer centers from one manufacturer's product line because it would incur increased support and maintenance costs and problems with multiple vendor equipment. Some of the specific problems the organization attempts to avoid are

- a one-time savings on the acquisition of another vendor's computer equipment that would be offset by the high cost of supporting software from more than one vendor due to training and keeping specialists current on each system; and
- vendors placing the blame on each other when the system failed, leading to longer repair times.

However, the organization does acquire terminals and minicomputers, which communicate with the centers, from about 30 different vendors.

Another organization supported single manufacturer systems in its computer centers because of problems with equipment components manufactured by different companies. This organization listed the following reasons for maintaining a single manufacturer's equipment in its computer center.

- New hardware and software is compatible with existing hardware and software.
- Single system suppliers insure that new products and features are compatible while multiple suppliers cannot.
- Contract administration to support a multiple vendor network requires additional staffing.
- Ongoing familiarization and a minimum of user education is required with a single manufacturer's system.
- Incumbent vendors have proven reliable and prompt and have provided experienced and educated staff.

It is this organization's policy to upgrade its computer centers with the incumbent manufacturer's product line. Orders for new equipment are placed with the manufacturer as needed. However, the center's computer equipment was originally selected competitively.

At yet another organization, management established the policy of staying with its computer center's incumbent mainframe manufacturer. Upgrades to computer mainframes are made whenever new technology is announced. With its workload doubling every 2 or 3 years, the organization attempts to minimize information cost increases by taking advantage of the increased cost/performance ratio offered by new technology. However, peripheral equipment, such as plug-to-plug compatible disk and tape drives, is being obtained from other vendors.

These organizations generally stay with the incumbent vendor's product line when upgrades are made and new technology is acquired. However, this does not totally eliminate competition. Third-party and compatible vendor sources vie for major computer equipment contracts. Full and open competition is more apparent when minicomputers, peripheral equipment, or software packages are being acquired.

Central computer centers reduce costs and improve the quality and effectiveness of ADP support

All of the 18 organizations we visited have central computer centers to support much of their information processing needs. These centers reduce ADP operating costs and improve the quality and effectiveness of ADP support. However, there are still many small computers dispersed among the various organizational users to meet their special needs.

In a study for one of the organizations, a major public accounting firm listed benefits expected from operating its computer centers as a central utility under common management. Several of the benefits were:

- Reduced costs through consolidation of computer equipment, data communications facilities, and technical support staff.
- Savings by being able to balance the workload between compatible computer centers.
- Implementation of a fair and equitable rate structure to charge users for ADP services.
- Pooling the expertise of technical personnel.
- Facilitating the implementation of common information systems, communication networks, and data bases.

Another organization with central computer centers previously operated many small independent computers at locations throughout the country. It centralized these computer activities to reduce the operational costs. Organization officials said that establishing several regional computer centers significantly reduced operating costs and improved user support and services.

At a third organization, officials said centralizing their computer facilities helped achieve the required level of data processing support at a lower cost. Before centralization, each operational element had its own computer equipment, and excess capacity at one element could not be easily used to offset a burdensome increase in workload at another element. With centralization, computer capacity is now controlled by a single computer service organization, with each user being billed for what it uses. Also, the computer centers are able to level the continuing workload fluctuations and eliminate much of the over- and underutilization of the equipment.

ADP PLANS GIVE MANAGEMENT TOOLS TO
SPECIFY ACTIONS FOR IMPLEMENTING
ADP STRATEGIES

ADP plans are developed by most of the organizations we visited to give management tools to facilitate, among other things, the systematic acquisition of computer resources to meet user information requirements. The plans are developed to implement the organization's ADP strategies and overall philosophies and goals. Short range plans can vary from 1 to 2 years and long range plans, 3 to 20 years. Short range plans identify the specific requirements to be fulfilled and any scheduled acquisitions that are needed, whereas long range plans focus on how ADP is expected to support primary goals of the organizations.

Short range ADP plans are part of
budgeting and schedule actions to
meet information requirements

We identified the use of short range ADP plans at all but 2 of the 18 organizations visited. These plans were developed as part of the annual budget process and contained detailed information on planned acquisitions and expenditure levels by organizational element or function. The following types of information were in one organization's plan.

- The current number of computer personnel and planned changes.
- Current computer operating costs, including the cost of personnel and equipment, and a cost forecast for the period of the plan.
- Comparison of actual performance with the prior plans, with explanation of the variances.
- Schedule of planned computer acquisitions for the next year.

Other organizations' plans contained similar types of information.

Annual operating plans or budgets are developed from the short range ADP plans and are used as a control tool. Approval of an annual operating plan represents a dollar expenditure level approval. It also provides managers accountability for performance, but it generally does not authorize specific computer acquisitions. At one organization, managers are accountable for their performance based on their monthly budgets which are also considered their short range ADP plans. Each month, actual performance is compared with what was forecasted and variances must be explained. The plan goes into detail for the coming year on computer equipment needs and matches specific dollars to specific equipment. However, separate acquisition and funding approval must be obtained prior to actually acquiring the computer equipment.

Another organization's ADP costs are budgeted for each operating unit based on the unit's input to the planning process. The ADP cost elements included in the budget are personnel, equipment, contracts, facilities, and data communications. Managers of each operating unit are aware of and accountable for each element of cost. A third organization controls funding project by project. Variances over 10 percent, either over or under budget, must be explained to management. Any unit manager who consistently over or underestimates project cost is subject to dismissal.

To facilitate the management of ADP planning, many of these organizations use capacity planning to forecast their computer center resource requirements. The forecasts depend on obtaining user estimates of future requirements, an analysis of prior workload, and estimates of expected business growth. For example, one organization projects its computer processing workload based on computer usage trends, overall organization growth rate, and management's best judgment. The projected workload is given by the type of data processing service expected to be needed, such as batch processing, time sharing, and data base management. At another organization, capacity plans for new computer equipment are developed using the actual and forecasted data processing workload for 30 of the largest application programs. These applications represent about 80 percent of the total computer usage.

Long range ADP plans describe how information technology is expected to support long term business needs

Long range ADP plans involve developing broad data processing goals that will meet organizational objectives. The goals are flexible and subject to modification as conditions change. Budgetary and cost information is provided for the period of the plan, but the information is about general rather than specific equipment actions.

At 15 organizations visited, long range planning is considered important to achieving ADP goals and objectives, as well as business goals and objectives. Examples of the types of information included in the organizations' long range ADP plans follow.

- One long range ADP plan summarizes total expected computing costs for a 5-year planning period. Overall costs for such areas as computing services, purchased ADP services, and ADP hourly labor costs were reported for all functional areas within the organization.
- Another long range ADP plan covered 10 years and discussed objectives, strategies, and tactics by which the organization would achieve its goals. These goals concerned growth of the organization in various broad areas such as communications and information processing. Rather than identifying specific computer equipment, the plan covered various technical areas that were going to be developed. For instance, computer-aided design and manufacturing were identified as new ADP techniques contributing to increased profits.
- Another long range ADP plan addressed broad strategic issues, such as how often to retool, and the need to provide better service through distributed processing. The organization projected 20 years into the future for ADP capital expenditures broken down by facilities and usage.

The above organizations' long range ADP plans give top managers an initial awareness of broad technological categories where computer growth is expected to aid in achieving the organizations' long range business goals.

CHAPTER 3

USERS ARE RESPONSIBLE FOR THE IDENTIFICATION AND SUPPORT OF THEIR INFORMATION REQUIREMENTS

At all 18 organizations, users are responsible for knowing their information needs. This responsibility includes determining current information requirements, forecasting future needs, and revalidating the existing workload, as well as deciding if automated support of a requirement is beneficial. Further, users are not generally required to rejustify their information requirements as part of the computer equipment acquisition process. Instead, the organizations rely on the budgetary process and a system of computer usage cost charge-back to periodically validate ADP resource needs. This management approach results in users having the responsibility for establishing their own information requirements and being held accountable for the cost of the computer support provided.

USERS DETERMINE, FORECAST, AND VALIDATE WHICH INFORMATION REQUIREMENTS ARE TO BE SUPPORTED BY THE COMPUTER

Users of computer resources at all of the organizations visited are responsible for determining their current information requirements and forecasting future needs. In addition, the user is responsible for validating the existing information needs. Revalidation is not a prerequisite to obtaining additional or new computer resources at these organizations.

While users are responsible for determining their requirements, they generally do not have authority to select which computer equipment will be used to satisfy their requirements. At one organization, the central ADP management office cannot tell users whether their information requirements are justified, but it does tell the users which computer center will provide the needed support. At another organization, the users identify their need for computer services, and the central computer center determines how it will provide those services.

Users at most organizations are responsible for providing their computer centers with periodic forecasts of information processing requirements. This information, along with historical growth rates and expected business trends, is used for capacity planning so short term specific equipment requirements can be projected. This forecasting of user needs is often the start of the computer acquisition process. For example, one organization requests its users each year to estimate their computer usage for the next 4 years. This information is an input to the organization's capacity planning projections, which also include an analysis of past workload and expected business trends. This organization then produces a graphic

analysis of the savings expected from the new technology. At another organization, the users give the central computer centers quarterly forecasts of their next year's requirements. This information along with historical usage data is used to project future computer equipment requirements.

Existing information requirement workloads are not questioned when these organizations approve the acquisition of additional or replacement computer equipment. Any revalidation of the existing workload is left to the user and is normally done during the regular planning, forecasting, and/or budgeting cycles. For example, at one organization, the existing information requirement workloads do not have to be revalidated prior to the procurement of new equipment. However, we were told that users revalidate their requirements each quarter as they prepare their forecasts of computer processing requirements. As part of its annual planning process, another organization requests its users to revalidate the necessity of existing computer support.

INFORMATION PROCESSING COSTS ARE A USER
RESPONSIBILITY THAT IS CONTROLLED THROUGH THE
BUDGETARY PROCESS AND A CHARGE-BACK SYSTEM

The organizations we visited do not generally control information processing costs through the computer acquisition process. They hold the users accountable for ensuring that such service is beneficial and cost-effective through the budget process, and make them pay for their ADP support.

At these organizations, the budget process is a primary tool for controlling the cost of information processing.

Sometimes, processing costs are included in the user's budget as part of an overall program or project and do not have to be separately justified. Users are allocated budget funds after organizational priorities are considered, and are held accountable by management to operate within the budget.

For example, at one organization, user management must budget computer costs by specific cost elements. Actual and budgeted costs are compared monthly and the managers are responsible for staying within the budget. All variances must be explained to top management. Another organization uses an expense budget and a capital budget to control its ADP expenditures. Quarterly variances have to be explained to the vice president of finance. Within these budgets, all items with a value of \$250,000 or more must be specifically identified. This organization will fund projects based on their return on investment, with ADP cost being considered only a part of the total investment cost.

At a third organization, funding for an ADP project or computer equipment acquisition must be obtained through the budget process. No equipment can be procured without funds being specifically available in the budget. Each user must justify the cost of

satisfying its ADP requirements during the budget process, either as a separate line item or as part of a specific program.

Computer cost charge-back systems were identified as being used by all 18 organizations to control user ADP costs at central computer centers. Each user must pay the computer center for the computer resources used. A main advantage for a charge-back system cited by officials at one organization is that it forces users to revalidate their continuing need for automated information. The charge-back process lets the user decide what information should be or should not be automated.

The user is billed for data processing based on usage rates that are periodically adjusted to reflect changes in the operating costs and/or to encourage use of nonpeak periods. The main objective of the usage charge is to recover all operating costs. However, at some of the organizations, the usage rates are set to also include a profit. Computer centers are encouraged to provide the latest in computer technology to meet user demands for more capability and to provide reliable service.

At one organization, the central computer center does not receive any separate allocation of funds, and is totally dependent on a charge-back system to recover its annual operating costs. Each year, the center negotiates service contracts with its users and rates are set to cover all operating expenses. At another organization, use of the computer center was encouraged by setting its rates about 50 percent below outside sources (while still recovering all operating costs). However, users are occasionally allowed to use outside sources for computer time if they can demonstrate the advantages of doing so. At a third organization, user service level objectives are published in terms of maximum wait times for work completion, computer response times, and computer service availability. Also, user rates are published with high priority work costing four times more than work that need not be performed for 24 hours.

CHAPTER 4

MANAGEMENT CONTROLS ACQUISITION PROCESS

BY FORMAL APPROVALS BUT AIDS THE USER

BY EARLY INVOLVEMENT AND ASSISTANCE

The organizations we visited have strong management controls over acquiring computer equipment. Generally, control is exercised by a central management organization that is responsible for reviewing and approving computer equipment procurements for technical feasibility and compliance with overall strategies. After technical approval, computer equipment acquisitions normally have to be approved for funding the same as other capital assets. The approving officials encourage early informal communications regarding planned acquisitions and normally help with procedural guidance and technical assistance.

MANAGEMENT MUST APPROVE BOTH THE TECHNICAL SOLUTION AND THE FUNDING REQUIREMENT

All but one of the 18 organizations that participated in our study have a central management organization with the authority to approve technical aspects of computer equipment procurements. Actual funding approval normally comes later through a capital expenditure request.

Approval of the proposed technical solution involves only one central review

At 17 of the organizations we visited, the technical review and approval of requests for computer equipment are performed by only one central organizational unit. For example, one organization designated an office to perform technical reviews of all requests for computer equipment. These reviews involve determining if the proposed technical solution can appropriately meet the ADP requirement and is consistent with organizationwide policies, in particular its compatibility with existing computer equipment and software. The reviewing office also considers whether the need can be met by an inhouse computer center. Once the formal technical approval is granted, users are 99-percent confident that funding for the procurement will be approved.

At another organization, a computer utilization committee was established within a central office to review the technical feasibility of all proposed computer acquisitions. The committee looks at the various approaches to the solution and at the company's overall strategy before recommending approval. One of the other organizations had two central offices that perform technical reviews. However, the location of the user determines which central office must concur with the computer equipment proposal. In some cases, for example, with remote terminals, both offices might have

to concur since all organizational locations are affected. At still another organization, the central office is involved only in reviewing the technical feasibility of the proposed hardware and software solutions to the user's information requirements. The user is fully responsible for determining the information requirements, but the central office decides whether the user or a central computer center will provide the needed support.

Computer equipment funding approval procedures are investment oriented and similar to those used for other types of capital assets

Once a computer equipment acquisition request receives formal technical approval, all but one of the organizations we visited follow the same procedures for obtaining funding approval as used for other capital assets. Although the ADP funding approval dollar thresholds vary from other capital assets at a few organizations, most organizations follow their normal capital asset funding process by submitting a request for funding approval to the designated level of management.

For example, one organization has the same dollar approval levels for funding ADP assets as it does for other capital assets. The only variance in the process is the required technical approval by a centralized technical staff.

At another organization, all computer acquisitions up to \$750,000 are approved by a group vice president, although the authority can be delegated. The expenditure level approval at this organization, however, is based only on the incremental ADP project cost. For example, if an item of computer equipment is being replaced or added, then only the net increase in total cost is considered when determining the management level needed for approval.

However, another organization has different funding approval levels for computer equipment procurements under \$1 million than for plant and equipment procurements under \$1 million. For example, a group president can approve plant and equipment procurements up to \$250,000, but not computer equipment procurements of over \$15,000. The central ADP office may approve funding for computer equipment purchases of up to \$250,000 a transaction and total leases of up to \$500,000, but is limited to \$100,000 for plant and equipment transactions. Corporate vice presidents of finance and operations may approve ADP transactions up to \$1 million, but have a limit of \$250,000 for plant and equipment transactions. Computer procurements over \$1 million are handled the same as other capital assets--by obtaining the management committee's approval.

Most organizations require all costs to be quantified as part of the justification for funding new computer equipment. This allows management to make decisions, knowing the full economic effects. However, several organizations do not believe that computer acquisitions must always be cost justified. For example, an officer at one organization stated that many computer acquisitions

show a paper loss but are approved because they yield "intangible" benefits that are more important, such as increased customer satisfaction. An official of another organization stated that the cost of computer equipment is not an important factor as long as the overall project has been justified and the computer equipment is needed for the project. The computer is considered to be just another tool to be used in accomplishing the project's objectives.

Another non-Federal organization is acquiring computer capabilities to stay competitive in its field. The project is not cost justified, but management believes such capabilities improve operational effectiveness. Management believes sales will increase if sales personnel have immediate access to current unit pricing and inventory data.

INFORMAL COMMUNICATIONS, DOCUMENTATION
GUIDANCE, AND TECHNICAL ASSISTANCE
FACILITATE THE APPROVAL PROCESS

The relationships established between the users and the designated central technical approval authority play a significant role in the organization's acquisition of computer equipment. Users informally keep the approval authority apprised of any possible acquisitions. The approval authority, in turn, provides guidance and technical assistance to aid users in performing the necessary studies and preparing the necessary documentation to support their information requirements.

Informal communication between the information user and the central office responsible for technical review of requests for computer support is very common at all 18 organizations. The central office is aware of pending needs long before any formal request is submitted. By eliminating any element of surprise, informal communication helps facilitate and ensure formal approval. Informal communication between these organizational units also reflects a high degree of trust and mutual support, which help reduce the time for the formal approval process and related procurements.

For example, an official at one organization stated that management is kept aware of business information requirements and the computer support needed through continual interaction with the user. This interaction builds mutual trust and respect for the individuals involved, and in turn the amount of time required to review a proposed acquisition is reduced. Another organization's official said an informal process is always going on, with the users continually talking to the central ADP office to get new ideas and identify alternatives for meeting their information needs more effectively and economically.

Most organizations publish user guides, manuals, or other reference material on how to justify and obtain approval for the acquisition of computer equipment. These guides usually provide a step-by-step approach to analyzing information system requirements, developing alternative solutions, and preparing

a cost-benefit analysis. The guides identify the types of information required for an acquisition decision and help ensure that consistent data is presented for all projects.

For example, the guide for one organization states that the required report will provide, in a standard format, formal detailed documentation of a user department's new requirements and/or problems with its current operations. Some of the data to be included in the report are a statement of basic system requirements, the best means to meet the requirements, the need for further analysis, the system description, and the cost justification.

Another organization requires each computer equipment acquisition to be preceded by a properly coordinated and approved user requirements study. All organizational units must prepare a report in the format outlined in the user's guide. The guide requires the user to include a complete description of the project, rationale for the proposed solution, and any important historical background. The user must write the report so that management will be able, with little or no previous understanding of the project, to comprehend the requirement sufficiently to make a sound business decision.

Central offices at all but one of the organizations we visited provide technical assistance to their users. The technical assistance can range from helping the user define the information system requirements to actually developing the acquisition documentation. Generally, working relationships between the central offices and the users appear good. A common attitude at these offices is one of helping the users obtain the computer resources that will effectively support their requirements.

For example, one central ADP office helps the users by writing the acquisition justification for computer equipment. In addition, it offers user management review and consulting services in various technical areas such as computer equipment and software performance and utilization, online computing services, and equipment evaluation and selection. The cost of these services normally is not charged to the user.

Another organization assists its users throughout the computer equipment acquisition process. This includes preparing the information requirements study, the funding proposal, and the necessary procurement documents.

CHAPTER 5

CERTAIN PROCUREMENT PRACTICES HELP

SHORTEN PROCUREMENT TIME

Acquiring computer equipment usually takes under a year for most organizations. As a result, these organizations plan for and obtain the latest computer technology. What makes a short planning and approval process possible has been described in the prior chapters. The procurement strategies discussed in chapter 2, coupled with the procurement practices discussed in this chapter, contribute to the short time frames. The procurement practices that appear to be most helpful in acquiring computer equipment within short periods are (1) a central procurement office, (2) limited competition, and (3) limited benchmarking.

CENTRAL PROCUREMENT OFFICES PROVIDE CONTROLS AND EXPERIENCED PERSONNEL NEEDED FOR RESPONSIVE COMPUTER EQUIPMENT PROCUREMENTS

At 14 of the organizations, central procurement offices are responsible for either conducting or coordinating the procurement of computer equipment. These offices provide procurement experts that not only procure the computer equipment but also control the type of equipment being acquired.

Officials at one of the organizations said a central computer purchasing department was established because computer hardware technology is so complex and it changes so frequently that better results can be achieved by personnel familiar with the technology. On the other hand, officials from another organization stated that the central purchasing department was established to ensure that all computer equipment acquired would be compatible with the existing equipment and information system software. At another organization, the central procurement function was established to ensure that computer equipment to be installed at separate locations would be compatible.

One organization's central procurement office provides technical personnel to help the users prepare their proposals for computer equipment, and then approves the requests. This office then decides which vendors will receive a request for bid, who will participate on the evaluation panel, and who will conduct the negotiations. Designated central procurement officials also must sign the final contract.

Organizationwide agreements for selected peripheral equipment are negotiated by the central procurement offices at 12 of the non-Federal organizations. For example, one organization negotiated an organizationwide agreement with a computer terminal manufacturer. All users are then required to obtain terminals from this manufacturer to foster standardization of computer equipment and software and reduce the cost of maintenance. Quantity discounts are

also obtained based on the number of terminals purchased each year. At another organization, the use of over 20 organizationwide agreements in 1979 was reported to have cut over \$3.5 million from manufacturer's list prices.

FULL COMPETITION AND BENCHMARKING
ARE NOT EMPHASIZED WHEN COMPUTER
EQUIPMENT IS BEING PROCURED

The organizations visited do not generally emphasize full and open competition or benchmarking when acquiring computer equipment. Acquisitions are usually based on a predetermined equipment selection, with competition limited to obtaining the best price from third party or plug-to-plug compatible vendors. Instead of benchmarking, organizations rely on published performance information and the experience of other users (within or outside the organization).

Full competition is seldom used
to select computer equipment

At 16 of the 18 organizations, including two governmental organizations, full and open competition is not regularly used to acquire computer equipment. The equipment selection is made by the organization's technical staff. If the organization is willing to obtain equipment from a source other than the incumbent manufacturer, limited price competition can occur among third party and plug-to-plug compatible vendors.

Most of the organizations have a strategy of staying primarily with a particular manufacturer's equipment or plug-to-plug compatible equipment. Price competition is available from third party sources and plug-to-plug compatible vendors. In addition, the availability of software packages and the desire to avoid software conversion costs are reasons some organizations give for staying with the same or compatible equipment vendors. For example, one organization decided to stay with the incumbent vendor primarily because of an estimated cost of \$3 to \$4 million to convert its existing software to another vendor's equipment.

Another organization limits competition for large- and medium-scale systems by requiring that the equipment be capable of running a specified operating system. Plug-to-plug compatible equipment is considered an acceptable alternative. The organization also limits the acquisition of distributed processors to only 4 vendors and the acquisition of terminals and work stations to 10 vendors. Other organizations only consider selected vendors when acquiring computer equipment because of the desire to maintain reliable service and increase equipment commonality, which in turn allow standard development and interchange of software programs.

The use of full and open competition is required at two of the four government organizations we studied, unless a single source acquisition is approved. For example, one of these organizations

will authorize single source acquisitions only after an extensive survey of the computer industry demonstrates that a specific brand of equipment is the only one that will meet its needs. The other organization will authorize a single source acquisition only when a specific make of equipment provides compatibility with an existing computer system and/or provides lower maintenance costs. The following describes the procurement approach of one of these organizations when competition is involved.

At this governmental organization, a multistep competitive procurement approach was developed to increase the number of responsive vendor offers and improve the timeliness of computer equipment acquisitions. This approach provides a structured forum for discussing alternative solutions to the organization's requirements and obtaining bids that are technically responsive and contain approved contract language. Potential vendors receive the organization's feasibility study that was performed to justify the procurement. The study includes not only the organization's stated requirements but also its cost estimates and the evaluation model that is to be used to evaluate the responsive bids. The multistep approach involves a compliance phase and a bid phase.

During the compliance phase, vendors submit conceptual proposals and then detailed technical proposals, but no cost data can be supplied during this phase. The organization reviews and discusses each proposal with the vendors during this phase in order to obtain more responsive technical proposals. Once there is assurance that responsive proposals will be submitted, the procurement enters the bid phase.

During the bid phase, an initial draft bid must be submitted. Again, no cost data is included. After reviewing these bids, the organization will tell the vendors if their bids are responsive to the requirements. The responsive vendors are then asked to provide their final bids with costs. The final bids are then evaluated and a successful bidder selected. To illustrate the success of this approach, an organization official stated that a large procurement (over \$30 million) took only 3 to 4 months to complete, after issuing the request for proposal (i.e., only the procurement phase).

Benchmarking is not commonly used to select computer equipment

At 15 of the organizations, benchmarking is not commonly used to select computer equipment. Little value is placed on this technique. Published performance data and the experiences of others are more often used as sufficient validation of equipment capacity.

Officials at one organization believe that benchmarking is expensive, time consuming, and an inaccurate measure of system performance. These officials believe that only in the actual work environment can system performance be measured and then compared to past system performance. Some organizations will occasionally do a performance test, but only after the vendor has been selected

and then only to validate the new equipment capability that has been obtained. Other organizations that believe benchmarking can be used as a measure of performance still seek confirmation from current product users, such as other units within the organization, area user groups, or friends in the computer business at other organizations. One of the organizations we visited had run benchmarks during a computer acquisition only because performance information was not available from other sources.

At one of the few organizations that normally requires benchmarks or equipment demonstrations, only those vendors whose proposals are considered fully responsive are asked to participate. Benchmarks are typically done by the three or four vendors whose proposals receive the top combined cost and technical ratings.

CHAPTER 6

CONCLUSIONS

Non-Federal organizations are committed to using ADP to achieve their business objectives and strategies. The organizations develop strategies and plans that provide the framework and direction within which their ADP acquisition process must operate. An informal communication process discloses the users' information requirements and allows management to comment before formally being asked to approve the required financial resources. Users are responsible for defining their information requirements and affirming their needs by paying the development and processing costs. A central office coordinates or technically approves acquisition proposals. That office is the focal point of the informal process, assists the user through the formal approval chain, keeps management informed about a project's progress, and ensures that ADP strategies and objectives are followed.

The organizations we visited generally stay with the incumbent vendor or compatible architecture as they upgrade or acquire new computer technology. However, no single manufacturer totally controls the data processing environment. Competition for major computer equipment is generally limited to compatible equipment and third-party sources. But competition for minicomputers, peripherals, and software packages is not so limited.

Support of the user is the primary objective of an organization's computer center. The unit achieves this objective by having the necessary technical skills and by planning (short and long range) equipment acquisitions to meet anticipated user requirements. User workload forecasts, historical business and data processing growth trends, and new application software developments help the data processing unit plan for ADP acquisitions, which are usually incremental. The ADP plan justifies an acquisition by stating the present system status, what data processing requirements are expected in a few years, and how a specific acquisition will meet a portion of the plan.

The organizations always want to reduce their data processing costs while maintaining or improving user support. The following efforts seem to help achieve this objective.

- Regional data centers are established with large-scale computers (maximizing price/performance ratio) that permit the leveling of workload peaks. 1/
- Application software packages are acquired or modified, rather than developed and maintained by inhouse staff.

1/The technical staff usually determines whether the information is processed at a regional center, a local center, or on a stand-alone system.

--Organizationwide standard application software programs are encouraged.

--Existing computer equipment is replaced by modern technology when there is greater capability at a lower total cost.

The user is an integral part of the acquisition process. The user initiates the process by stating a requirement, is assisted through the process by the technical staff, and affirms the need by paying the development and operating costs. The cost of processing and maintaining a system is recovered by charging the user for the services received. Users demand more data processing services as the computer becomes more of a cornerstone in improving productivity and decreasing operating costs of daily business.

Throughout the acquisition process, informal communication exists between the user and the approving authority. The informal process allows all interested parties to comment, air differences, and disclose extenuating factors that could influence the final decision. The informal process is facilitated by a central office that keeps management informed about a proposal's progress and helps the user get the technical assistance and guidance needed.

The non-Federal acquisition process can be summarized in three steps:

--The user states the problem.

--The technical staff works out an acceptable solution with the user.

--Management allocates the funds to implement the selected solution.

Management delegates responsibility for operating a business unit. Line management is accountable and evaluated on how well it accomplishes the business mission tasks. To that end, data processing is one of the business tools that are used. The acquisition process used to acquire this tool is an integrated set of management control, planning, accountability, and specific procurement practices working together as a whole.

EXTENT OF ATTRIBUTE COMMONALITY OF COMPUTER EQUIPMENT
ACQUISITION PRACTICES AT 18 NON-FEDERAL ORGANIZATIONS

	<u>Yes</u>	<u>No</u>
<u>ADP Strategies</u>		
Computer equipment upgrades are made to take advantage of new technology capabilities	16	2
Mainframe computer upgrades are limited to compatible equipment	17	1
Computer centers provide regional data processing support	18	-
<u>ADP Plans</u>		
Short range ADP plans are developed as part of the annual budget process	16	2
Long range ADP plans are developed to guide future use of information technology	15	3
<u>Responsibility for Information Requirements</u>		
Users are responsible for knowing their information requirements	18	-
Users pay for the support of their information requirements	18	-
<u>Management Control</u>		
Technical solution requires central management approval	17	1
Funding approval procedures are similar to those used for other types of capital assets	17	1
Formal approval process is facilitated by:		
Informal communications	18	-
Documentation guidance	14	4
Technical assistance	17	1
<u>Procurement Practices</u>		
Central procurement office specializes in computer equipment acquisitions	14	4
Full and open competition is <u>seldom used</u> to acquire computer equipment	16	2
Benchmarking is <u>not commonly</u> used to select computer equipment	15	3
Computer equipment acquisitions were normally completed in under 1 year	15	3

PARTICIPATING NON-FEDERAL ORGANIZATIONS

American Telephone and Telegraph Company, Information Systems
Department, Piscataway, New Jersey
New York Telephone, Information Systems Organization,
New York, New York

Bank of America, Electronic Banking Division, San Francisco,
California

Commonwealth of Pennsylvania, Department of General Services,
Harrisburg, Pennsylvania
Commonwealth Management Information Center, Middletown,
Pennsylvania

Computer Science Corporation, Systems Group, Falls Church,
Virginia

County of Los Angeles, Data Processing Department, Downey,
California

Exxon Corporation, Communications and Computer Sciences
Department, Florham Park, New Jersey

General Electric Company, Corporate Computer Planning Operations
Bridgeport, Connecticut
General Electric Credit Corporation, Corporate Information
Systems Operation, Stamford, Connecticut

International Telephone and Telegraph Corporation, Corporate
Information Systems, New York, New York
ITT Continental Baking Company, Information Systems,
Rye, New York
Hartford Insurance Group, Data Processing Services,
Hartford, Connecticut

Pillsbury Company, Information Management and Environmental
Systems, Minneapolis, Minnesota
Burger King Corporation, Information Management,
Miami, Florida

Rockwell International, Information Systems Center, Seal
Beach, California

Shell Oil Company, Information and Computer Services, Houston,
Texas

State of California, State Office of Information Technology,
Sacramento, California
Stephen P. Teale Consolidated Data Center, Sacramento,
California

State of Washington, Data Processing Authority, Olympia,
Washington
Department of Social and Health Services, Analysis and
Information Services, Olympia, Washington
Department of Retirement Systems, Olympia, Washington

Texas Instruments Incorporated, Information Systems and
Services, Dallas, Texas

TRW Incorporated, Defense and Space Systems Group, Redondo
Beach, California

United States Steel Corporation, Regional Service Center,
Pittsburgh, Pennsylvania

Westinghouse Electric Corporation, Management Systems and
Services, Pittsburgh, Pennsylvania
Power Systems Company, Pittsburgh, Pennsylvania

Xerox Corporation, Corporate Information Management, Stamford,
Connecticut, and Rochester, New York

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