STATE OF ARIZONA
OFFICE OF THE
AUDITOR GENERAL

A PERFORMANCE AUDIT
OF THE

DEPARTMENT OF ADMINISTRATION-
DATA CENTER

DECEMBER 1981

A REPORT TO THE
ARIZONA STATE LEGISLATURE

REPORT 81-24

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SUMMARY

The Office of the Auditor General has conducted a performance audit of the Department of Administration - Data Center (DOA-Data Center) in response to a January 30, 1980, resolution of the Joint Legislative Oversight Committee. This performance audit was conducted as a part of the Sunset review set forth in Arizona Revised Statutes (A.R.S.) §§41-2351 through 41-2379.

The Department of Administration (DOA) Data Center provides centralized data processing services to State agencies. These services include the collection of data, computer processing of data, development of computer programs and technical support to agencies utilizing computer services. The DOA-Data Center provides these services to more than 40 different State agencies, boards and commissions.

We found that the DOA-Data Center's project development process is deficient in four areas: 1) projects are not evaluated or planned properly, 2) the DOA-Data Center spends an excessive amount of time performing the coding function, 3) projects are not monitored properly, and 4) the DOA-Data Center does not follow project review and acceptance procedures. We also found that 1) user agencies are not provided alternatives to the DOA-Data Center for their automation needs, and 2) all of the above problems have been compounded by high staff turnover in the Systems and Programming section. As a result, the DOA-Data Center does not complete most projects within budgeted costs or completion dates.

To more effectively and efficiently serve the needs of the agencies the DOA-Data Center serves we found the DOA-Data Center needs to change:

- A management philosophy that includes providing whatever a user agency may request regardless of whether the request will result in inefficient uses of DOA-Data Center resources.
- A planning process that is not sufficiently coordinated with user agencies' needs and is based on inadequate data.

- A problem-resolution process that has never been formally established and implemented within the management systems of the Center.

Reviewing the printing function we determined the DOA-Data Center does not monitor the time that the printers stand idle. In addition, the Center does not monitor unnecessary use of the printing process by user agencies or by its own personnel.

Two errors in the DOA-Data Center billing system caused DOA-Data Center to undercharge users for printing by approximately $300,000. Further, a DOA-Data Center evaluation of the printing process failed to detect these billing errors. Finally, the DOA-Data Center purchase of an additional printer was not properly justified given 1) the unnecessary printing that is occurring, and 2) the fact that an apparent increase in utilization of the printers is due in part to the correction of billing system errors which had resulted in users not being charged for all printing and printing utilization to be under-reported.

We report as Other Pertinent Information the observations and recommendations for improvements made by consultants employed by the Office of the Auditor General. These observations included:

- The Center's use of a chargeback cost-recovery system which provides negative incentives for efficiency as opposed to a cost-accounting cost recovery system which provides positive incentives.
- The need for the Center to widen its staff's exposure to training in additional management techniques.
- Possible improvements in the handling of computer tapes.

Consideration should be given to the following recommendations:

1. The DOA-Data Center should:
   a. Change the policy of performing the synopsis and evaluation phases of a project free of charge if the user agency does not proceed with development.
   b. Revise the Policy and Standards Manual to clarify the methods for performing each task in the project development process, especially feasibility studies.
   c. Adopt a timesharing "style" of development.
   d. Analyze the coding function and adopt a method to reduce coding costs which might include:
      - structured programming,
      - modular programming,
      - reusable code in the form of library routine, or
      - breadboard programming.
   e. Monitor projects more closely including more timely updating of project plans and status reports, and ensuring that project changes are documented.
   f. Follow the established project review and acceptance procedures when concluding projects.

2. The Legislature should consider providing the DOA-Data Processing Division with the responsibility of establishing an application review process similar to the EDP equipment acquisition review process. Such an application review process should include needs analysis, cost benefit analysis, feasibility studies <u>and</u> an exploration of alternatives for meeting needs.

3. On an on-going basis, the DOA-Data Center should review and formally notify users, the DOA-Data Processing Division, the Executive Budget Office and the Joint Legislative Budget Committee staff of practices or requests that will result in inefficient uses of DOA-Data Center resources.

4. The DOA-Data Center assist all users in preparing data processing plans and utilize these plans to prepare a long-range resource plan.

5. The DOA-Data Center adopt a billing/data gathering system that provides more useful data for management planning and control.

6. The DOA-Data Center develop a formalized, centralized problem resolution function. Consideration should further be given to assigning this function to the Quality Control Group.

7. The DOA-Data Center monitor program dumps to determine what action should be taken to reduce their frequency.

8. The DOA-Data Center evaluate in-house printing and eliminate all unnecessary use of the printing resource.

9. The DOA-Data Center revamp the billing system to ensure that users are charged correctly and to ensure accurate information for management purposes.

INTRODUCTION AND BACKGROUND

The Office of the Auditor General has conducted a performance audit of the Department of Administration - Data Center (DOA-Data Center) in response to a January 30, 1980, resolution of the Joint Legislative Oversight Committee. This performance audit was conducted as a part of the Sunset review set forth in Arizona Revised Statutes (A.R.S.) §§41-2351 through 41-2379.

The Department of Administration (DOA) Data Center provides centralized data processing services to State agencies. These services include the collection of data, computer processsing of data, development of computer programs and technical support to agencies utilizing computer services. The DOA-Data Center provides these services to more than 40 different State agencies, boards and commissions.

In 1970 the Legislature recognized the need for centralized and coordinated data processing services and 1) prescribed that the then Commissioner of Finance provide such services to State departments, agencies, boards and commissions, and 2) created the Data Processing Revolving Fund for the purpose of allowing governmental units to contract for data processing services with the Department of Finance. Accordingly, the Legislature appropriated $483,000 for the revolving fund. Subsequently, efforts were made to consolidate the State's data processing activities into centralized data processing operations centers.

In 1973 the Department of Administration was created; the Data Processing Division was established within it; and the Data Processing Revolving Fund and the authority to establish data processing operations centers and provide data processing services to State agencies was transferred to the Division. Efforts to consolidate the State's data processing resources were culminated in 1975 when the Governor's Office designated and authorized five centralized State data processing operations centers,* one of which was the DOA-Data Center.

The DOA-Data Center originally reported to the DOA assistant director for Data Processing (Data Processing Division). In 1978, the reporting responsibility of the DOA-Data Center was transferred from the Data Processing Division to the Director of the Department of Administration.

All activities of the DOA-Data Center are funded from the Data Processing Revolving Fund. Table 1 shows the revenues, expenditures and full-time equivalent employees (FTE) of the DOA-Data Center for the fiscal years 1976-77 through 1980-81.

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* The other four state data processing operations centers are housed in the Departments of Transportation, Public Safety, Revenue and Economic Security.

TABLE 1

REVENUE, EXPENDITURES AND FULL-TIME EQUIVALENT EMPLOYEES OF THE DOA-DATA CENTER FOR FISCAL YEARS 1976-77 THROUGH 1980-81

	Fiscal Years				
	1976-77	1977-78	1978-79	1979-80	1980-81
Number of FTE's	94	95	101	100	122
Total Revenue	$2,876,717	$3,286,910	$3,905,803	$4,410,460	$4,964,297
EXPENDITURES:					
Personal services	$ 965,700	$1,127,500	$1,299,000	$1,490,200	$1,854,051
Employee-related expense	136,800	205,300	245,800	284,800	361,827
Professional and outside services	41,400	3,800	53,900	99,800	85,115
Travel:					
In State	5,200	3,900	3,800	3,900	4,503
Out of State	2,100	2,000	1,300	1,500	3,951
Other operating expense	547,900	563,600	611,500	799,000	1,060,423
Equipment	836,300	1,196,000	1,781,500	1,538,200	1,838,330
TOTAL	$2,535,400	$3,102,100	$3,996,800	$4,217,400	$5,208,200
EXCESS (DEFICIT) REVENUES	$ 341,317	$ 184,810	$ (90,997)	$ 193,060	$ (243,903)

The Auditor General expresses gratitude to the manager of the DOA-Data Center and his staff for their cooperation and assistance during the course of the audit.

SUNSET FACTORS

SUNSET FACTOR: THE OBJECTIVE AND PURPOSE IN ESTABLISHING THE DATA CENTER

The DOA-Data Center was created by administrative action and not through enabling legislation. Therefore, there is no statement of legislative intent nor are there statutes specifically setting forth duties of the DOA-Data Center. The manager of the DOA-Data Center has informed us that it was created under A.R.S. §41-712 (B) which provides for the

> "...establishment of one or more centralized data processing operations centers, for the purpose of serving the management and other needs of the legislature, excutive and judicial branches of state government."

The DOA-Data Center manager has stated the objective of the Center is to serve the needs of smaller agencies who have no data processing capabilities of their own, and also to serve larger agencies whose workload exceeds their own data processing capacities.

SUNSET FACTOR: THE DEGREE TO WHICH THE DATA CENTER HAS BEEN ABLE TO RESPOND TO THE NEEDS OF THE PUBLIC AND THE EFFICIENCY WITH WHICH IT HAS OPERATED

In contrast to a licensing board or regulatory agency the DOA-Data Center has only incidental interaction with the public. The nature and purpose of the DOA-Data Center do not directly place it in the position of responding to public needs.

SUNSET FACTOR: THE EXTENT TO WHICH THE DATA CENTER HAS OPERATED WITHIN THE PUBLIC INTEREST

To the extent the DOA-Data Center has failed to ensure that its users use the Center's resources efficiently, and to the extent the Center has failed to monitor and evaluate its functions, the DOA-Data Center may not have operated within the public interest. (pages 21 and 31)

SUNSET FACTOR: THE EXTENT TO WHICH RULES AND REGULATIONS PROMULGATED BY THE DATA CENTER ARE CONSISTENT WITH THE LEGISLATIVE MANDATE

The DOA-Data Center has no enabling statutes to provide it with rule-making authority. Consequently, the DOA-Data Center does not promulgate rules.

SUNSET FACTOR: THE EXTENT TO WHICH THE DATA CENTER HAS ENCOURAGED INPUT FROM THE PUBLIC BEFORE PROMULGATING ITS RULES AND REGULATIONS AND THE EXTENT TO WHICH IT HAS INFORMED THE PUBLIC AS TO ITS ACTIONS AND THEIR EXPECTED IMPACT ON THE PUBLIC

This Sunset factor is not applicable to DOA-Data Center.

SUNSET FACTOR: THE EXTENT TO WHICH THE DATA CENTER HAS BEEN ABLE TO INVESTIGATE AND RESOLVE COMPLAINTS THAT ARE WITHIN ITS JURISDICTION

The Data Center does not receive, investigate or resolve complaints.

SUNSET FACTOR: THE EXTENT TO WHICH THE ATTORNEY GENERAL OR ANY OTHER APPLICABLE AGENCY OF STATE GOVERNMENT HAS THE AUTHORITY TO PROSECUTE ACTIONS UNDER ENABLING LEGISLATION

The DOA-Data Center has no enabling legislation to define violations or offenses.

SUNSET FACTOR: THE EXTENT TO WHICH THE DATA CENTER HAS ADDRESSED DEFICENCIES IN THE ENABLING STATUTES WHICH PREVENT IT FROM FULFILLING ITS STATUTORY MANDATE

The DOA-Data Center has not found a need to request that enabling legislation be created or that the Center be given statutory authority or responsibilities of any kind.

SUNSET FACTOR: THE EXTENT TO WHICH CHANGES ARE NECESSARY IN THE LAWS OF THE DATA CENTER TO ADEQUATELY COMPLY WITH THE FACTORS LISTED IN THE SUBSECTION

The audit did not reveal a need for changes in the laws of the DOA-Data Center.

FINDING I

CHANGES ARE NECESSARY TO IMPROVE THE DOA-DATA CENTER'S PROJECT DEVELOPMENT PROCESS.

The DOA-Data Center is responsible for developing and maintaining data processing systems for those State agencies that do not have the expertise to perform this function for themselves. Our review revealed that the DOA-Data Center's project development process performed by the Systems and Programming Section is not functioning adequately. We found the following deficiencies in the process:

1. The synopsis and evaluation phases of the process are performed in a cursory manner,

2. The DOA-Data Center can reduce the time spent performing the coding function,

3. Projects are not monitored properly, and

4. Project review and acceptance procedures are not followed.

In addition, we found that 1) user agencies are not provided alternatives to the DOA-Data Center for their automation needs, and 2) the problems described have been compounded by high staff turnover. As a result, the DOA-Data Center does not complete projects within the budgeted costs or required dates or in some instances does not complete projects at all.

DOA-Data Center Project Development Life Cycle

The DOA-Data Center has developed a project development life cycle that is divided into four phases with several steps within each phase. The cycle is summarized as follows:

REQUEST AND SYNOPSIS PHASE

A. Project Request

A brief description of the system, objectives to be met and anticipated costs and benefits.

B. Project Synopsis

A statement of user objectives, limitations, expected benefits, additional recommendations and a feasibility study.

EVALUATION PHASE

A. General System Flowchart

A graphic outline of the flow of data.

B. Cost/Benefit Analysis

A detailed summary of the estimated development and operational costs compared with the expected benefits and an evaluation of alternatives.

C. Project Initiation and Control Preparation

A document to support selected alternatives, user responsibilities, costs and time frames involved.

DEVELOPMENT PHASE

A. Equipment Preparation

Planning for the hardware, software and facility needs of the project.

B. Detail Design

A summary of the input, data, output, programming and processing requirements of the project.

C. Program Specification

An outline of what function each program is to perform as a basis for the final program documentation.

D. Materials Preparation

Ordering any specialized forms or materials necessary for the project.

E. Coding

The translation of the detail design into executable programming code.

F. Testing

The preparing of a test plan and the test data, and the testing of the program and the system.

G. Documentation

Communication among analyst, user, programmer and operator to ensure that all major points of development and implementation have been addressed.

H. Conversion

Convert existing formats into those required by the new project.

I. User Training

Training conducted to familiarize the user with their function within the system.

PROJECT REVIEW AND ACCEPTANCE

A. General Review

A review as soon as the system is settled to evaluate development, operation and variance from estimated costs.

B. Project Acceptance

A formal acceptance of the project by the user.

C. Problem Resolution

A method for correcting problems that cause the project to not meet the needs of the user.

Our review of the DOA-Data Center project development life cycle revealed that some functions are not performed adequately and others not efficiently.

The Synopsis and Evaluation Phases Of the Project Development Process Are Performed In A Cursory Manner

The synopsis and evaluation phases of the project development process are perhaps the most critical as they establish the framework for the whole project. According to the manager of the Systems and Programming function: 1) these phases are the most critical, and 2) there could be a five- to tenfold improvement in the results of projects if more analysis was done.

We found these phases are performed in a cursory manner in that too little time is devoted to these phases and essential steps are either not performed or are not performed adequately.

A productivity analysis of the Systems and Programming staff's time showed that the staff spends less than ten percent of its time performing synopsis and evaluation tasks. The manager of Systems and Programming told us that although it was difficult to provide a percentage figure of what should be spent on these phases, he would prefer to see his staff spend a minimum of 15 percent of its time in synopsis and evaluation.

We also found the DOA-Data Center does not perform adequately many of the steps in the synopsis and evaluation phases of the project life cycle.

Reviewing 14 projects that were scheduled for completion in fiscal year 1980-81, we found the DOA-Data Center apparently did not perform feasibility studies or cost benefit analyses for any of the projects reviewed. If such studies were done, they were either not done formally or not included in the project files.

Our review revealed that the DOA-Data Center does not perform the synopsis and evaluation phases adequately for the following reasons:

1. A DOA-Data Center policy that user agencies will not be charged for synopsis or evaluation work if the user decides not to proceed with the project development.

2. The DOA-Data Center's Policy and Standards Manual is unclear with regard to what is to be performed in the synopsis and evaluation phases.

DOA-Data Center "No Charge" Policy

The DOA-Data Center has adopted a "marketing" philosophy of not charging for synopsis or evaluation work if the user decides not to proceed with the project development. This is done because in many instances agencies need to know how much a project will cost before requesting funds for the project. However, since the DOA-Data Center operates on a revolving-fund concept, the "no charge" work must be recovered elsewhere if the Center is to remain solvent. This puts pressure on the Systems and Programming staff to perform the synopsis and evaluation phases quickly to mitigate the possibility of not recovering costs if the user agency decides not to proceed with project development.

Policy and Standards Manual Is Unclear

The DOA-Data Center's Policy and Standards Manual (Manual) governing project development was originally prepared in 1972 and has basically remained unchanged since. Our review of the Manual revealed that it does not clearly define what tasks are to be performed and how they are to be performed, especially tasks regarding feasibility studies and cost/benefit analyses. According to the Systems and Programming manager in a statement regarding feasibility studies,

> "There is nothing within the Policies and Standards Manual which provides a clue as to what is to go in there....We recognize the out-of-date condition of the Policies and Standards Manual and are working at this time toward a complete revision of the document."

The DOA-Data Center Can Reduce The Time Spent Performing the Coding Function

Our review of the DOA-Data Center development process revealed that the coding function is the most time-consuming and expensive portion of the process. The DOA-Data Center has not made a formal effort to reduce the time and cost spent coding. It should be noted that the DOA-Data Center manager is aware of the problem and is planning to take steps to reduce coding time and shift the emphasis toward the synopsis and evaluation phases of the development process. According to a consultant hired by the Office of the Auditor General to evaluate the Data Center, the following steps could be taken to systematically reduce coding time.

> "Management should have identified one or more options to reduce cost, such as structured programming (not always seen to reduce cost), modular programming, reuseable code in the form of library routines, "breadboard" programming. One of those options should have been selected, and a project proposed for implementation.
>
> "Elements of coding time should have been analyzed, and suggestions for reducing that time made.
>
> "Time involved in coding (as well as the rest of the cycle) could be reduced by adopting a timesharing 'style' of development, in which no printout is required, data and output are stored on disk, output is reviewed on disk and programs resubmitted without ever seeing any printed copy. System utility routines, job control language, and operating techniques may require modification. Management should be aware of these possiblities."

Projects Are Not Monitored Properly

Our review revealed that the DOA-Data Center does not monitor adequately the projects being developed. We found that the project plans were not being updated systematically and that project changes were not documented properly. As a result, projects overrun budgeted costs and estimated completion dates.

For example, as of October 1981 of the 16 Data Center projects scheduled for completion in fiscal year 1980-81, eight were overbudget, two were completed within budget and two had been halted. The status of the remaining four projects could not be determined as they were ongoing projects.

The DOA-Data Center has an automated project status report system designed to monitor projects, however, this system has not been updated on a timely basis. In addition, the Policy and Standards Manual includes a procedure for documenting project changes and adjusting budgeted costs based on these changes. However, these procedures are often not followed leaving the DOA-Data Center with no documentation to support an increased charge. It should be noted that the DOA-Data Center is now taking steps to resolve these problems, including having a quality assurance group check each project being developed at certain mileposts during the development process.

Project Review and Acceptance
Procedures Are Not Followed

Project review and acceptance procedures are necessary to ensure that 1) the projects actually meet the needs of the users, and 2) Data Center management becomes aware of any problems that occurred in the development of the project and can take steps to prevent their reoccurrences in subsequent projects.

Our review of the development projects in fiscal year 1980-81 revealed that fewer than ten percent of those projects were formally accepted by the user agency or reviewed by DOA-Data Center staff even though the Policy and Procedures Manual requires these procedures. This occurs because in many instances the user agency will not formally accept a project until the project is actually in production at which time the analyst in charge of the project is working on another project and has forgotten that the project was not reviewed or accepted.

User Agencies Are Not Provided Alternatives To the DOA-Data Center For Their Automation Needs

During the synopsis and evaluation phases, user agencies are often not made aware of the alternatives to the DOA-Data Center that are available to meet their automation needs. As a result, some agencies contract with DOA-Data Center to develop projects that may be more easily, and less expensively, accomplished through other options.

Two examples of projects in which the agencies were not informed of less expensive, more easily implementable alternatives, are described below.

Case I - Liquor Licensing Board

The Liquor Licensing Board contracted with the DOA-Data Center to develop a licensing system. The original costs were estimated to be $15,040 to develop the system and $11,354 per year to operate the system. During the initial evaluation, Liquor Licensing was not informed of any alternatives to the proposed DOA-Data Center System.

The system was developed and implemented over a three-year period at a cost to the Liquor Licensing Board of $19,420. An additional $2,981 in cost overruns was absorbed by the DOA-Data Center as overhead. However, the system never did work according to the Liquor Licensing Board and was scrapped in favor of two word processing units obtained on a three-year lease/purchase agreement costing $12,070 per year. Liquor Licensing Board staff told us the word processing units do not have all of the capabilities of the DOA-Data Center, but that the units do meet Liquor Licensing Board needs and are more cost effective.

It should be noted that the Liquor Licensing Board will be replacing the present word processing units with more powerful units in February 1982. These new units, which will cost an additional $91 per month, have increased storage and memory capabilities and are compatable with the present units.

Case II - Registrar of Contractors

The Registrar of Contractors presently has its licensing system automated through the DOA-Data Center. In November 1980 it requested a modification to the system to provide for staggered renewal of licenses as required by a statutory change.

The Registrar's office later requested additional cost estimates on changing the licensing system to an on-line system and cost estimates on automating its compliance data. The DOA-Data Center estimated it would cost $15,800 to implement a staggered renewal system. It also estimated it would cost $26,000 to develop a system to automate the compliance data and $14,200 annually to operate the system. Before the Registrar realized it could not afford both the on-line and compliance data cost studies and discontinued its request $1,200 was spent for study work on the on-line system. The assistant Registrar told us to his knowledge "...no cost benefit analyses were performed, nor was any evaluation of possible alternatives explored."

Because of the costs projected by DOA-Data Center the Registrar explored alternatives on its own. The Registrar hired a temporary staff member at a cost of $2,400 as part of an evaluation that concluded the licensing system could be placed on a minicomputer, the staggered renewal system implemented and the compliance data file automated with a five-year savings of more than $85,000 when compared to the DOA-Data Center costs.* The DOA-Data Processing Division has since given the Registrar permission to proceed with this alternative as a "pilot" project.

DOA-Data Center often does not inform agencies of alternatives to its Systems and Programming services for two primary reasons: 1) because DOA-Data Center must market its services it does not regard itself as having a role of providing agencies with alternatives, and 2) some alternatives lie outside the expertise of the DOA-Data Center systems and programming staff.

* The Registrar evaluated six alternatives (including the DOA-Data Center) for meeting its needs and compared hardware, maintenance, development, annual operating and overhead costs.

In explaining the DOA-Data Center marketing philosophy, the Systems and Programming manager gave the following analogy:

> "...if you came to me at 15th Avenue and Adams and I am a taxi driver and you asked me to drive you to the Capitol, I am not going to suggest you walk down the two blocks yourself, nor am I going to suggest you walk one block and catch a bus. If I know that my vehicle is capable of conveying you to the Capitol, and it is an alternative that will solve the problems of getting you to the capitol, I will take you there. I will not do it in a round-about fashion, however, I will take you there in the best manner I can. I will do it with a smile knowing full well that my good service might cause you to use my taxi again."

With regard to expertise, the DOA-Data Center manager told us his staff's expertise was largely in the use of mainframe computers and their applications and that they did not have sufficient expertise in mini- and microcomputers and word processors to be able to provide users with comparative data on these alternatives.

During the course of the performance audit of the DOA-Data Processing Division (Report 81-12) we noted that the DOA-Data Processing Division has identified a need for projects (computer applications) to be reviewed in a manner similar to that used for acquiring data processing equipment. If such a procedure were established it would allow DOA-Data Processing Division, a third party not concerned with marketing its services, to provide users with alternatives to DOA-Data Center.

Turnover Has Compounded Development Problems

Each of the problems in the development process described above has been compounded by high staff turnover in the Systems and Programming section. The turnover rate for EDP Programmer Analyst II's in the Department of Administration was 83 percent in fiscal year 1979-80 and 33 percent in fiscal year 1980-81. The turnover rate for EDP Programmer Analyst III's was 50 percent in fiscal year 1979-80 and 100 percent in fiscal year 1980-81. By way of contrast, turnover for all positions in State service was 25 percent in fiscal year 1980-81.

Such turnover has had its impact on the development process particularly with regard to overruns of budgets and deadlines. For example, the data base system being developed for the Land Department is $107,000 over budget. This project has had four different project leaders in three years. Similarly, in responding to an Auditor General survey of DOA-Data Center users, the Controller of the Arizona Corporation Commission wrote:

> "I think the biggest and most important problem with the Data Center is turnover. We have lost three of the five Programmers and Project Leaders assigned to us in the last month. One of our projects is of such a magnitude that we have had to stop all further action on it due to this loss of continuity in staffing and lack of adequate support. The result is costly and annoying delays."

DOA-Data Center and the State Personnel Division have taken some steps to attempt to alleviate the problem. Beginning July 1, 1981, the DOA-Data Center was given permission to hire EDP Programmer/Analyst I's and II's at step three of the salary schedule. In September 1981 the positions in the Systems and Programming section received one grade upgrades. The Systems and Programming manager told us that although these new salaries may still be slightly low, they are now competitive. He believes it will help relieve the problem of staff leaving for 25 percent to 35 percent salary increases.

CONCLUSION

The DOA-Data Center's project development process is deficient in several areas. Projects are not evaluated or planned properly. In addition, the DOA-Data Center spends a significant amount of time performing the coding function. Also, projects are not monitored properly and the DOA-Data Center does not follow project review and acceptance procedures. Finally, user agencies are not provided alternatives to the DOA-Data Center and all of the above problems have been compounded by high staff turnover in the Systems and Programming section. As a result, the DOA-Data Center does not complete most projects within budgeted costs or completion dates.

RECOMMENDATIONS

1. The DOA-Data Center should:

   a. Change the policy of performing the synopsis and evaluation phases of a project free of charge if the user agency does not proceed with development.

   b. Revise the Policy and Standards Manual to clarify the methods for performing each task in the project development process, especially feasibility studies.

   c. Adopt a time-sharing "style" of development.

   d. Analyze the coding function and adopt a method to reduce coding costs which might include:
      - structured programming,
      - modular programming,
      - reusable code in the form of library routine, or
      - breadboard programming.

   e. Monitor projects more closely including more timely updating of project plans and status reports, and ensuring that project changes are documented.

   f. Follow the established project review and acceptance procedures when concluding projects.

2. The Legislature should consider providing the DOA-Data Processing Division with the responsiblity of establishing an application review process similar to the EDP equipment acquisition review process. Such an application review process should include needs analysis, cost benefit analysis, feasibility studies <u>and</u> an exploration of alternatives for meeting needs.

FINDING II

IMPROVEMENTS ARE NEEDED IN THREE ASPECTS OF THE MANAGEMENT OF THE DOA-DATA CENTER: MANAGEMENT PHILOSOPHY, PLANNING AND PROBLEM RESOLUTION PROCEDURES.

The DOA-Data Center has primary responsibility for meeting the data processing needs of all state agencies that do not have their own data centers. To more effectively and efficiently serve the needs of these agencies DOA-Data Center needs to change:

- A management philosophy that includes providing whatever service a user agency may request regardless of whether the request will result in inefficient use of DOA-Data Center resources.
- A planning process that is not sufficiently coordinated with user agencies' needs and is based on inadequate data.
- A problem-resolution process that has never been formally established and implemented within the management systems of the Center.

Inappropriate Data Center Management Philosophy

Our review of the DOA-Data Center revealed a management philosophy that allows inefficient utilization of resources. This philosophy includes providing whatever service a user agency requests regardless of whether resources are efficiently used. Incentives to operate efficiently are lacking because

1. the DOA-Data Center operates under a revolving fund concept.

2. Users are required to use the DOA-Data Center in preference to outside sources.

Operating under a revolving fund DOA-Data Center has no incentive to ensure that its users use its resources efficiently. DOA-Data Center is funded by charges to its users based on the resources consumed. The more resources consumed because of user requests the more funds are generated for the Revolving Fund. If the Data Center's staff or equipment capacity is reached any additional funds generated will pay for new staff or equipment. Thus, in terms of DOA-Data Center expansion there may actually be a disincentive to have user agencies use its resources efficiently. The problem is compounded by the fact that many DOA-Data Center users are small and may not be sufficiently sophisticated in data processing to know if they are using its resources efficiently.

In a similar manner the DOA-Data Center may not have an incentive to use resources efficiently because unlike a computer service bureau in the private sector, DOA-Data Center does not have to compete for its clients. Under DOA-Data Processing Division policies, users are required to use DOA-Data Center in preference to outside sources. Further, users are limited in their abilities to buy equipment and perform their own data processing because 1) DOA-Data Processing Division has no plans to authorize large users to establish their own centers, and 2) smaller users cannot buy equipment because DOA-Data Processing Division has placed a freeze on the acquisitions of mini- and microcomputers.

Inefficient Use of
Data Center Resources

The DOA-Data Center does very little to ensure that its resources are utilized efficiently by user agencies. The Data Center has established some standards "in an effort to attain greater throughput efficiency." However, these limits only regulate the size of the job not the efficiency with which it operates. Our review revealed that in many instances the DOA-Data Center does not monitor the jobs it processes as the following cases illustrate:

CASE I - A Significant Number of Program Dumps

As discussed on page 32, Finding III, Auditor General staff observed that a significant number of program dumps were being printed. A program dump is a printout of a portion of main memory at a specific time which usually involves the entire program and may include some of the raw data. These printouts range in size from just a few pages to literally hundreds of pages. Most program dumps are caused by poor program editing or data entry problems which can be systematically corrected. However, the DOA-Data Center has not attempted to determine the cause of program dumps or reduce the number of program dumps being printed. DOA-Data Center personnel were asked about the program dumps and responded that they felt obligated to perform services for which users are willing to pay.

According to the DOA-Data Center Operations Manager users are not normally contacted even if it is known that a requested job is inefficient provided the job is: 1) within established size limits, and 2) run on the second or third shift. He further stated that the Data Center does not perceive itself as being responsible for users' applications and gave the following example of an inefficient user request that the Data Center would not necessarily attempt to discourage. The example is shown as Case II.

CASE II - Inefficient Tape Drive Utilization

The DOA-Data Center will become aware that an application with ten activities ties up four tape drives simultaneously. However, the first nine activities require only one tape drive while the tenth activity requires four tape drives. If the user is willing to pay for all four tape drives for the entire application including the time when only one tape drive is being used, the DOA-Data Center does not feel responsible to notify the user of the unnecessary cost it is incurring.

Our review also revealed unnecessary utilization of resources for DOA-Data Center in-house purposes as the following case illustrates:

CASE III - Unnecessary Repetitive Printing

As discussed on page 33, Finding III, our review of a DOA-Data Center overhead printing account revealed that certain programs were being reprinted as many as seven times with only minor changes over a one-month period. When DOA-Data Center personnel were questioned about this practice they responded that the repetitive printing was unnecessary and could be eliminated with a few programming changes. Our analysis indicated that at least eight percent and as much as 35 percent of the DOA-Data Center in-house printing is unnecessary. It should be noted that this could amount to more than 1.5 million print lines monthly since the DOA-Data Center is the largest single user of printing directly from disk. Such a reduction could save the DOA-Data Center approximately $10,000 per year.

As the preceding cases illustrate, the DOA-Data Center does not feel compelled to operate efficiently. This results from a philosophy at the DOA-Data Center that its primary function is to fulfill user requests regardless of any inherent inefficiencies in those requests.

The DOA-Data Center Planning Process Is Inadequate

Our review of the DOA-Data Center planning process revealed the following two weaknesses:

1. Insufficient coordination between the DOA-Data Center and the user agencies, and

2. A management information system that does not provide accurate, useful planning information.

As a result, the DOA-Data Center has developed projects that only partially meet the needs of the user agencies. In addition, the DOA-Data Center has been unable to update its own overall long-range data processing plan. Further, even the short-range plans for revenue acquisition have proven to be inadequate.

Insufficient Coordination Between
DOA-Data Center and User Agencies

According to the Long Range Planning Guidelines For EDP Functions the "planning process must be built on the objectives and plans of the user and host agency." The DOA-Data Center has made only cursory attempts to obtain the objectives and plans of their user agencies. Prior to 1981 the only structured attempt to gather data from users was a form that asked users to estimate their future requirements in only technical terms such as CPU time and disk space as opposed to program requirements such as documents processed. As a result, the DOA-Data Center was unable to update its long-range plan for 1981 because it did not receive information from the user agencies regarding their data processing needs. The absence of coordinated planning between the DOA-Data Center and user agencies also causes problems with resource acquisition as the following example illustrates:

Example: Front-End Processor Acquisition.

> The State Compensation Fund purchased approximately 40 new terminals in April 1981 without notifying the DOA-Data Center. The inclusion of these terminals in the DOA-Data Center network caused the front-end processors to reach almost full capacity. As a result, the DOA-Data Center was forced to purchase a new front-end processor much sooner than anticipated in order to maintain an adequate response time.

The inadequacies in the DOA-Data Center planning process have also adversely affected project development. According to the Manager of the DOA-Data Center Systems and Programming section who is responsible for project development.

> "In many cases, because of the short period of time that everyone has in order to prepare a budget request, we are asked to develop a cost off the top of our heads that might satisfy this based on certain criteria that we hear about. Many times the criteria that we hear about is only a part of what the user really wants, but at the time the request is made of us, is never given. These funds, when they become available, are really not enough to satisfy the total project that the user now has in mind. In that case, we will, with the user, develop in as modular fashion as possible, a system using those funds that are available. In that case, we all recognize that we are really going to partially meet the user's desires."

As the preceding statement illustrates the DOA-Data Center has developed projects that only partially meet the needs of the user agencies because the projects are not adequately planned before being funded. This is another indication that the DOA-Data Center needs to increase its coordination with and assistance to user agencies. In an effort to do this the DOA-Data Center is preparing a new data processing planning questionnaire. However, as of September 25, 1981, the planning questionnaire was not yet completed.

Substandard Management
Information System

A second problem that causes the data center's planning process to break down is the failure to consistently gather information necessary for planning. Most of the resource utilization information is gathered from DOA-Data Center billing records. However, in many instances these records do not reflect actual utilization in sufficient detail for proper resource management. For instance, the DOA-Data Center considers the printers as a single billing unit. However, there are now four printers operating at two different speeds with varying efficiency. The billing system does not separate the different types of printers so the DOA-Data Center has no information on how efficient each printer operates or at what capacity. As a result, the DOA-Data Center will not have any data to support the need for a new printer when the older printers lose their efficiency.

A similar situation exists with the disk drives and tape drives. There are three models of disk drives with three different capacities. There are also two models of tape drives operating at two different speeds. Although these different models operate at different capacities and different costs they, like the printers, are treated as one billing unit. This does not allow for analysis of a more cost-effective equipment mix.

It should be noted that the DOA-Data Center has been discussing the need for a new billing system for more than a year. However, this is considered a low priority item and no action has been taken to obtain a more accurate, useful system.

Establishment Of a Quality
Control Group In the DOA-Data Center

The DOA-Data Center established a quality assurance section in August 1981 to help alleviate some of the problems mentioned previously. The responsibilities of this section are summarized as follows:

1. Develop and maintain a five-year plan which reflects the Data Center and user goals.

2. Monitor the five-year plan and provide periodic reports on its progress.

3. Provide a central repository for all Data Center policies and procedures, application systems documentation, and technical library.

4. Conduct reviews of all systems developed by Data Center staff to ensure that:

   A. Systems are documented according to existing standards.

   B. Systems are developed in the best interest of the Data Center and user.

   C. Systems are developed in accordance with existing policies and procedures.

5. Provide accounting facilities for the following:

   A. User billing data,

   B. Produce Data Center financial reports,

   C. Monitor user financial resources,

   D. Maintain equipment inventory, and

   E. Develop and maintain Data Center budget.

6. Coordinate the procurement of training as identified by other sections within the Data Center.

Lack Of a Formal
Problem Resolution Process

The DOA-Data Center has not established a formal centralized problem resolution process. This precludes the DOA-Data Center from determining how often problems recur, how quickly they are resolved or whether they are resolved at all. The consultants hired by the Office of the Auditor General stated that 1) a centralized problem resolution process encompassing the above elements is essential for the efficient operation of a data center and 2) in productivity analyses they have done in other centers, such a process is commonplace. DOA-Data Center devotes less than two percent of its staff time to such activities. DOA-Data Center draft proposal for the quality control section included a function for problem detection as follows:

> "Maintain a system to monitor problem reports. Report the status of problems detected and resolved monthly. Analyze problems to identify frequencies and trends of problems and report findings to Data Center managment.

It should be noted that the final responsibilities of the quality assurance section did not include the problem resolution function.

CONCLUSION

The DOA-Data Center does not efficiently use its resources. In addition, the DOA-Data Center planning process is ineffective because of a lack of coordination with user agencies and a poor internal data gathering system. Finally, there is no formal problem resolution process to identify and resolve recurring problems impacting the efficiency of DOA-Data Center.

RECOMMENDATIONS

Consideration should be given to the following recommendations:

1. On an on-going basis, the DOA-Data Center should review and formally notify users, the DOA-Data Processing Division, the Executive Budget Office and the Joint Legislative Budget Committee staff of practices or requests that will result in inefficient use of DOA-Data Center resources.

2. The DOA-Data Center assist all users in preparing data processing plans and utilize these plans to prepare a long-range resource plan.

3. The DOA-Data Center adopt a billing/data gathering system that provides more useful data for management planning and control.

4. The DOA-Data Center develop a formalized, centralized problem resolution function. Consideration should further be given to assigning this function to the Quality Control Group.

FINDING III

THE DOA-DATA CENTER DOES NOT MONITOR OR EVALUATE ITS PRINTING PROCESS ADEQUATELY.

Printing is the third most costly DOA-Data Center function. In fiscal year 1980-81, DOA-Data Center printing costs were approximately $500,000. Our review of the DOA-Data Center revealed that it has not monitored or evaluated its printing function adequately.

In addition, billing system errors caused the DOA-Data Center to undercharge users almost $300,000 over a 28-month period for printing and to acquire $83,000 of additional printing equipment based on erroneous information. Both of these problems were not detected by the DOA-Data Center when it evaluated its printing function in August 1980. Finally, it appears that the DOA-Data Center's purchase of another printer for $83,000 in October 1981 was not properly justified.

Fiscal Year 1980-81 Printing Budget

The DOA-Data Center printing budget was almost $500,000 for fiscal year 1980-81. Over two-thirds of this total was for printing paper and supplies. The remaining budget was to cover the costs and maintenance of the three existing line printers and for the purchase of a new printer in December 1980.

Printer Utilization Is Not Adequately Monitored

DOA-Data Center maintains printer utilization statistics for billing purposes. However, these statistics are not routinely used for measurement and analysis of printer utilization.

According to DOA-Data Center personnel utilization data are not routinely produced and analyzed, because the information is difficult to gather. However, usage records kept by the computing system could be used to track printer usage, idle time, and any unusual operating conditions. A program could be written to extract, sort and display pertinent information. Such data, together with observations of what is printed, could then be used to identify problem areas. For example, if it is found that the number of forms changes is excessive, a possible solution would be to alter the printer queuing strategy to reduce the number of changes. If excessive system control information, program dumps, or other specialized information is printed, operating procedures can be changed to eliminate those items unless specifically requested by a programmer or user.

Unnecessary Utilization Of
The Printing Process

DOA-Data Center personnel do not attempt to discourage unnecessary utilization of the printing process by users. Further, in some instances, DOA-Data Center personnel utilize the printing process unnecessarily.

Our review of the DOA-Data Center printing process revealed a significant number of program dumps* were being printed. This was observed during our review of procedures by the operations section and was verified by analysis of billing records.

Program dumps should only be used as a last resort to debug a program being developed or for production jobs** that abort. Even in these situations, program dumps can often be avoided. For example, in many cases programs can be debugged by printing the area of the program immediately surrounding the problem area rather than printing a program dump, or by using the program source and documentation to locate a problem.

* A program dump is a printed numerical representation of the contents of a portion of main memory at a specified time.

** A production job is a job that is fully developed and tested and has been run previously.

This would be significant since a program dump printout can be hundreds of pages long. Excessive program dumps are an indication of problems with program applications, programming, data integrity or other software elements. However, the DOA-Data center does not routinely analyze the program dumps to determine what is causing them. This precludes the Data Center from identifying problems and taking corrective actions. The DOA-Data Center operations personnel were asked about the program dump problem and responded that as a service agency they felt compelled to print program dumps as long as the users were willing to pay the costs.

In addition, we found that the DOA-Data Center itself is the single largest user of its own printers and, in some instances, utilizes those printers unnecessarily. An analysis of one of the overhead accounts revealed that certain programs were compiled* and reprinted as many as seven times in a one-month period with only minor changes. Further review indicated that as much as 35 percent of DOA-Data Center in-house printing could be eliminated with minor programming changes to print only the problem areas of the program. The excessive printing from this one overhead account could amount to as much as 1.5 million lines monthly or 10 percent of the Center's total disk-to-print printing. These unnecessary costs, which we estimate at $10,000 per year are subsequently passed on to user agencies and ultimately the taxpayer.

* Compiling is the conversion of a computer language into machine language.

Billing System Errors Caused The DOA-Data Center To Undercharge User Agencies Approximately $300,000

Our review of the DOA-Data Center billing records involving the printing process revealed that the users were undercharged approximately $300,000 over a 28-month period. There were two errors in the billing system which caused the undercharges. The first involved an improper device code which went undetected for approximately twenty-two months from January 1979 through November 1980. The second involved a programming error in the billing system which was made in October 1979 and was not detected until April 1981. A device code is a numerical identification number given to each piece of equipment in the data center for billing purposes. It should be noted that neither of these errors were detected by DOA-Data Center personnel.

The following two cases summarize the effects of the billing errors and the manner is which the errors were detected.

CASE I

This error involved an improper device code* and was uncovered by a user agency in November 1980. The user compared two bills for an identical job and noticed a discrepancy in the charges. The DOA-Data Center reviewed the bills and discovered that one bill did not contain any printing charges. Further analysis revealed that the Data Center had not been charging for any batch jobs** printed by its large printer because of an improper device code. The error caused the DOA-Data Center to fail to charge for approximately 20 percent of the center's printing which amounted to a loss of approximately $100,000 over a two-year period. The DOA-Data Center did correct this error in January 1981, but it could not recover the $100,000 because data was not available to determine who should have been charged.

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* A code used to identify for the billing system the piece of equipment being used.

** Jobs which are transferred from disk to tape before being printed.

Case II

The programming error in the billing system was detected by Auditor General staff, during analysis of the billing records in April 1981. We found that the DOA-Data Center was not billing users for any of the printing performed directly from disk. Approximately 28 percent of the DOA-Data Center printing is directly from disk, and we determined that this error had been occurring since October 1979 when changes were made to the billing system. The error went undetected because the billing system was not adequately tested after the changes were made. As a result, the DOA-Data Center undercharged users more than $210,000 during the period from October 1979 through April 1981. The Center did charge the users retroactively for this printing and as of September 15, 1981, had collected almost $200,000.

As the previous two cases show, the DOA-Data Center billing system does not contain adequate controls. This is significant because the Center relies on the billing system to provide data for management. This is illustrated by the results of an evaluation performed by the DOA-Data Center in August 1980.

Printer Evaluation Based
On Incorrect Information

The DOA-Data Center performed an evaluation in August 1980 to determine if the purchase of a new printer, which was budgeted for December 1980, was justified. The evaluation was requested by Operations personnel because they felt the printing workload justified a new printer in that they could not print all jobs in a timely manner. However, a preliminary evaluation, which was based on data gathered from the billing system, indicated that the printers were being utilized at less than 40 percent of capacity.

No effort was made to determine the cause of the discrepancy between the results of the preliminary evaluation and the operations section's report of actual printer utilization. Instead, the evaluation was never completed and the purchase of the printer was postponed. Had further evaluation been performed the DOA-Data Center could have detected the two errors in the billing system previously mentioned.

The DOA-Data Center purchased an additional printer in October 1981 at a cost of $83,000. The new printer increases the DOA-Data Center's printing capacity by 40 percent. In processing its request through the EDP acquisition review procedure of the DOA-Data Processing Division, the DOA-Data Center cited increased usage of the printers and excessive downtime of the older printers as justification for the new printer. However, the increased utilization cited involved a comparison of two time periods. One period was before the Center corrected its billing system to record and charge for the batch jobs printed on the large printer. The second period measured utilization after the correction was made. Thus, some of the apparent increased usage was only a result of recording printing that was already occurring.

Buying a new printer to replace old equipment may have some justification. However, buying a new printer because of increased utilization was not properly justified for two reasons:

1. A significant amount of unnecessary printing is occurring; and (page 32)

2. Some of the increased usage cited by the Center can be explained by the fact the Center started recording and charging for printing for which it had not previously been charging. (page 34)

CONCLUSION

The DOA-Data Center does not adequately monitor printer usage. As a result, unnecessary use of the printing process by user agencies and by Center personnel occurs.

Two errors in the DOA-Data Center billing system caused DOA-Data Center to undercharge users for printing by approximately $300,000. Further, a DOA-Data Center evaluation of the printing process failed to detect these billing errors. Finally, the DOA-Data Center's purchase of an additional printer was not properly justified given: 1) the unnecessary printing that is occurring, and 2) the fact that an apparent increase in utilization of the printers may be largely due to the correction of billing system errors which had resulted in users not being charged for all printing and printing utilization to be under-reported.

RECOMMENDATIONS

Consideration should be given to the following recommendations:

1. The DOA-Data Center monitor program dumps to determine what action should be taken to reduce their frequency.

2. The DOA-Data Center evaluate in-house printing and eliminate all unnecessary use of the printing resource.

3. The DOA-Data Center revamp the billing system to ensure that users are charged correctly and to ensure accurate information for management purposes.

OTHER PERTINENT INFORMATION

CONSULTANT OBSERVATIONS

The Office of the Auditor General employed the consulting services of Performance Management Associates, Incorporated to assist audit staff in analyzing the productivity and costs of the DOA-Data Center's work centers. The results of the analyses combined with the consultants' observations were used to rank order areas for audit work based on the potential for increased efficiency and/or potential cost savings. The most important areas are shown as Finding I (page 9), Finding II (page 21) and Finding III (page 31).

In addition, the consultants made other observations and recommendations for improvements in the operation of the DOA-Data Center. These observations included:

1. The Center's use of a chargeback cost-recovery system which provides negative incentives for efficiency as opposed to a cost-accounting cost recovery system which provides positive incentives.

2. The need for the Center to widen its staff's exposure to training in additional management techniques.

3. Possible improvements in the handling of computer tapes.

These observations are presented in greater detail:

COST-RECOVERY FOR DP SERVICES

Cost Accounting vs Chargeback*

Controlling the performance of a DP center includes relating the costs and prices for services to the use of resources. The costs of services within a government agency or corporation must be related to pricing of services and effecting cost-recovery. A recommended way to set up a method for planning for resources, assuring their performance levels, and controlling revenues is to use basic cost accounting analysis for DP resources. Another method, called chargeback, is also used to recover costs. This method is more directly related to machine utilization rather than considering all other resources as personnel or support activities.

Cost Accounting

Cost accounting is a disciplined way to account for all the resources in a DP center and measure their uses to produce work and services. The capacity for each resource is derived and related to the amount used for productive work. Time is often the unit of measure used, but counts of other units are used for machine resources.

Resource types include personnel, machine, software, communications and support services. Work centers are a grouping of resources performing similar functions so that there is a single unit of measure for its resources.

Within each work center there is a listing of job tasks or work functions which relate to the utilization of its resources. For example, setting up a production job involves tasks as manual log in, prepare JCL card, get tapes from library, delivery to operations. Each task is measurable in terms of the number of minutes or hours it takes. In the case of a machine resource like a CPU, measuring its use would be in terms of CPU hours.

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* Auditor General Note:
The DOA-Data Center utilizes the chargeback system of cost recovery.

The cost budget for the DP center is broken down into an individual budget for each work center. In this way costs for resources by month are directly related to where the work is actually performed. Costs are categorized into fixed and variable. Fixed costs are basic costs which are independent of the workload volume. Variable costs are those which fluctuate based on a change in workload volume.

This method includes the identification of work which comes in for processing. It is defined as batch jobs, time spent at a terminal, administrative projects, or special user services. Items off of a workplan for DP are related to an amount of resource use as hours or counts of units of measure.

The workload volume relates to the use of an amount of capacity for a work center. The remaining capacity is for nonproductive activities. A standard cost for each unit of measure is derived and used to develop standard costs for using each work center.

The cost for processing work in each work center is known and a billing method set up. Prices can be set to effect a profit for the DP center and control user behavior in using services. The result is unit-of-work costing which is applicable to both government and commerical environments.

Chargeback

In a chargeback billing system the emphasis is placed upon the use of machine resources. Other resources as people, support functions and customer services are allocated across the machine resources. These overhead accounts tend to prevent the visibility over the resources involved which would provide better performance and control.

Machine resources are separated into working groups, called cost centers. A unit of measure is derived for measuring the use of the resource. In this way it is like cost accounting.

On a user's bill the types of units used to show charges are usually in machine terms or a listing of the equipment used to process work. This can be difficult for the user or non-DP manager to understand. The translation process which results over understanding the bill takes considerable attention. The result is that the use of all resources and their costs does not get communicated clearly.

Inequities in the billing can result. Since overhead charges are included in user bills, a user who only uses machine resources will have other costs included in his bill.* This will not accurately reflect the services he received.

In order to effect full cost-recovery and revenue incentives, a pricing scheme is developed based on costs. The pricing issue adds another computational layer which must be taken into consideration. The user sees the prices rather than the true costs and he cannot relate prices to resources used.

Further Observations

Full chargeback of all DP costs provides negative motivations to all parties involved in the process. For example, under chargeback if a user wants to decrease his bill, he would normally make it perform more efficiently by changing the program, the number of reports received, or the way it uses resources. For a time, he might get a lower bill. The DP manager, however, notices that there's less money being collected from that user, and from all users in general if they all take this approach. He is then forced by chargeback policies to raise his rates until costs are recovered. The result is that a user who intends to become more efficient winds up with what could become the same size bill, or that other users pay an increased price because one user becomes more efficient. (Emphasis added)

* Auditor General Note:
An example of such a user at the DOA-Data Center is the State Compensation Fund.

From the DP managers viewpoint, if he has excess capacity, has not bought supplies wisely, and they cost more than expected, has a very high incidence of reruns and has to work his shop overtime to deliver the work, he can raise the rates to recover those added expenses. These are items which in many views would be described as poor management. Chargeback helps conceal poor management, and removes the incentives to become more efficient. Motivations in full chargeback of all DP costs are all negative. (Emphasis added)

An argument is usually made in favor of chargeback as a control on user behavior. By making daytime processing more expensive, for example, the users will choose to process at night, thereby relieving a peak loading problem during the day. The degree to which chargeback accomplishes this is inversely related to the degree of integration of DP into the day-to-day affairs of a business. Automatic teller machines, for example are highly integrated into banking, and are totally insensitive to charges for use, since the users want to make deposits or withdraw money at times convenient to them. A service bureau, delivering DP services to the general public, notices that prime time charges do indeed have an effect, but those services are usually not an integral part of a firm's business. Chargeback can be viewed as having little real effect on user behavior.

An alternative to chargeback is to use direct costing methods. First, measurement and cost accounting methods are used together to detemine the excess capacity needed to maintain service level delivery, and the cost of that excess capacity. It is possible that DP could transfer that amount as overhead back to the corporation as a whole. In effect, the corporation "eats" the excess capacity that they have chosen to put in place in order to maintain service levels. Then, a direct measurement is made as to the amount of people and hardware resources used by work and a bill is sent out on that amount.

The DP manager then must manage the resource to account for any variances. If users become more efficient, they get a lower bill, and DP shows up with an underrecovery. The manager of DP must then either get additional work to create more billings, or must trim expenses or reduce the amount of resource available. If the DP shop becomes more efficient, all users can benefit through reduced costs.

With direct cost charging, motivations are all in the positive directions. (Emphasis added)

WIDENING STAFF EXPOSURE TO ADDITIONAL MANAGEMENT TECHNIQUES

During audit interviews, we noticed that data center personnel were not routinely exposed to education other than that done internally, or that provided by the vendor.

If data center personnel routinely attended seminars and technical society meetings other than those sponsored by the vendor, useful techniques of installation management could be brought back for use. Some of these techniques can improve productivity and save money.

One obvious technique involves the way in which programs are developed. Currently, the data center personnel prepare and submit programs using on-line terminal facilities. Once submitted, the programs are processed and printed in the data center, and the output returned to the programmers. Often, the programmers watch the progress of their jobs using an on-line terminal, tying up that terminal and blocking use by someone else. Further, the print volume generated by this approach can be significant, and the time delays introduced can measurably decrease the speed at which programming projects are completed.

It is common practice in the industry to prepare and submit programs using an on-line facility. When the programs are submitted, however, the resulting output is placed in a disk file, rather than printed. The programmer can then review the results without ever printing the program output, and without delays introduced by delivery of bulky printed material.

TAPE HANDLING PROCEDURES

A review of the tape library system should be made, looking toward increased automation of library functions including release of tapes and retention procedures.

Changes to job processing procedures should be considered to allow prefetching tapes for production and test or remote activities. Tapes should be fetched in quantity, placed on a cart in serial number order and brought to the machine room in batches of 50 or 100, rather than the existing groups of from one to ten or more.

Minicomputer devices are available which "read" computer consoles, intercept tape mount messages, and place the required information in large display lights over each tape drive. When processing is complete, status lights also specify the dispostion of the tape. Such a device can reduce mount time by eliminating console reading time, making the mount information visible from anywhere in the room. Errors in mounting and tape disposition are also reduced.

DEPARTMENT OF ADMINISTRATION
DATA CENTER

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BRUCE BABBITT, GOVERNOR
ROBERT B. TANGUY, DIRECTOR

December 28, 1981

Mr. Douglas R. Norton
Auditor General
111 West Monroe, Suite 600
Phoenix, Arizona 85003

Dear Mr. Norton:

You will find enclosed our written response to the performance audit of the Department of Administration Data Center. This response is based upon the modified draft report received December 24, 1981.

We appreciate the opportunity to comment on your report.

Respectfully submitted,

Ben Froehlich

Robert B. Tanguy

BF:ds

Attach.

RESPONSE OF THE D.O.A. DATA CENTER TO PERFORMANCE AUDIT CONDUCTED BY THE OFFICE OF THE AUDITOR GENERAL AS PART OF THE SUNSET REVIEW

The D.O.A. Data Center wishes to thank the Auditor General's staff for their efforts and courtesy in conducting this audit. The report generally reflects the discussion; however, there are several basic concepts that should be included.

FINDING I

With respect to Finding I recommendations, the following are Data Center comments:

1.a. Do not concur - The Data Center policy of not charging the user for preparation of the synopsis and evaluation phases, which include cost estimates, allows the Center to be more responsive and cost effective during that phase of project development. The user normally has no funds available to pay for the activity, and to wait until a budget request can be made and approved to pay for a proposal could add as much as a year to the process.

1.b. Concur - The Data Center Policy and Standards Manual has already been reviewed and is being rewritten.

1.c. Concur - The Data Center, as stated in the report, is aware of the significant amount of time spent in performing the coding function and has taken some steps to reduce the expenditure. Our programmers have been trained and are versed in the use of time-sharing. They presently do many things that do not result in hard copy printouts. When they are printed they are used to "desk check" the program logic rather than tie up computer time and space. There should be a happy medium between all printout and no printout.

1.d. Concur - DOADC has, and is using, techniques to reduce the coding effort. Some of these are libraries, structured programming, modular programming, and some structured design. As noted in your report, some of the techniques save little in preparation, but can be significant in the cost of later system modifications.

1.e. Concur - We are now developing a process of consolidating work plan information and actual cost that will provide us a better monitoring tool for projects. Changes to project development should, of course, be documented and we will strive to ensure that this is done routinely.

1.f. Concur - As indicated in Finding II discussion, the responsibility for project review will be in Quality Assurance; however, the user should remain the final authority for acceptance of the system.

FINDING II

Comments on recommendations for Finding II are as follows:

1. Concur - Informing the users of inefficient use of the computer is being done on an informal basis. This notification can be formally documented in the future. However, we believe that including the budget offices when a specific cost cannot be identified is not necessary.

2. Concur - The Data Center is in the process of including user plans in the Center long-range plan.

3. Concur - The current computer programs used for billing are being reviewed and it is anticipated they will be replaced.

4. Concur - Currently there are several procedures used by the Center for the resolution of problems. These include procedures for dealing with vendors, production processing, remote terminal equipment, and application programming. This information will be centralized for review.

FINDING III

Comments relative to the recommendations of Finding III are as follows:

1. Do not concur - Monitoring of program dumps initiated by remote users is not cost effective when considering the Center and user staff time required. It should also be noted that the program dump facility is a tool used to assist programmers in the correction of program errors and savings in printing cost of dumps may decrease programmer productivity.

2. Concur - There are some reports that can be put on microfiche instead of printing and this will be reviewed.

3. Concur - As stated in the comments of recommendation three of Finding II, the billing process is being reviewed.

With regard to the point that the printer installed in October 1981 was not justified, the following comment is submitted:

The acquisition request forwarded to the Data Processing Division on May 29, 1981 states that February, March, and April 1981 print volumes were compared to the same months of 1980; and that this comparison showed the printer hours used had increased by 92 percent and local lines printed had increased by 15 percent. The information used for this comparison was not the dollars, but rather actual print hours and number of print lines extracted from the accounting data. This information is extracted prior to the billing error that was found.