# MANAGEMENT AUDIT OF THE ELECTRONIC DATA PROCESSING SYSTEM OF THE STATE OF HAWAII

Conducted by
Deloitte Haskins & Sells

A Report to the Governor and the Legislature of the State of Hawaii

Submitted by the
Legislative Auditor of the State of Hawaii
Honolulu, Hawaii

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# FOREWORD

In the General Appropriations Act of 1985, the Hawaii State Legislature requested the Legislative Auditor to conduct a management audit of the statewide data processing system.

The act called for a preliminary report to the 1986 legislative session and a final report to the 1987 session. However, it was determined that it would be more economical to meet the requirements through a single, final report, and the report is being issued during the interim period between sessions to allow for sufficient time to consider the recommendations made.

From several firms submitting proposals, the firm of Deloitte Haskins & Sells was selected to conduct the audit. Deloitte Haskins & Sells was responsible for conducting the audit as well as preparing the final report while our office was responsible for the draft of the implementing legislation which appears in the appendix.

We join Deloitte Haskins & Sells in expressing our appreciation to the many individuals, in government as well as in the private sector, who cooperated in the audit. We extend our thanks especially to the State Director of Finance, the Director of the Electronic Data Processing Division, and the State Comptroller, and their respective staffs for their valuable assistance.

Clinton T. Tanimura
Legislative Auditor
State of Hawaii

August 1986

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# PART I

# INTRODUCTION AND BACKGROUND

# Chapter 1

# INTRODUCTION

This is a report on a management audit of the electronic data processing (EDP) system of the State of Hawaii. The audit has been conducted in fulfillment of a request from the Legislature pursuant to the General Appropriations Act of 1985, Section 195, Act 300, Session Laws of Hawaii 1985.

## Objectives of the Audit

The objectives of the audit were:

1. To evaluate the strategic planning, management control, and operational control processes of the EDP system to determine whether the processes are adequate, effective, and efficient.

2. To evaluate whether the EDP system has been meeting the requirements of user agencies in a timely and efficient way.

3. To identify the reasons for any shortcomings in the EDP system, and if appropriate, to recommend changes to the system's organization, management, policies, and practices.

## Scope of the Audit

The focus of the audit was the Electronic Data Processing Division of the Department of Budget and Finance (B&F). However, it was necessary to examine EDP operations in the other departments and to determine the extent to which user agency requirements are being satisfied by the EDP system.

The audit also examined, evaluated, and ascertained whether a part or all of the EDP functions currently being performed by B&F for the major users of EDP services should be more appropriately assumed by such major users.

## Organization of the Report

This report is divided into four major parts as follows:

Part I (Chapters 1 and 2) includes this introduction and background on the State's EDP system.

Part II (Chapters 3 and 4) provides a summary of current EDP management trends and describes a model process for managing EDP in state government. The trends and model process provide a context for examining the management of the State's EDP system.

Part III (Chapters 5 through 9) includes our assessment of the State's EDP system. It presents our findings and recommendations in five major areas:

- User satisfaction,
- Organization,
- EDP planning,
- Management controls, and
- Operational controls.

Part IV contains the responses of the Department of Budget and Finance and the Department of Accounting and General Services to our recommendations, together with our comments.

The report also includes an appendix which contains a draft of suggested legislation to implement the major recommendations of the report.

# Chapter 2

# BACKGROUND

## Development of Data Processing in Hawaii's State Government

The State's current electronic data processing (EDP) system has evolved over time in response to a changing environment affected by steadily growing information needs and rapidly increasing technological capabilities. The following paragraphs provide a historical perspective on the evolution of EDP in Hawaii's state government. This perspective is helpful in evaluating the State's current EDP organization and management practices.

**Early automation.** Business-oriented data processing began to gain widespread acceptance in the early 1960s. The banking industry was a notable leader in utilizing EDP systems. Soon, government entities, particularly at the federal and state level, realized that an information revolution was upon them. Because information storage, retrieval, and dissemination were primary activities of almost all government organizations, the use of computing equipment was quickly accepted as a valuable tool.

A number of state agencies in Hawaii soon developed EDP applications. In 1962, responding to concern regarding the duplication of EDP systems, the Legislature passed Act 31, calling on the Department of Budget and Finance (B&F) to conduct a study of EDP statewide and to develop a comprehensive and integrated plan for the State's EDP system.

**Centralization.** As a result of the study, Governor John A. Burns issued Administrative Directive 6, establishing policy and a management structure for EDP administration.

Administrative Directive 6 established the position of Director, Statewide Data Processing System, within the Governor's office, and it assigned systems analysts to work under the director. This new organization was to coordinate and integrate data processing activities for the entire state government.

Soon, three computer centers—one at the Department of Accounting and General Services, one at the Department of Education, and one at the Department of Labor and Industrial Relations—were established. Each of these centers served a number of state agencies. At the same time, computer task forces were set up for each center, providing advice to the director on policies, procedures, and priorities for that center.

**Statewide information system.** As the use of computer technology increased, the state administration discovered that growth required adjustments in policy and organizational structure. In order to maintain an effective administration and enhance the use and value of the resource, the Statewide Information System (SWIS) was created in 1965. This agency was assigned to the Department of Budget and Finance, although its directorship remained within the Governor's office.

Five years later, in 1970, B&F assumed complete administrative control of SWIS. As a result, the entire EDP function was placed under the direct supervision of the Director of Finance.

Also in 1970, B&F developed a plan for SWIS. Completed in 1971, the plan resulted in another reorganization, this time turning SWIS into a division within the Department of Budget and Finance. It was then that its name was changed to

Electronic Data Processing Division (EDPD). The plan also recommended that the departments be responsible for developing, implementing, and modifying their own systems.

**Consolidation.** During the 1970s, the main focus of the computer industry was the development of larger and faster mainframe computers. In order to obtain the economies of scale that the new, high-capacity computers presented, consolidation became the trend throughout the industry. The State followed this trend. From 1972 to 1976, the State consolidated its three computer centers into a single computer facility under the administration and control of the Department of Budget and Finance.

Between 1975 and 1977, several groups—Systems Consultants, Inc., the State's Ad Hoc Commission on Operations, Reviews and Expenditures, and the Commission on Organization of Government—reviewed and discussed the organization of the State's EDP system.

The major theme of these discussions is summed up in the February 1977 Commission on Organization of Government Report to the Ninth State Legislature. The Report states:

> "Given a broad definition of information systems, user agencies must be in a position to decide their own information systems needs and to be held accountable for satisfying them. A structure should be designed to meet user needs in a cost-effective manner. The user agency must be allowed to specify its needs and to design, or to control the design of, the system(s) for meeting those needs. It follows, then, that the user must have available professional and technical support plus specialized information processing services, which could include telecommunications and micrographics as well as computerization. The EDP central control function should determine the most cost-effective manner in which the support and services required can be met."[1]

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1. Hawaii, Commission on Organization of Government, *Report to the Ninth State Legislature,* February 1977, p. 63.

Among the Commission's recommendations regarding EDP were the creation of a Management Information System (MIS) development unit as a staff group in each of the new consolidated departments of the reorganization proposal and the division of EDPD into two major units: MIS Development and EDP Resources. MIS Development would define and manage relationships between itself, the departmental MIS development units, and EDP Resources. It would be responsible for developing common systems, assuring new hardware and software development, and defining approval procedures for purchase of hardware and software by user agencies. The intent would be to assure compatible and economic software decisions and to eliminate design duplications.

EDP Resources would include a large computer center and its operations staff, programmers, data entry personnel, and training resources. Control facilities would also be set up so that these services could be sold to the user departments according to a transfer pricing schedule.

**Administrative Directive 1977-2.** In anticipation of the ever-increasing importance that the data processing function would have during the 1980s, Governor George R. Ariyoshi issued Administrative Directive 1977-2 (AD77-2).

This directive formalized the state administration's data processing policy and clarified the EDP responsibilities of the Director of Finance and user department heads. The most significant issues addressed by AD77-2 were:

- Recognition of the concept of distributed processing, or the installation of a number of smaller computers connected to a centrally located large mainframe computer, as a viable means of optimizing the State's use of its data processing resources.

- Reaffirmation of centralized control and coordination of the State's various data processing resources.
- Recognition of the need for an organized planning function.
- Recognition that the various departments using the services and resources provided by EDPD of the Department of Budget and Finance have a set of responsibilities that are complementary to the specific duties and responsibilities assigned to the Director of Finance.

The consistent theme of AD77-2 is central control of a distributed processing environment:

> "This concept embraces a large central computer facility and data base accessed by minicomputers connected to the central facility by communication lines. The minicomputers will be remotely located in centralized areas to give departments distributed processing capability backed up by the computing power, speed and data-handling capabilities of the central facility."

Under AD77-2, the Director of the Department of Budget and Finance has responsibility for developing, maintaining, operating, and controlling the central computer facility and departmental EDP activities, and for "providing technical leadership in the field of data processing, mechanization and computer use." The text of AD77-2 states:

> "The Director of Finance is charged with the authority and responsibility for:
>
> a. Functional control in the acquisition of hardware and software.
>
> b. Operational control of EDP hardware and software.
>
> c. Contracting services for EDP related activities.
>
> d. Establishing EDP positions and augmenting staff capability.
>
> e. Preparing a data processing plan for each budget biennium.
>
> f. Entering into cost sharing agreements with other establishments of State Government."

Within the general areas above, AD77-2 also contains a list of 14 more detailed specific duties for which the Director of Finance is responsible. These are:

"1. Develop, update and distribute procedures that will be followed in complying with the policies of this Administrative Directive and will include but not be limited to the forms that are to be used, formats to be followed, necessary instructions, and where applicable, flow charts to describe the procedure.

2. Advise the Governor and user agency managers on appropriate data processing activities affecting the State.

3. Exercise control over data processing activities in the State of Hawaii to the extent prescribed in this directive.

4. Plan, manage and coordinate (at the State level) a productive and efficient EDP capability.

5. Plan for the State's central EDP hardware and software acquisition.

6. Establish statewide data processing standards, guidelines and conventions that will assure uniformity and compatibility of EDP systems under its control.

7. Provide the technical leadership and assist all State agencies in applying EDP techniques, concepts and methods in development of computer-assisted application systems.

8. Maintain a comprehensive statewide EDP training program for the State's data processing staff as well as other involved technical and managerial personnel.

9. Provide specific application systems development and maintenance support to other State agencies, when such capability does not exist within those agencies.

10. Provide common application systems development and maintenance support to the agency with prime responsibility for the system.

11. Provide computer operations services to user agencies.

12. Maintain a data base management system for efficient organization and utilization of the State's multiple data files.

13. Enter into a cost sharing agreement with other State agencies to provide EDP related services.

14. Compile each agency's biennium data processing plan into a statewide EDP plan."

The responsibilities given to the user department heads complement those of the Director of Finance. Specifically, the responsibilities assigned to the department directors are:

"1. To appoint a data processing coordinator to coordinate all departmental EDP activities and serve as department liaison to the EDP Division, Department of Budget and Finance.

2. To plan and budget for their own departmental data processing requirements--specifically:

   a. EDP positions;

   b. Off-line equipment; and

   c. Teleprocessing devices (including controllers, modems and communication lines).

3. To provide the Director of Finance with a data processing plan for each budget biennium.

4. To provide the Director of Finance with an EDP progress report for the preceding budget biennium.

5. To undertake the initial systems requirements documentation for all application systems to be computerized.

6. To present a written request to the EDP Division for all data processing services desired on the official approved form provided for this purpose.

7. To establish departmental priorities for application systems development.

8. To undertake the design, development and maintenance of specifically departmental systems when such capability exists within the department.

9. To provide the Director of Finance with written approval authorizing the Electronic Data Processing Division to release computer files to another agency."

The implementation of this directive has resulted in an essentially centralized structure in which the Electronic Data Processing Division of the Department of Budget and Finance operates and maintains a central computer facility. Essentially

all of the agencies and departments use the systems development, computer processing, or other services provided by EDPD.

The data processing capabilities within the agencies and departments vary widely. Some agencies and departments have no data processing capabilities of their own. Others have limited EDP personnel and/or computer capabilities. And still others have reasonably sophisticated stand–alone systems.

### Governor's EDP Advisory Committee

In April 1978, the Governor issued a memorandum, establishing the Governor's EDP Advisory Committee. The members of the committee are from the Department of Budget and Finance, Department of Accounting and General Services, and the Governor's office. Supported by staff from EDPD, the committee meets quarterly and establishes statewide priorities for the development of computer–assisted information systems.

### Electronic Data Processing Division

In general, EDPD serves as the State's central data processing resource. The services provided to the departments and agencies of the State include:

- Systems analysis and design for new applications and for modifications to existing systems;
- Programming and implementation of new applications, as well as maintenance of systems already in production status;
- Scheduled processing of production systems; and
- Support of a data communications network which allows users to connect terminals, minicomputers, and microprocessors to the central facility.

**Organization.** In order to carry out these functions, EDPD is composed of the following four branches:

- Administrative and Technical Services Branch,
- Application Systems Development Services Branch,
- Computer Systems Services Branch, and
- Computer Operations Services Branch.

In addition, there are two staff organization segments:

- Special Project Staff, and
- Secretarial and Clerical Staff.

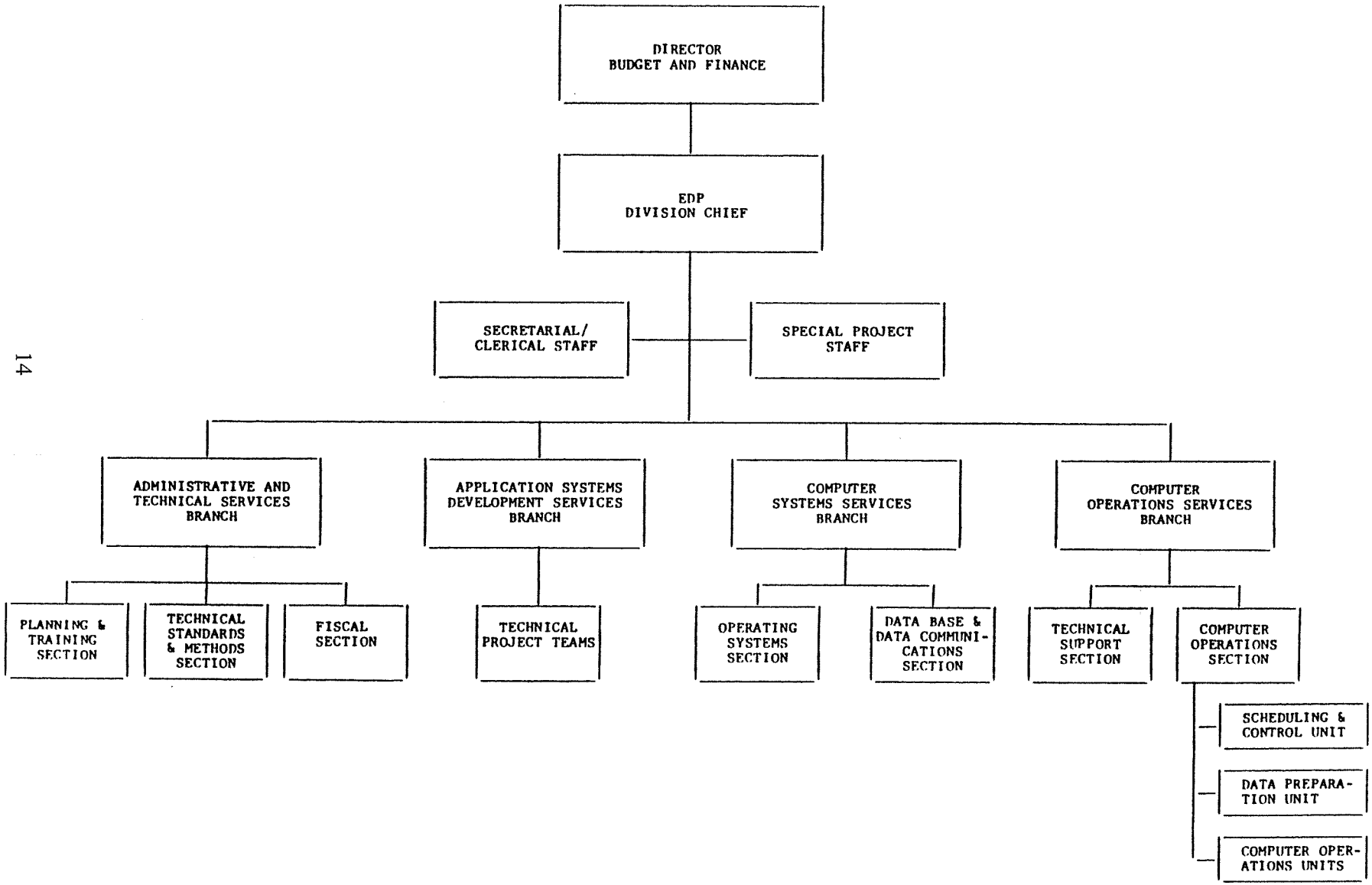
The organization chart (Exhibit 2–1) shows the relationships between the major sections and units within EDPD.

**Branch responsibilities.** Within the general duties and responsibilities of EDPD, the specific responsibilities of the four branches are:

- **Administrative and Technical Services Branch**
  - Develop statewide policies, procedures, standards, and conventions;
  - Develop procedures for the management and control of EDPD projects and monitor the progress and performance on major projects;
  - Develop and provide leadership in the implementation of long range EDP plans;
  - Prepare the EDPD budget;
  - Plan and administer the statewide EDP training program; and
  - Prepare and administer data processing contracts.
- **Application Systems Development Services Branch**
  - Assist departments in developing technical skills necessary to enable the departments to do their own application development;

Exhibit 2–1

Department of Budget and Finance
Electronic Data Processing Division
Organization Chart



— Assist departments in the design, development, implementation, and maintenance of application systems; and

— Plan and coordinate development projects to ensure that system design is compatible with the processing environment and that the system meets documentation standards.

- Computer Systems Services Branch

  — Install and maintain systems control programs and generalized utility software;

  — Provide job accounting, performance measurement, capacity measurement, and capacity planning services for the division;

  — Develop and implement plans necessary for the security of system software, application software and data, and telecommunications;

  — Develop plans and procedures for disaster recovery;

  — Participate in the review of hardware acquisition requests; and

  — Monitor state contracts for hardware and software.

- Computer Operations Services Branch

  — Manage, coordinate, and operate all computer equipment and related auxiliary services;

  — Monitor the performance and reliability of the data communications network;

  — Prepare and maintain production schedules for data processing operations; and

  — Schedule and coordinate additions, deletions and changes to the system, either hardware or software.

**Staffing.** EDPD is authorized a total of 237 positions. The positions are: managers, 16; analysts, 44; programmers, 36; computer operators, 33; key data entry operators, 72; and clerical and others, 36.

**Central site computer equipment.** Data processing services for user departments and agencies are provided by EDPD on the following four computers: IBM 3081 Model D, IBM 3083 Model E, IBM 4341 Model Group II, and Wang VS 100.

A variety of peripheral devices such as printers, tape drives, disk storage units, communications controllers, and a number of terminals accompany all four machines.

## User Departments and Agencies

EDPD provides data processing services to all three branches of the state government: executive, legislative, and judiciary. The executive branch—which includes the Office of the Governor, the Office of the Lieutenant Governor, the 17 departments, and a few small agencies—makes up the primary user community. In addition, the Legislative Reference Bureau and the Judiciary make use of EDPD services.

**Staffing.** Only a few of the larger departments have data processing staffs large enough to undertake systems development efforts of any scale. The majority of the departments make use of a small number of data processing personnel and depend heavily on EDPD for assistance in all aspects of data processing.

**Computer equipment.** The quantity and variety of data processing equipment installed in the departments have increased rapidly over the past several years. Although some of the departments have taken advantage of computer capabilities only for word processing, others have substantial applications running on minicomputers.

The biggest recent advance in technology is the widespread installation of microcomputers. Many of these desk-size computers are currently used for word processing tasks, but as departmental personnel become more familiar with the machines, additional applications will be developed and used.

Some applications, because of their size, their complexity, or both, require the far greater computing power of a central mainframe computer. The personnel responsible for such applications access programs and data through the use of terminals located in their departments and connected to a mainframe computer by means of the data communications network supported by EDPD.

Exhibit 2-2 shows the distribution of computer equipment in the departments. Use of stand-alone minicomputers has increased. Some of the minicomputers are used almost exclusively for word processing, while others are used to support fairly sophisticated data processing applications. The use of microcomputers, and terminals connected to the EDPD computers, is also indicated for each department. As shown, nearly all the departments now use microcomputers and many have on-line access to data stored on the State's central computers.

Exhibit 2–2

Distribution of Computer Equipment in Departments

| Department | Type of Minicomputers | Micro-computers | Terminals |
|---|---|---|---|
| Accounting and General Services | DEC 11/23<br>IBM S/36 | X | X |
| Agriculture | Wang 2200 | X | |
| Attorney General | Wang VS | X | X |
| Budget and Finance, not including EDPD | | X | X |
| Commerce and Consumer Affairs | | X | X |
| Defense | | X | |
| Education | DEC 11/780<br>IBM S/36 | X | X |
| Hawaiian Home Lands | Wang VS | | |
| Health | DEC 11/34<br>BASIC 4<br>Wang VS | X | |
| Labor and Industrial Relations | Wang VS | X | X |
| Land and Natural Resources | Wang VS | X | |
| Lieutenant Governor | | X | X |
| Transportation | DEC 11/40<br>IBM S/36 | X | X |
| Office of Hawaiian Affairs | Wang VS | X | |
| Taxation | | X | X |
| Personnel Services | | X | X |
| Planning and Economic Development | Wang VS | | X |
| Social Services and Housing | IBM S/36 | X | X |

# PART II

# A FRAMEWORK FOR MANAGING THE ELECTRONIC DATA PROCESSING SYSTEM IN STATE GOVERNMENT

# Chapter 3

# CURRENT TRENDS

Historically, both the private and public sector data processing environments have been highly centralized. However, many organizations have decentralized the systems analysis and programming functions in the last several years. More recently, many are moving toward distributed data processing. With the advent of minicomputers and microcomputers, computer equipment and processing have been moved to individual business or program service units. Some remote computers have been installed as stand–alone systems, but an increasing number are being connected to the central computer facilities in distributed processing configurations.

While the operational functions of data processing are being distributed, the corresponding control functions are being decentralized. Where central organizations formerly exercised tight functional control over electronic data processing (EDP) in private companies and government agencies, many of these organizations now provide only central coordination and advisory services. Their missions are to advise and counsel executive management regarding EDP systems, coordinate the use of EDP systems, offer consultation on technical services, and research and promote the use of emerging technology. They also provide central computer utility services.

## Innovation and Entrepreneurship

A trend in both the private and public sectors is increasing emphasis on innovation and entrepreneurship. *In Search of Excellence* and *Passion for*

*Excellence,* best selling books which explore this trend, show that some of America's most successful, large organizations have many traits in common such as:

- A bias for action;
- Autonomy and entrepreneurship; and
- Simultaneous loose–tight properties.

A recent issue of *The Consultant* contains several interviews with management specialists on the subject of innovation and entrepreneurship. In one of the interviews, entitled, "Innovation and Entrepreneurship as a Systematic Practice," Peter Drucker discusses his new book *Innovation and Entrepreneurship: Practices and Principles.* In the interview, Drucker indicates:

> "The practice of entrepreneurship applies equally to existing businesses, to new ventures, and to public service institutions. And contrary to conventional wisdom, it is the large existing organization—the one with $500 million or more of sales—that has the best chance of behaving in entrepreneurial or innovative ways. . . .Successful innovation must be decentralized, ad hoc, autonomous, specific and micro–economic. Of course, it must be purposeful and managed."[1]

In another interview in the same issue of *The Consultant* entitled "Technological Change – A Threat or an Opportunity?" Dr. Rosabeth Moss Kanter cites five characteristics of high innovation companies:

- Broad job assignments,
- High degree of decentralization,
- A culture of pride,
- Access to information, and
- Availability of resources for experimentation.

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1. *The Consultant,* Digital Equipment Corporation, May/June 1985.

These books and articles indicate that many successful, large organizations have decentralized many of their operations, and they have encouraged a spirit of innovation and entrepreneurship.

Small organizational units are given autonomy, and they are held accountable for their results. Yet the individual units are held tightly to certain organizationwide values and policies.

**Decentralized and Distributed Data Processing**

The trend toward decentralized and distributed data processing was recognized in professional literature several years ago. For example, in 1982 three articles described the need to develop strategies and plans for decentralizing and distributing certain data processing responsibilities and controls.

In the first article in *MIS Quarterly* entitled "Information Technology in the 1990s: A Long Range Planning Scenario," Robert Benjamin predicts the nature of information technology in the 1990s based on a model used at Xerox. Benjamin draws several conclusions that he indicates appear to be applicable to large organizations:

> "There will be a significant movement of processing, database, and application development to distributed organization levels. . . .To accommodate this without losing control there will have to be greater emphasis on centralized control of IS (Information Systems) policy and standards, technical and functional architectures, and network management.
>
> "The combination of office/end user systems will substantially increase IS spending as a percent of revenue.
>
> "The rapid increase in computers . . . devoted to end user computing will cause IS management to develop policy and control mechanisms for the demand for its services, rather than the traditional policy and controls which have been concerned with managing the supply of computing services.

"The primary added value of centralized IS utility services will be in providing interconnectability to the organization.

"Organizational frameworks will have to be developed to encourage the development of applications that provide the necessary integration across the business functions."[2]

In the second article in the *Harvard Business Review* entitled "Managing Information Systems by Committee," Richard Nolan states:

"Continued growth of centralized DP activities has resulted in services of such size and diversity that companies are losing opportunities for cost-effective use. Managers naturally respond to this type of complexity by breaking the organization into smaller pieces and decentralizing. The heart of the issue is when and how to decentralize, not whether to do so.

"Expansion of uses of computers in business and the essential role of users in defining new applications have increased the pressure to decentralize responsibility and control."[3]

In the third article in *Harvard Business Review* entitled "An Unmanaged Computer System Can Stop You Dead," Brandt Allen indicates that senior management should be concerned about establishing a strategy for managing EDP resources. He differentiates between distributing EDP resources and distributing the control over those resources. According to Allen:

"The first strategic planning question for information resources is how the system should be organized.

"Almost all organizations must now decentralize more of the responsibility for information systems than they had to in the past. The pervasiveness of computers and their related technologies has made simple organizational solutions impractical. Few central computer

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2. Benjamin, Robert I. "Information Technology in the 1990s: Long Range Planning Scenario," *MIS Quarterly,* Society for Information Management, June 1982.

3. Nolan, Richard L. "Managing Information Systems by Committee," *Harvard Business Review,* Harvard University, July-August 1982.

groups can manage all this technology effectively in a large or even medium-sized business. Even companies that have decentralized computing to a division or group level find that they must go still further. End-user facilities, decision support systems, information centers, and many of the new nonprocedural programming systems all require more decisions by users. Yet many of these newer technologies depend on data bases and other centrally managed technology, such as networking, for their effectiveness.

"Furthermore, the projected shortage of employees with MIS skills, the growing applications backlogs, and the upcoming systems rewrites make a reassessment of organizational strategy essential. Many companies will be reorganizing their resources for central applications development and systems programming to concentrate on matters of strategic importance. Usually these will be corporatewide telecommunications networks, data bases, a limited number of truly corporate applications, and end-user facilities to be provided to division and corporate-level departments.

"At the same time, most companies will further decentralize the responsibility for most of their applications design and programming or acquisitions as well as most of their computing resources.

"The second element of computer strategy is control. Top executives must establish who will control which aspects of information resources, how control will be effected, and how and by whom performance will be assessed. Chief issues include:

- Who plans and approves applications and sets priorities according to what criteria.
- Who selects and approves new technology, and on what basis.
- How budgets are set and who determines spending levels and constraints.
- How outside sourcing decisions (and all make or buy decisions) are made and by whom.
- Where and how costs are collected and charges are rendered.
- What financial controls are used for the data centers and development groups.
- How performance is measured.

- Who sets corporatewide standards and policies, and how they will be enforced.

- What the role of computer auditing is and how it is to be used."[4]

Allen goes on to indicate that there are several options for addressing these control issues, including combinations of centralized, bureaucratic, and decentralized approaches. He indicates that the options must be selected consistently. For example, "decentralized control over applications, budgets, and priority setting works best when the information services function has budget flexibility, is run more like a profit center than a cost center, and has an advanced pricing-oriented charge-out system."

Later articles have continued to focus on the trend toward decentralized and distributed data processing. The articles indicate that by decentralizing, organizational units gain greater control over their own EDP resources.

For example, in a 1983 issue of *The Office,* David Didising indicates in his article entitled "Distributed Data Processing is Well Worth the Experiment" that:

> "The several advantages of distributed processing are compelling: quick, convenient access to data, the ability to center events and their control near those most able to deal with them, and the sense of field operations being able to shape and mold much of their affairs without being subject to other priorities."[5]

A year later, in another article in *The Office,* Didising makes "The Case for Decentralized Control of Data Processing." He states:

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4. Allen, Brandt. "An Unmanaged Computer System Can Stop You Dead," *Harvard Business Review,* Harvard University, November-December 1982.

5. Didising, David. "Distributed Data Processing is Well Worth the Experiment," *The Office,* September 1983.

"When corporate headquarters controls data processing, that very control can become a threat to the future growth of a company. The reason is that, unless the central data processing facilities are allowed to actually provide a high level of service and support, the organization becomes vulnerable to limited conditions."[6]

Finally, in an article in a 1984 issue of the *ABA Banking Journal,* Herbert Halbrecht discusses the results of his informal contacts with the 50 largest banks in North America. While Halbrecht indicates that "banks choose centralization or decentralization more as a result of management styles and corporate cultures than because of any supposedly more rational processes," he goes on to describe a trend in the banking industry:

"The basic industry trend will soon lead to much more involvement by the end users in data processing decisions as the users get more systems people in their organizations . . . the trend toward decentralization of information resources will continue to accelerate as end users become more comfortable with and more willing to manage technology.

"Minis and micros will most definitely be decentralized and systems staff members are also likely to be decentralized and dedicated to business units. Some central information systems organization will remain to handle interdivisional systems, networks, and database management.

"New products coming down the pike are so impressive, providing tremendous software and hardware capabilities to do one's own analyses, that departmental or functional centers will eventually serve individual strategic business units. At the same time, this will leave the corporate central group to do operations systems and the transaction work without having functional users impatiently waiting to get access to mainframes for their analytical work . . . these new products will make for much less dependency on central information departments, with users having much more freedom to 'do their own thing.'

"As more of the technologically literate assume greater responsibilities within the user functional areas, there will be increased pressure for these functional users to 'own their own resources.'"[7]

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6. Didising, David. "The Case for Decentralized Control of Data Processing," *The Office,* September 1984.

7. Halbrecht, Herbert Z. "Is There a Best Way to Deliver Data Services?," *ABA Banking Journal,* October 1984.

## The Changing Role of the Electronic Data Processing Manager

As indicated in the previous section, major changes are taking place in the organization of EDP resources. The trend toward decentralizing and distributing responsibilities and control of data processing is causing a change in the role of the EDP manager. As indicated by John Kirkley in an editorial in a 1983 edition of *Datamation:*

> "A new DP direction seems to be emerging. We are witnessing the convergence of office automation, telecommunications, and the data processing function while at the same time, fourth generation languages, personal computers, and local area networks are dispersing computer power out to the user community . . . this simultaneous contraction and expansion is ushering in an entirely new era in corporate computing and a major restructuring of MIS (Management Information Systems) . . . there is no set pattern for the new roles MIS will perform. Each enterprise is different, and each DP manager and MIS director must negotiate his own relationship with his users and his management."[8]

A survey was recently conducted to test the hypotheses and predictions of several information systems researchers and practitioners relative to the changing role of corporate information systems (IS) officers. A September 1985 article in *MIS Quarterly* reports on the results of this survey of chief information officers (CIOs) of 20 large corporations and government organizations. As stated in the article:

> "Nolan[9] has suggested that Information Systems (IS) is currently in a period of 'technological discontinuity' as it makes the transition from a traditional DP technology (characterized by mainframe computers and common software under the control of a centralized data processing organization) to a user-dominated technology.

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8. Kirkley, John L. "Editorial," *Datamation,* April 1983.

9. Nolan, R. L. *Managing the Advanced Stages: Key Research Issue,* to be published as part of 75th Anniversary Colloquium papers; Harvard Business School, Cambridge, Massachusetts, July 1983.

"Rockart, Bullen, and Ball[10] emphasize this evolving staff orientation for IS management – in particular for the CIO. Drawing upon the combined thinking of a group of successful CIOs and established researchers in the field, they theorized about the evolving CIO role. . . .More specifically, they make three 'predictions' regarding this emerging role:

1. Decentralization of line responsibilities to divisions and departments—The new management environment will make it impossible for the CIO to maintain direct line management control over computer-based technology throughout the company. Accordingly, 'line management of local hardware and much of the software development will be thrust into divisions and departments.'

Nonetheless, the CIO will necessarily retain direct, line responsibility for several critical areas associated with the information infrastructure of the firm. These areas will include the communications network, corporate data management, common software development (including a changing array of start-up projects), and the corporate computing facility.

2. Staff orientation—The new emphasis on staff-oriented responsibilities will result in the need for organizations to have a focal point for planning and facilitating the organization's move into the information era (or, in Nolan's terminology, into the advanced stages of user-dominated technologies).

The CIO will increasingly focus on strategies and planning. He/she will be oriented towards facilitating, guiding, and promoting change—but will not control it. Techniques utilized by the CIO to guide, facilitate, and promote will include: communication and education processes, standards (e.g., for data, communication, privacy and security), and other indirect controls (e.g., steering committees, policies, and guidelines, and individual persuasion). Rather than being the 'owner' of a centralized IS technology, the CIO will become the 'gate keeper' and 'integrator' of an increasingly diverse spectrum of technological resources which will be decentralized throughout the firm.

3. Corporate responsibility for information resource policy and strategy—Increasingly, the CIO will be a member of the top management team. He/she will have broad responsibility for developing policies and strategies for the information resources of the firm, just as the CFO (chief financial officer) has similar responsibility for the financial resources of the firm.

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10. Rockart, J. F.; Bullen, C. V.; and Ball, L. "Future Role of the Information Systems Executive," *MIS Quarterly,* Volume 6, Special Issue, December 1982.

Of most importance to the IS executive and to senior management is that the pace of this change is faster than was anticipated. It was predicted to be transitional through the end of the decade but, in fact, describes reality for many leading companies today. Specifically:

— The distribution of corporate IS activities to subsidiary IS and user management is proceeding rapidly. Our research demonstrates this from both a budgetary and from a functional point of view. CIOs are concentrating their line activities where interconnection is required—corporate-wide applications, corporate data networks, and the like.

— The CIO, as evidenced by the responses received, accomplishes primary goals through staff activities.

— The CIOs are proactive executives who, in general, report to the CEO or one level below, and are aligned through their reporting relationships to the strategic and operational elements of the business. Their strongest personal initiatives are in areas of strategic importance; end user computing, telecommunications, and strategic planning."[11]

We have seen evidence of this changing role of the CIO in some large organizations. For example, the distribution group of a large mainland-based company with operations in Hawaii is in the process of decentralizing its data processing functions. Previously, the three divisional MIS directors reported organizationally in a solid line relationship to the group MIS director and functionally in a dotted line relationship to the presidents of their respective divisions. Now, the reporting relationships have been reversed: the divisional MIS directors report organizationally to the presidents of their divisions and functionally to the group MIS director. Where the group MIS director previously had line responsibility for all MIS, he now operates in a staff role with functional responsibility over only certain aspects of groupwide MIS activities.

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11. Benjamin, Robert I.; Dickinson, Charles Jr.; Rockart, John F. "Changing Role of the Corporate Information Systems Officer," *MIS Quarterly,* September 1985.

The company is in the process of revising its corporate policies for the organization, management, and operation of its data processing function in a decentralized/distributed environment. The essence of this policy change is the striking of an appropriate balance between centralized and decentralized control and ensuring that a proper environment is created for fostering the effective and efficient use of data processing.

## Chapter 4

## THE PROCESS FOR MANAGING ELECTRONIC DATA PROCESSING

This chapter describes a model for managing the electronic data processing (EDP) function in state government. The model focuses on the four critical elements of management: *planning, priority setting, execution,* and *control.*

Because individual departments are relatively autonomous, they should be held accountable for their actions. Nevertheless, statewide coordination is needed to ensure that the State's overall EDP resources are used effectively and efficiently. The model provides for both departmental accountability and statewide coordination in a decentralized/distributed EDP environment.

### Planning

Planning is the fundamental element of managing an EDP function. Through the development of EDP plans, executive level management establishes the framework and direction for subsequent EDP activities. EDP plans must be based on a department's program goals, objectives, and plans; and they must be consistent with approved budgets. The components of EDP planning are program plans, strategic and operational EDP plans, EDP budgets, and technology research and promotion.

**Program plans.** Effective management of EDP requires effective planning at appropriate levels. The primary planning level revolves around the program plans developed by the departments. Program plans have a multiyear time horizon,

describe the activities to be conducted, and estimate the resources which will be required to accomplish specified program objectives. Proposed biennium budgets are derived from the program plans. Based on the approved budgets, modifications to the plans are made accordingly.

**Strategic electronic data processing plan.** Just as with program planning, strategic and operational planning for EDP systems is needed to ensure that information systems are developed to effectively and efficiently support program goals, objectives, and plans. Strategic EDP planning provides an overall approach to developing information systems to meet future requirements. It covers planning for departmentwide data and applications to ensure that a department pursues the correct projects. Moreover, it creates an integrated whole, resulting in systems that are stable over time and contribute to overall program performance. The products of a strategic EDP plan are:

- **Applications Architecture.**

  The applications architecture provides a framework for development of a department's EDP systems. The architecture identifies future application systems and their interrelationships through shared data, current application systems that are to be retained and/or modified, and their relationships to the future application systems.

- **Data Architecture.**

  The data architecture complements the applications architecture by providing a framework for developing a department's data bases. The architecture identifies the data classes and the major data bases needed to support a department's programs, and it shows the relationships of the data to the application systems and the programs.

- **Location Architecture.**

  The location architecture identifies the geographic locations of application processing and data storage needed to meet a department's information systems requirements and defines a department's overall distributed data processing environment.

- **Development Projects.**

  The strategic EDP plan also contains a list of prioritized projects for designing, developing, and implementing a department's target application systems and data bases.

Typically, strategic EDP planning is long term. In the State's case, this may be four to six years with updates occurring at least every biennium.

**Operational electronic data processing plan.** While a strategic EDP plan establishes long-term objectives, an operational EDP plan focuses on the short-term actions required to implement the high priority projects identified in the strategic plan. An operational EDP plan translates long-term goals into short-term objectives, sets operational priorities, identifies projects to be completed over the period of the plan, identifies the sequence of the projects, establishes schedules, estimates resource requirements, and assigns responsibilities for completing projects. Typically, operational EDP plans are short term, cover the biennium, and are updated annually.

Each department develops strategic and operational EDP plans as part of the departmental strategic and operational program planning process. Operational EDP plans need to be consistent with approved departmental budgets.

While conceptual or general designs for distributed data processing systems are included as part of the location architecture of a strategic EDP plan, specific

hardware configurations are included only in an operational EDP plan. Specific hardware components are identified as part of the process of developing specific information systems. Hardware configurations and costs are estimated when the feasibility of an information system project is studied. Specific hardware components, configurations, and costs are later identified when system design alternatives are analyzed after the specific information requirements have been defined for an application system. Once hardware configurations are defined, their acquisition, implementation, and maintenance are included in operational EDP plans.

Operational EDP plans also include estimates of hardware, personnel, and other resource requirements for systems to be developed but for which feasibility studies or system design alternatives analyses have not been performed. The estimates are subsequently revised as the studies and analyses are completed.

**Electronic data processing budget.** A department's EDP budget, as part of the department's overall budget, identifies estimated costs of specific EDP resources required to develop, maintain, and operate the information systems and perform the related activities identified in the department's operational EDP plan. As the department's budget changes, corresponding changes to the department's EDP budget and operational EDP plan should be made.

A department budgets for its EDP costs in sufficient detail to allow for proper analysis of the impact of budgetary changes on the EDP systems which support the affected programs. Frequently, there are high ratios of fixed to variable costs associated with EDP systems. Therefore, cuts in the department program funding may not be applied in the same percentage to the costs of the supporting EDP systems.

From a statewide perspective, individual departments budget for their share of the cost of operating central EDP services used by multiple departments. For example, each department budgets for and pays a central computer utility for the systems and programming, training, computer operations, and other services it uses.

**Statewide electronic data processing plans.** Statewide strategic and operational EDP plans are needed to provide coordination of individual departmental plans. They must be more than simple compilations of departmental plans if they are to provide a useful basis for managing the statewide EDP activity. They must build on the basis of the needs and documentation of department plans. Also, they must address the broad or statewide issues involved in EDP resource management throughout state government over the planning period.

Statewide EDP planning deals primarily with the allocation, deployment, and coordination of EDP resources to achieve maximum efficiency, effectiveness, and economy statewide.

Statewide EDP planning is also concerned with reporting on automation efforts, trends, and directions in state government; and with identifying opportunities for developing common systems, sharing common data bases, and making effective use of emerging EDP technology.

Because it is intended to take a total view of state government, statewide EDP planning is best done centrally as the specific responsibility of a single organizational unit.

Strategic and operational EDP plans are also needed for central computer facilities which provide EDP services to the departments. Central computer facility plans must be developed based on service requirements identified in departmental EDP plans.

**Technology research and promotion.** Rapidly changing EDP technology continues to achieve substantial increases in capabilities with corresponding substantial decreases in costs. With the continuing limitations on federal, state, and local funding, governments need to take maximum advantage of the cost-effective productivity gains available from current and emerging EDP technology.

Because research and promotion of emerging EDP technology are important parts of EDP planning, departments should strive to evaluate alternatives and include cost-effective uses of current and emerging EDP technology in their strategic and operational EDP plans. However, individual departments cannot conduct research at the level required to properly identify and test potential uses of emerging EDP technology, whereas a group of specialists in a central service organization can perform research more thoroughly and cost-effectively. The central group can also disseminate their research findings to the departments; actively promote the use of current and emerging technology; and assist departments in evaluating, testing, planning for, and implementing technology.

## Priority Setting

Priority setting is one of the key critical elements of managing an EDP function. By setting priorities for EDP activities, management can direct the allocation of EDP resources toward critical program goals and objectives. Executive and operating level management must be involved at appropriate points in the priority setting process to ensure that departmentwide and statewide perspectives are maintained and that management's directions are appropriately communicated.

**Major electronic data processing projects.** As noted in the discussion of planning, strategic EDP plans should include a prioritized list of the major EDP projects required to develop a department's target application systems. A major project typically consists of the tasks required to develop or acquire and implement applications software, hardware, and other EDP resources. Criteria for defining a major project should be in terms that are important to a department. Examples of criteria include: expenditures in excess of $50,000 or some other amount; personnel time in excess of one person year or some other measurement; involvement by two or more divisions; high technical risk; and a critical or high risk program.

As EDP resources become available, a department selects the next major project from the prioritized list in the strategic plan. A project valuation assessment (PVA), or feasibility study, is then performed to determine if the project is economically, technically, and operationally feasible and if it is advisable to proceed with it.

The project valuation assessment is the key control point in the process of managing the data processing function. The PVA serves as the baseline plan against which subsequent project efforts are measured and sets forth the benefits the project is expected to achieve and the corresponding costs.

A major EDP project is not undertaken without a project sponsor, a key member of the department's management team who takes responsibility for, is accountable for, and "owns" the system developed as a result of the project. The sponsor also should direct the PVA and "sell" it to executive management.

**Priority setting for major electronic data processing projects.** Major EDP projects demand the attention of executive management because they require major resource commitments by a department. Because resources are limited, major EDP

projects must be evaluated relative to competing demands, and they must be appropriately prioritized.

A department establishes a major EDP projects priority committee which consists of division heads and other executive level managers from within the department. Ideally, the director of the department chairs the committee. The committee meets quarterly or more often to review and approve the department's strategic EDP plans, select major EDP projects for which PVAs should be performed, and evaluate and approve completed PVAs. By approving a PVA, the committee gives executive level management authorization to commit the resources (as estimated in the PVA) to complete the project.

Another important responsibility of the committee is the progress report review and approval for major EDP projects in process. As long as a major EDP project is proceeding on time and within budget (as estimated in the PVA), then the committee should not be concerned. However, if a major EDP project begins to exceed its schedule or its budget by some predefined amount, such as 10 percent, then the committee requires the sponsor of the project to submit a detailed progress report explaining the reasons for the variances and the planned actions for correcting the situation. After reviewing the report, the committee determines whether to continue the project.

This review is critical in ensuring that a department's resources continue to be committed to high priority projects. All too frequently, an EDP project can consume far more resources than were originally expected by management. Often, the project continues without executive level management involvement even though the original authorization to proceed was based on a benefit–cost relationship which is no longer valid.

The major EDP projects priority committee also should establish the criteria for defining a major EDP project and the criteria for determining when a project must be reviewed for continued funding.

**Electronic data processing service requests.** There are many instances where users have needs to change existing EDP systems or develop new EDP systems, which do not fit under the category of major EDP projects. Changes may be required to correct problems or "bugs" in software, make enhancements to the features or performance of a system, modify a system to meet legislative or other regulatory requirements, or react to other changes external to the system. Moreover, new systems often need to be developed which do not require major resource commitments. In addition, users routinely request a variety of other services, such as special computer processing, training, technical assistance, and management consulting from their provider(s) of EDP resources.

Each department should have a mechanism for formally communicating and tracking EDP service requests. A standardized form is typically initiated by a user, signed by a manager authorized to approve EDP service requests, and given to the data processing coordinator who directs the appropriate EDP resources to meet the request.

**Priority setting for electronic data processing service requests.** EDP service requests do not demand the attention of executive level management because they do not require major resource commitments. If they do, they should be reclassified as major EDP projects. However, the requests do demand the attention of operating level management. EDP resources are typically established as central, fixed pools to be shared by all the divisions of a department. Because requests

generally exceed the resources available, the requests need to be prioritized to ensure that the needs of all users are appropriately met.

Typically, a department establishes an EDP service requests priority committee consisting of branch heads, division heads, or other appropriate operating level managers from within the department. The committee chairperson is also a member of the department's major EDP projects priority committee. The committee meets monthly, or as appropriate, to review and prioritize EDP service requests. Resources are then committed to completing the requests in priority sequence.

The data processing coordinator should be given latitude to complete trivial, or very small, requests ahead of higher priority requests where such actions increase the productivity of personnel who become available for short periods of time. Emergency requests also receive immediate attention without waiting for committee approval to ensure that situations are resolved on a timely basis.

However, the coordinator reports the actions taken on trivial and emergency requests after the fact to the committee to ensure that resources are not inappropriately diverted from high priority requests. The coordinator also makes outstanding progress reports to the committee so that the committee can take appropriate actions to change priorities and adjust resource commitments for completing EDP service requests.

**Statewide priority setting.** Priority setting is needed on a statewide basis for major EDP projects involving the development of common systems or shared data bases which are used or shared by two or more departments in support of their individual program functions. The need for common system or shared data base projects should be identified as a part of statewide EDP planning.

Typically, a state establishes a common systems priority committee, consisting of all or a representative number of department heads. The committee meets quarterly to review the statewide strategic EDP plan, set priorities for the development of common systems and shared data bases, recruit sponsoring departments for the development of the systems, evaluate and approve project valuation assessments for common systems, and review and approve progress reports for common system projects. The committee also supports the sponsoring departments' budget requests for performing common system project valuation assessments and developing common systems.

A common system is not the same as a statewide system. A common system is a system used individually by multiple departments to support their individual programs. A statewide system is a system operated by a single department in support of its mission of providing administrative, oversight, or other support functions to multiple departments. A loan accounting system is an example of a common system that could be used individually by multiple departments. While each department could devise its own loan accounting system suitable to its own needs, a loan accounting system could be developed that would meet the needs of several departments. A personnel system, on the other hand, is an example of a statewide system used by an administrative department to support its mission of providing personnel services to multiple departments.

A common systems priority committee should set priorities for common systems. But it should not set priorities for statewide systems or other individual departments' major EDP projects. The departments must set their own priorities if they are to have effective authority over and accountability for their programs and operations.

## Execution

Executing, or implementing, EDP plans involves many activities which are guided by the management directions established in the priority setting process. Acquisition and retention of required personnel and other resources are the keys to the successful execution of the EDP function. As with other functions, hiring, training, and retention of qualified personnel are some of the more important aspects of managing an EDP function. Also important is the acquisition of computer hardware, software, services, productivity aids, facilities, and other resources required to carry out the EDP program. The activities of an EDP program can be broadly categorized as systems development, systems maintenance, and systems operations.

**Personnel recruiting, hiring, and training.** Successful departmental and statewide EDP program execution depends on qualified personnel. Effective EDP recruiting, hiring, training, and other personnel administration policies and procedures must be in place to recruit and retain qualified EDP personnel. Ongoing EDP training programs are particularly critical to developing and maintaining requisite skills because EDP technology changes so rapidly.

Typically, in a state government, a central personnel services department has responsibility for developing statewide personnel policies and procedures. Also, a state's central EDP service organization usually assists in developing the policies and procedures and in monitoring their effectiveness because it generally employs personnel in all or most of a state's EDP job classifications and generally works with a variety of EDP personnel in the individual departments. A central EDP service organization also often provides technical training for EDP personnel on a statewide basis, in coordination with the central personnel services department. Such training

is often supplemented with vendor-supplied training, particularly in highly specialized areas.

One of the problems associated with decentralizing EDP personnel is that the units located in the individual departments tend to become isolated. The staffs are generally smaller and the ranges of equipment, software, and other technologies used in the departments are generally narrower. As a result, the decentralized EDP personnel do not have as great an opportunity to gain on-the-job training as they would if they were located in a larger organization. Some states and large companies have attempted to solve this problem by establishing an EDP personnel rotation program. Personnel from central facilities are loaned to decentralized groups, and vice versa, for periods of time to provide for cross training.

**Resource acquisition.** A variety of EDP resources, other than personnel, are required to implement and execute departmental and statewide EDP plans. Such resources include: computer hardware, software, and facilities; telecommunications hardware, software, and facilities; related supplies; and contract services. Effective procedures must be in place to acquire EDP resources on a timely basis to match demands. The procedures must also provide for coordinating and guiding the acquisition process so as to:

- Ensure the acquired resources meet the needs,
- Obtain quality resources at fair and reasonable prices,
- Obtain the benefits of volume purchases,
- Avoid costs of unnecessary duplication of vendor negotiations and contract preparations,
- Provide consistency statewide,

- Gain leverage in dealing with vendors through coordinated purchasing and vendor relations,
- Provide for hardware and software compatibility where appropriate,
- Provide for fair and open vendor competition,
- Protect both the vendors' and the State's interests in contractual arrangements, and
- Avoid litigation by adhering to statutory requirements and approved policies and procedures.

The EDP resource acquisition process consists of a number of tasks, including the following:

- Identification of user needs;
- Definition of user requirements;
- Development of technical specifications;
- Identification of potential suppliers;
- Preparation of requests for bids or requests for proposals (RFPs);
- Evaluation of bids or proposals;
- Selection of suppliers;
- Negotiation of terms and conditions; and
- Preparation, review, and approval of contracts.

The individual department procuring EDP resources has the responsibility for performing the tasks. However, a central service organization charged with the responsibility for assisting departments in the process can provide substantial benefit to the departments and the state as a whole.

A central organization can be of great assistance in identifying potential suppliers, developing technical specifications, providing model RFPs, reviewing

proposed RFPs, providing model contracts, and reviewing proposed contracts. In addition, on behalf of all the departments, a central service organization can let competitive bids for volume purchasing agreements and master contracts. Volume purchasing agreements provide the benefit of reduced costs through volume discounts. Master contracts enable a state to let a single contract with a vendor under which the departments can acquire EDP resources.

Multiple procurements are not required for volume purchasing agreements and master contracts. Competition is encouraged and optimum terms and conditions can be negotiated and applied statewide. For example, by having master contracts with four or five suppliers of microcomputers, individual departments select the type of microcomputers that best meet their needs without going through individual competitive procurements.

By consolidating some of the acquisition tasks in a central service organization, a state can obtain its greatest leverage in dealing with EDP vendors. The ongoing relations between the state and its EDP vendors can also be facilitated by such an arrangement.

It is important to note that the goal of EDP resource compatability is often thought to discourage competition. Compatibility and competition need not be pursued as mutually exclusive goals. With today's EDP technology, compatibility in terms of data or information interchange is nearly always attainable, albeit sometimes at high cost and sometimes with less than optimal efficiency. Technical specifications and RFPs can be developed which define reasonable requirements for interfacing or integrating different hardware and software to provide for compatibility. Vendor proposals should be objectively evaluated in terms of costs

and benefits and the vendors offering the best solutions for the lowest overall costs should be selected.

**Systems development, maintenance, and operation.** The activities of an EDP function can be broadly categorized as systems development, systems maintenance, and systems operation.

Systems development includes the systems analysis and design, computer programming, and implementation activities required to develop an information system. The specific tasks involved in developing an information system are described in the SDM/70 systems development methodology used by the State. SDM/70 groups the tasks into the following phases:

- Service Request/Project Valuation Assessment
- System Requirements Definition
- System Design Alternatives
- System External Specifications
- System Internal Specifications
- Program Development
- Testing
- Conversion
- Implementation
- Post Implementation Review

SDM/70 also identifies the personnel who are responsible for performing the development tasks. Users, business systems analysts, EDP systems analysts, computer programmers, and EDP technical specialists share responsibilities. In addition, management consultants, systems development companies, and other

contractors are often engaged to perform some or all of the tasks of developing an information system.

The individuals involved in the process can reside in various organizations. Typically, business systems analysts, EDP systems analysts, and computer programmers reside in the department responsible for developing a system. However, for smaller departments, these resources, as well as certain EDP technical specialists often reside in a central organization that provides EDP services to multiple departments. The trend is for the systems development personnel to reside in the user departments to better understand the requirements of the users and to be more responsive to their needs.

Systems maintenance includes the systems analysis and design, computer programming, and implementation activities required to maintain existing information systems. Maintenance involves the correction of problems or "bugs" in software and the modification or enhancement of existing systems. Maintenance may also involve the development of small systems as adjuncts to large existing systems or as stand–alone systems.

The same types of personnel who perform systems development activities perform systems maintenance activities. Hence their organizational placement generally corresponds to that of the development personnel. Ideally, both development and maintenance personnel are in the same organization to facilitate communications and coordination. Consequently, contractors are seldom hired to perform systems maintenance tasks.

Central service organizations often develop and maintain common systems and shared data bases. However, individual departments can be given responsibility for developing and maintaining common systems.

Systems operation includes the activities involved in managing and operating computer hardware, systems software, and other EDP facilities to process data through information systems. Such processing can be performed on a centralized, decentralized, or distributed basis. In a centralized environment, the computer facilities are located in a central organization which provides processing services to multiple departments. In a decentralized environment, a department operates its own stand–alone computer. In a distributed environment, a department operates its own computer but also uses the central computer facilities. The department's computer is connected to the central computer so that data can be passed back and forth between the distributed system and the central system. A distributed computer generally can be used on a stand–alone or decentralized basis as well.

With rapidly decreasing costs for computer equipment, the trend is for increased use of decentralized and distributed processing. However, because of economies of scale, a combination of centralized, decentralized, and distributed processing for state governments is likely to continue for some time.

### Control

Management must exercise control over the EDP function to ensure that activities are performed according to established plans and priorities. Performance feedback relative to the plans and priorities is needed to provide essential information for management decisionmaking. Executive level management does not need to be involved in day–to–day activities provided that:

- The performance of the EDP function is measured and reported on a routine basis.

- Operational and management controls are exercised to monitor performance and take corrective actions where appropriate to bring performance in line with EDP plans and priorities or to adjust the plans and priorities.

**Performance measurement.** Information systems and procedures are needed to provide feedback to management on the performance of the EDP function relative to established plans and priorities.

Some of the important components of performance measurement systems are the following:

- Goals, objectives, and standards against which actual performance is measured;
- Procedures for collecting quantitative and qualitative data about actual and projected performance; and
- Reports comparing actual and projected performance against standards, highlighting variances, and identifying potential problems.

Different performance measurement systems are typically implemented for each of the major categories of systems development, systems maintenance, and systems operation. However, financial performance reporting on actual expenditures compared to budgets is common to all areas. Examples of some of the other performance measures used in each area are outlined in the following paragraphs.

In the systems development area, statistical reports are typically produced on quantitative performance measures such as the number and size of development projects requested, completed, in process, and outstanding by program. As another example, measures of the productivity of systems development personnel are

typically reported and analyzed to ensure that the appropriate number of person hours are being spent on authorized projects *vis–a–vis* administrative or overhead activities.

Qualitative measurement of performance in the systems development area is more difficult to achieve. However, reports on the results of user surveys and statistics on projects completed late or over budget are commonly used as some of the indicators of performance. In addition, progress reports are generally used for systems development projects. Such reports describe project status relative to schedules; work completed, in process, and planned; problems encountered and expected; and estimates of the time and resources needed to complete the project.

Many of the performance measures used for systems development are also used for systems maintenance. However, where detailed reports are often used for a single systems development project, summary reports are generally used for multiple systems maintenance activities. The reason for aggregating systems maintenance activities is that they tend to be short in duration and require relatively small amounts of personnel time.

Hence the activities are often completed before measurements can be reported and adjustments can be made. Nevertheless, performance reporting is critical in ensuring that individual maintenance activities are completed on a timely basis, appropriate levels and numbers of personnel resources are committed to maintenance activities, and backlogs of service requests are reasonable.

In the systems operation area, both external and internal performance measurements are needed. External reports include comparisons of the actual performance of the EDP function to the service expectations of its users. On–line systems response time, on–line systems availability, batch systems turnaround,

schedule adherence, and similar measures are typically reported to users. Internal reports include comparisons of the actual performance of computer hardware, software, and personnel to established standards. Computer utilization and capacity, system throughput, hardware and software failures, processing problems and reruns, schedule adherence, and similar measures are typically reported to EDP management.

The performance measures and reports outlined in the previous paragraphs are meant to be illustrative only. As indicated, there are numerous measures of performance involved in managing an EDP function. Essentially, the performance of every activity involving the use of EDP resources at both the departmental and statewide levels must be measured to provide management at all levels with the feedback needed to control the EDP function.

**Operational and management control.** EDP operational and management controls are internal accounting and administrative controls used to protect a department's assets and ensure that EDP activities are performed in accordance with management's authorization. Controls consist of policies, standards, procedures, methodologies, guidelines, and productivity aids. Management uses controls to monitor and direct activities to ensure that the activities are performed efficiently and effectively in achieving a department's goals according to established plans and priorities.

There are numerous controls appropriate for managing an EDP function. Several general controls apply to all EDP activities while many specific controls apply to each of the major categories of systems development, systems maintenance, and systems operation. Examples of general controls are organizational segregation of duties, personnel policies and procedures, and EDP

standards. Some of the important controls for systems development and systems maintenance are systems development methodologies; documentation standards; project planning and control systems; change control procedures; program library management systems; structured analysis, design and programming techniques; and applications development productivity aids such as fourth generation programming languages. Some of the important controls for systems operation are production and job scheduling systems; input and output control logs; data access control systems; tape library management systems; problem management and change control procedures; and computer performance management and capacity planning systems and procedures.

Management and supervisory personnel at all levels of an EDP organization are responsible for developing, implementing and enforcing operational and management controls. However, executive level management in the user departments and in the EDP organization can focus on a limited number of key controls. By closely monitoring five key control points, executive management can be reasonably well assured that the EDP function is performing in accordance with management's authorization.

The first key control point consists of the strategic and operational EDP plans. By reviewing and approving EDP plans, management establishes the overall framework and direction for subsequent EDP activities.

The second key control point is the project valuation assessment or feasibility study. By prioritizing, reviewing, and approving PVAs, executive management commits resources to the major EDP projects required to develop and implement the information systems essential to the support of program missions. Acquisition of computer hardware, software, and other EDP resources is determined by the

information system requirements identified in a PVA. Once management approves a PVA, further approvals to acquire EDP resources to complete the project should not be required unless anticipated or actual expenditures exceed estimates included in the approved PVA.

The third key control point consists of progress reports for major EDP projects. The reports should be prepared at least quarterly and at the end of key phases of the life cycle of a systems development project. By reviewing and approving the progress reports, executive management can be assured that approval for continued funding of major EDP projects is not made without specific management authorization. This is particularly important for projects that exceed schedules or budgets approved at the PVA or other phases of the systems development life cycle.

One of the most important phases that should receive detailed management review is the system design alternatives phase. The design alternative selected at the end of this phase dictates the specific computer hardware, software, personnel, and other resources and the corresponding costs that must be committed to complete the project.

The fourth key control point is a post implementation review. By analyzing and approving the results of a post implementation review, executive management can be assured that the expected benefits of the new system are achieved and that the actual costs of the project were within approved limits. This review provides management with the options of cancelling systems that do not meet benefit–cost criteria, modifying the systems to improve their benefit–cost ratios, and taking actions in the future to improve the systems development process.

The fifth key control point consists of ongoing performance monitoring. Executive management should require routine reporting on key performance indicators for each major component of its EDP function. Where performance does not meet established targets, management should take action to modify plans and priorities or otherwise correct the situation.

### Summary

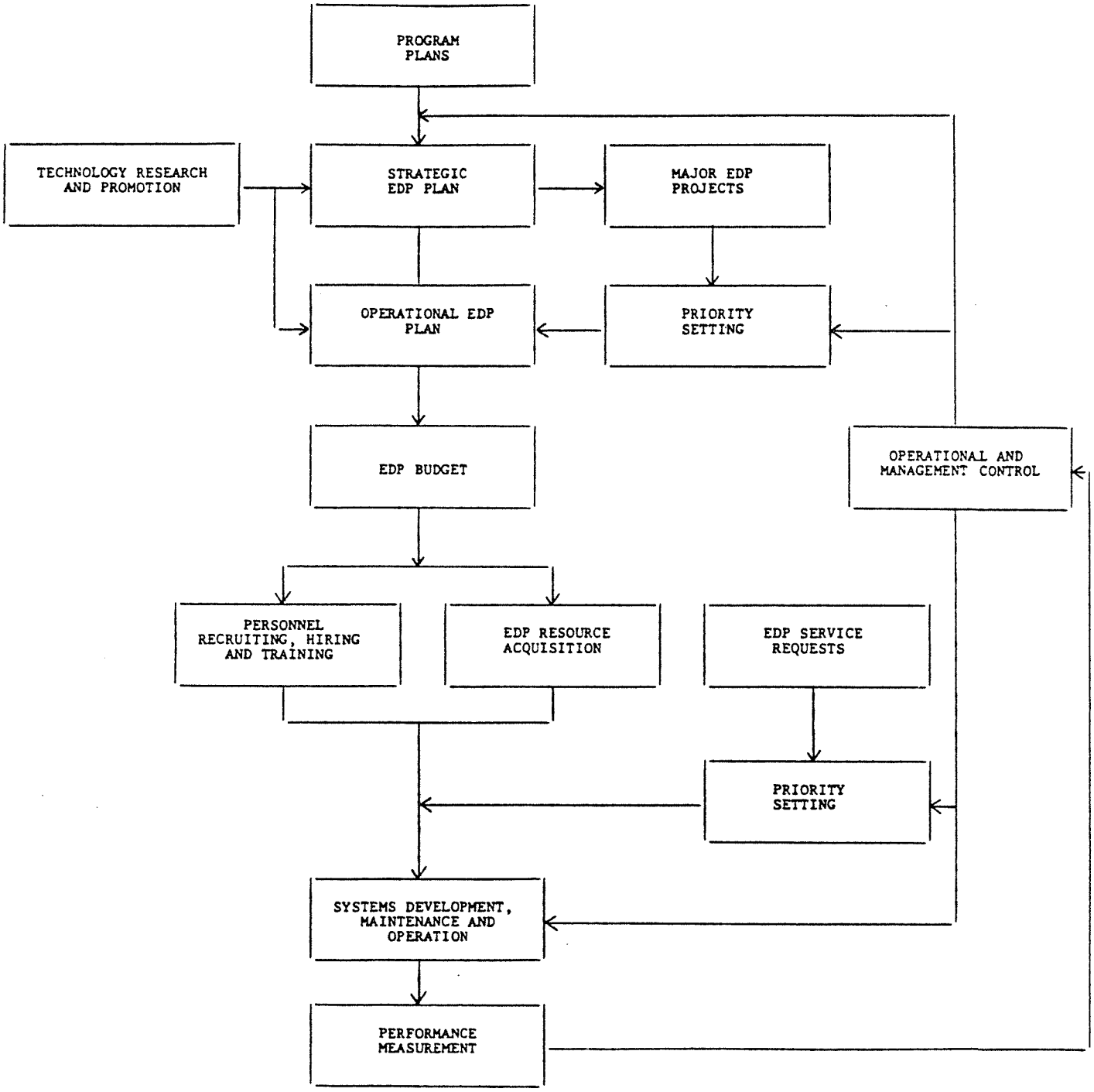
Our discussion of a model for managing the EDP function in state government began with a discussion of the four basic elements of management: planning, priority setting, execution, and control. Then the components of each of these elements were described in greater detail. Exhibit 4–1 shows the relationships among the detailed components of the EDP management model.

As illustrated in Exhibit 4–1, the process of managing EDP involves many interrelated components. The complexity of this process increases as the complexity of the environment increases. In the environment of a complex state government, the critical components of an EDP management model, such as the one we have described, are essential and must be in place if the State's EDP function is to operate efficiently and effectively.

The model we have described serves as our baseline against which to evaluate the organization and management of the EDP system of the State of Hawaii.

Exhibit 4–1

Electronic Data Processing Management Model
Detailed Components



# PART III

# AN ASSESSMENT OF THE STATE'S ELECTRONIC DATA PROCESSING SYSTEM

# Chapter 5

# USER SATISFACTION

In this chapter, we assess the level of user satisfaction with the State's electronic data processing (EDP) system and the Electronic Data Processing Division's (EDPD) procedures and services. To make the assessment, we interviewed the directors of most of the departments and we surveyed and interviewed the designated data processing coordinators in all the departments. This sequence of surveys and interviews ensured clearer and more accurate understanding of the responses. It also allowed discussions of the departments' use of, and satisfaction with, data processing systems and services beyond the scope of the survey questionnaire.

## Summary of Findings

In general, users expressed concern that the level of service from EDPD is not what it should be, the State's EDP environment is overcontrolled, and the user departments should have greater autonomy to meet their data processing needs. However, a number of users expressed optimism that under the new director of EDPD (who had only been recently appointed at the time of our survey and interviews), there might be acceleration of the use of information technology in the State.

## User Perceptions

The users' perceptions, as expressed in comments received in the questionnaires and interviews, are discussed in detail in the following four categories: meeting needs, levels of satisfaction, user recommendations, and user needs over the next three to five years.

**Meeting needs.** The questionnaire included a general question, "How well do the systems you are currently operating meet the needs of your department?" Users responded on a scale of 1 to 5, ranging from 1 = not at all to 5 = extremely well. The average response was 3.2. The distribution of responses is shown in Exhibit 5–1.

**Exhibit 5–1**

**How Well Do Systems Meet Your Department's Needs?**

| Score | Description | Number of Responses |
|---|---|---|
| 5 | Extremely Well | 2 |
| 4 | | 6 |
| 3 | | 6 |
| 2 | | 5 |
| 1 | Not At All | 1 |

**Levels of satisfaction.** The questionnaire also included specific questions aimed at providing a more detailed picture of user satisfaction. Users were asked to rate six service areas: turnaround time, response time, schedule adherence, system reliability, special requests, and new or expanded services.

Respondents used a 1 to 5 scale where 1 = poor, 2 = fair, 3 = good, 4 = very good, and 5 = excellent. Users responded most favorably to the area of system

reliability, whereas responses were lowest in the area of new or expanded services. The specific responses in each area are summarized in the following paragraphs.

*Turnaround time.* This is the elapsed time between the submittal of a job and the receipt of the final output following completion of processing, printing, and distribution. The average response was 3.5.

*Response time.* This applies to on-line functions, such as data input and inquiry, and is the elapsed time between pressing the "enter" key and the terminal being ready to initiate another task. The average response was 2.7.

*Schedule adherence.* This measures how consistently products are delivered, services are performed, or processing is completed according to schedules or deadlines agreed upon between the department and EDPD. The average response was 3.4.

*System reliability.* This refers to how dependably work can be submitted with a high level of confidence that the processing will be completed without interruptions caused by hardware failure or some difficulty with the operating system or its associated software products. The average response was 3.6.

*Special requests.* This is a measure of EDPD's ability to respond in a timely and appropriate manner to requests from users for services that are not planned or have extraordinary scheduling or resource requirements. The average response was 2.7.

*New or expanded services.* This refers to EDPD's response to requests for additional services, such as new data communications lines, terminals to be added to an existing cluster, or a new program to support an existing system. The average response was 2.4.

Exhibit 5–2 displays the average and distribution of the responses for these six services.

**Exhibit 5–2**

**Levels of Satisfaction by Service Area**

| | Total Number of Responses | Average Score | Number of Responses by Score 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| Turnaround Time | 15 | 3.5 | 1 | 7 | 5 | 2 | – |
| Response Time | 14 | 2.7 | – | 3 | 4 | 7 | – |
| Schedule Adherence | 15 | 3.4 | 2 | 6 | 5 | – | 2 |
| System Reliability | 16 | 3.6 | – | 10 | 5 | 1 | – |
| Special Requests | 15 | 2.7 | – | 4 | 4 | 6 | 1 |
| New Services | 17 | 2.4 | – | 2 | 5 | 7 | 3 |

**User recommendations.** One section of the questionnaire asked for users' recommendations and suggestions for optimizing the departments' utilization of data processing resources. The users' responses are summarized in the following paragraphs.

***Central control.*** A number of users expressed concern that too much control is being exercised by EDPD and that greater autonomy is needed within the departments. For example, one of the users said:

> "This department needs the authority to make decisions and execute them. The current approval process has virtually halted data processing activity. They (EDPD) are currently a 'control' organization rather than a 'service' organization. This results in a very inefficient use of resources."

In this regard, several users indicated that the project or application approval process is too slow. Two users indicated that their departments have lost federal funding because approvals were not obtained in a timely manner.

Other users expressed interest in streamlining the acquisition process for hardware, software, and services, both for the approval steps and for the subsequent activities necessary to complete the procurements.

***User involvement.*** A number of users expressed a strong desire to be more involved with EDPD, particularly in providing input on areas of statewide impact, both for planning and for the formulation and implementation of statewide policy.

Our interviews indicated that the Distributed Information Processing and Information Resource Management planning process was viewed by some as the beginning of better communication between EDPD and the users.

***Responsiveness to user needs.*** Several users expressed a desire for a relationship with EDPD which would be more responsive to the needs of end users and more supportive of solutions to meet those needs. The following are some of the suggestions those users felt would contribute to the creation of such a relationship:

- Appropriate development personnel should be assigned to work exclusively within or reside in an individual department.
- EDPD application development personnel should provide on-site support to individual departments.
- EDPD personnel should take a more proactive role in developing individual departments' uses of data processing capabilities.
- EDPD should provide consultation to users in various technical areas, including the specification and selection of data processing related procurements.
- EDPD should take the lead in improving communications between EDPD and users within departments.

- EDPD should become more sensitive to the needs of end users.
- More stand-alone and distributed computer systems should be installed in the individual departments.
- Policies and procedures should be established to facilitate, encourage, and support increased sharing of hardware, software, and data.

***Staffing.*** Users expressed concerns related to staffing more frequently than any other area. In general, users want to increase staffing levels in the departments, as well as at EDPD. The users indicated that additional staff in the departments is needed in part because technical staff must be familiar with the applications in order to design systems effectively. Although several users indicated a willingness to accept personnel on contract from EDPD rather than to augment their own staffs, they expressed a need to have the staff members on-site in the departments during the design and development of applications.

At the same time, users expressed concern about difficulties in recruiting and retaining qualified personnel and about the lengthy amount of time required to complete the recruiting and hiring process.

***Response to requests for service.*** As already mentioned, users evaluated responsiveness to requests for additional or expanded services as the least satisfactory of EDPD services. The following are some of the users' specific concerns in this area:

- Some departments perceive that the lack of available resources at EDPD limits the departments' capability to use data processing.
- Some users indicated that systems development projects performed by EDPD are typically not completed on schedule. Certain projects have fallen more than a year behind schedule.

- Some users indicated that once a project is approved and work is started on the design and development, the originally specified and approved requirements are negotiated away, particularly when a project falls behind schedule. This results in what users perceive to be minimal systems that, when completed, meet only the basic needs of the department.

**User needs over the next three to five years.** The questionnaire included a general question regarding the anticipated data processing needs of users over the next three to five years. The users expressed optimism during the interviews, indicating an increasing use of data processing throughout the State. In particular, the users indicated they expected to:

- Develop additional application systems,
- Continue making enhancements to existing systems,
- Increase their use of minicomputers and microprocessors,
- Increase their use of data communications networks including local area networks, and
- Implement office automation capabilities.

## Conclusions

Based on the responses to the questionnaires, we have drawn the following conclusions about the level of satisfaction perceived by users of the State's EDP system.

Basic user needs appear to be met, but improvements are clearly needed. Forty percent of the users questioned about how well the current systems are meeting their needs appeared to be satisfied (score of 4 or 5); however, 30 percent appeared to be unsatisfied (score of 1 or 2).

Users are reasonably well satisfied with EDPD's operational production services, except for on-line terminal response time.

On the other hand, users are not satisfied with EDPD's responsiveness to special requests or requests for new or expanded services. Users perceive this area as a problem.

There appears to be a significant level of frustration among users with respect to getting things accomplished. Users indicated that delays and cumbersome approval and acquisition processes slow things down unnecessarily.

Users want more service and less control. They want greater control over satisfying their own EDP needs and over their own resources.

Users want help. They need assistance with and education about technology, research on emerging technology, and proactive advisory services. There is an opportunity for EDPD to provide technical leadership in assisting the departments in applying EDP techniques, concepts, and methods.

Based on user perceptions, the area in greatest need of improvement is the application systems development function.

## Current Electronic Data Processing Division Activities

EDPD is currently performing a number of activities aimed at improving its responsiveness to users and increasing user satisfaction. EDPD management is scheduling vendor presentations and demonstrations at department data processing coordinators meetings to increase user awareness of emerging technology. A new emerging technology function has been established by EDPD to stay abreast of the

rapid advances in information technology. The Information Resource Center in EDPD has been formed to assist users in locating data and information, evaluating different computer hardware and software, solving specific computer-related problems, and learning about new technologies. The recently implemented Distributed Information Processing and Information Resource Management planning process has provided users with an opportunity to begin shaping their future data processing environment. EDPD management has also made progress in positioning the State to take advantage of discount buying plans available from some vendors. Communication within the data processing community of the State has been facilitated by the formulation of committees dealing with specific areas of concern. Finally, another effort to increase the level and extent of communication between the departments and EDPD is the recent establishment of a newsletter published by EDPD.

Despite the steps being taken by EDPD, users continue to express concern that the level of service from EDPD is not what it should be, the State's EDP environment is overcontrolled, and the user departments should have greater autonomy to meet their data processing needs. It is clear that the users perceive that EDPD should be functioning as a service organization rather than as a control organization.

## Chapter 6

## ORGANIZATION

In this chapter, we assess the State's current organization of its electronic data processing (EDP) resources relative to current EDP management trends, the model process for managing EDP, and user perceptions regarding the State's EDP system outlined in Chapters 3, 4, and 5, respectively.

### Summary of Findings

1. The State's process of developing and implementing application systems involves excessive centralized controls, which unnecessarily delay systems development projects and impede departments in their efforts to automate critical functions.

2. As a result of the excessive controls over the State's EDP system, which has hindered the acquisition and use of EDP technology, the State has made relatively limited use of EDP technology, and thus, has not fully capitalized on opportunities to improve productivity.

3. Since user departments are not required to pay for services provided by the Electronic Data Processing Division (EDPD), there is a lack of accountability for the use of EDPD's resources. The current system of financing EDPD's operations through direct general fund appropriations does not encourage resources to be used efficiently.

4. The setting of statewide priorities by the Governor's EDP Advisory Committee for specific EDP projects of the various departments is inappropriate. It

is contrary to the concept of giving departments authority and responsibility for the EDP resources they use and holding them accountable for the results. In addition, the advisory committee, with only three or four members, is constituted too narrowly to assume an appropriate role of priority setting and monitoring of common systems projects.

5. Current administrative policy on EDP is not appropriate in light of today's technology and current trends in EDP management. Legislative policy is needed to assign functional and operational control over EDP to the user departments; emphasize the service—rather than control—function of EDP; reorient EDPD to proactive coordinative, advisory, and consultative services; and locate the division in a department that operates with a service orientation.

### Excessive Controls

Currently, the process of developing and implementing an application system involves many steps and too many centralized controls. Because each control point generally requires review and management decisionmaking, the excessive controls result in unnecessarily delaying systems development projects.

The problem can best be described by example.

1. A division manager of a large department identifies a need for an information system to support an essential program function.
2. The department's EDP staff and the division users perform a project valuation assessment (PVA).

   The PVA indicates that the proposed system is cost-effective. The department plans to contract with a management consulting firm to define the information systems requirements and perform the systems

design alternatives analysis. The department expects to purchase an on-line software package, modify it to meet the division's unique requirements, acquire additional computer equipment to increase the capability of the department's existing computer to handle the anticipated increased workloads, and add EDP personnel to support ongoing systems operation. The department also plans to have EDPD develop the system internal specifications, install and modify the software package, and perform the rest of the tasks to implement the system.

3. The division manager sponsors the project and presents the PVA to the department's executive management where the project is given top priority.
4. The division manager obtains approval from the department director to include the project in the department's budget request.
5. The budget is subsequently approved by the Department of Budget and Finance (B&F), the Governor, and the Legislature.
6. The department's EDP personnel include the project in the department's Distributed Information Processing and Information Resource Management (DIPIRM) plan.
7. The department's EDP manager obtains approval of the DIPIRM plan from the department's executive management.
8. The department submits its DIPIRM plan to EDPD, and EDPD reviews the plan for conformity with the DIPIRM planning guidelines.
9. The department presents the PVA for the new system to the Governor's EDP Advisory Committee to have the project assigned priority relative to all the other major EDP projects in the State.

10. Because the project is high on the department's list of priorities and funds are available, the department plans to start the project by engaging a consultant to perform the requirements definition and system design alternatives analysis. To ensure that its money is well spent, the department decides to enter into a contract for the requirements definition only and then enter into a second contract for the alternatives analysis if the consultant performs quality work. However, the department decides to conduct a sole source procurement because it has worked with a consulting firm which is one of few qualified specialists in the field and which has particular knowledge of the division's program, having performed substantial work for the department in the past.

11. The department obtains approval from the Governor to contract for consulting services.

12. The department also obtains approval from EDPD on behalf of B&F for its request to contract with a consultant.

13. Once the required approvals are obtained, the department negotiates the contract with the consultant and then obtains certification from the Department of Accounting and General Services (DAGS) that funds are available.

14. After completing the requirements definition, the department decides to engage the consultant for the system design alternatives analysis.

15 through 17.

The department repeats Steps 11 through 13 and again obtains the necessary approvals.

18. Because the system will involve telecommunications equipment and services, the department obtains further approval from DAGS.

19. After completing the system design alternatives analysis, the project sponsor presents a progress report to the department's executive management for approval for continued funding.
20. Quarterly, the project sponsor presents progress reports to the department's executive management.
21. Quarterly, the project sponsor presents progress reports to EDPD and the Governor's EDP Advisory Committee.
22. Following completion of the design alternatives analysis, the department submits a request to EDPD for EDPD to complete the system implementation.
23. The department waits until EDPD's resources are available to work on the project.
24. The department also obtains approval from EDPD on behalf of B&F to acquire the software package.
25. The department conducts a competitive procurement to select the software package.
26. The department obtains certification from DAGS that funds are available for its proposed software contract.
27. As the project progresses, the department obtains approval from EDPD on behalf of B&F to acquire the needed hardware.
28. The department conducts a competitive procurement to select the hardware.
29. The department obtains certification from DAGS that funds are available for its proposed hardware contract(s).
30. As the project nears completion, the department obtains approval from B&F through EDPD to add EDP personnel in the department.

31. Following completion of the project, the department performs a postimplementation review.

As shown in this example, the numerous controls required in the process of developing and implementing an information system have the potential to substantially delay the process.

We noted, for example, one instance where a department head submitted a request to the Department of Budget and Finance to purchase three terminals for a total of about $3,600. The request took almost six months for approval. Not only did the approval process take an inordinate amount of time, but requiring a department to submit a request for such a small expenditure is inefficient and counterproductive.

In a similar example, a department head submitted a request to B&F to purchase a microcomputer, including a printer, pen plotter, and related software for a total of about $10,000. The request took two months for approval.

We noted other examples where excessive centralized controls have hindered departments in their efforts at automating critical functions. As noted in Chapter 5, two users indicated they lost federal funding due to delays in the approval process.

As described previously in Chapter 4 under the discussion of an EDP management model, there are several key control points in the process of managing major EDP projects: EDP plans, project valuation assessments, project progress reports, and postimplementation reviews. Once a project has been approved and included in the budget, it is not necessary to approve individual requests for hardware, software, contract services, and personnel. In the preceding example involving 31 steps, departmental management reviews the project at each of the key control points. Approvals outside the department should not be required.

In the example, there are eight steps where approvals should be eliminated. These steps and the reasons for eliminating them are identified in the following paragraphs.

**Steps 9 and 21.** As described in the *Inappropriate Priority Setting* section of this chapter, once the department's executive management sets the priority for a major EDP project unique to the department, the Governor's EDP Advisory Committee should not be involved. In our example, Steps 9 and 21 should be eliminated.

**Step 18.** The department should coordinate with DAGS regarding telecommunications requirements throughout a major EDP project so that DAGS can appropriately plan for the impact of the project on its resources. However, once the department's executive management approves the project, specific approval should not be required from DAGS before work can proceed. In our example, Step 18 should not be required.

**Steps 12, 16, 24, 27, and 30.** The department should coordinate with EDPD regarding central EDP system requirements throughout a major EDP project so that EDPD can appropriately plan for the impact of the project on its resources. However, once the department's executive management approves the project and monitors its progress, specific approval of individual hardware, software, contract services, and personnel should not be required by EDPD. In our example, Steps 12, 16, 24, 27, and 30 should be eliminated.

***Recommendation.*** *The requirements for EDPD and the Department of Accounting and General Services to approve individual requests for hardware, software, contract services, and personnel and for the Governor's EDP Advisory Committee to set priorities for and monitor departmental projects should be eliminated. Roles and responsibilities of the departments, EDPD, the Department*

*of Accounting and General Services, and others should be redefined as part of restructuring the organization of the State's EDP system. Recommended roles and responsibilities are outlined in the second section of this chapter.*

### The State's Use of Electronic Data Processing Technology

The most significant apparent impact of the excessive controls over the State's EDP system is the relatively limited use the State has made of EDP technology.

In recent years, departments have acquired several minicomputers and numerous microcomputers. The State has recently installed a local area network, and greater use is being made of on-line terminals connected to departmental minicomputers and EDPD's central computers. Nevertheless, the State still makes relatively limited use of current EDP technology. For example:

- Little use is made of true distributed data processing.
- Many systems use batch processing rather than on-line processing.
- There is relatively heavy use of punched cards.
- Obsolete magnetic card typewriters were only recently replaced.
- There is an opportunity to automate many existing manual systems.

In today's environment, there is great pressure to reduce government spending or maintain it at current levels. Yet, service demands continue to increase. Government managers are finding it increasingly difficult to add personnel to respond to growing workloads. Improvement in the productivity of existing personnel is becoming increasingly important. Data processing in general, and current and emerging EDP technology in particular, have the potential to improve personnel productivity and provide the capability to respond to increased workloads

without incurring corresponding increased costs. The State needs to increase its use of current and emerging EDP technology to improve the productivity of state workers.

We conclude that one of the reasons the State has not made as much use of data processing as it could, is that excessive controls have hindered the acquisition and use of EDP technology. As described previously, control should be decentralized, and redundant and unnecessary controls should be eliminated.

***Recommendation.*** *The Legislature and the Governor should encourage increased use of EDP technology and modernization of existing automated systems to improve the productivity of state personnel. In doing so, the State should be prepared to make additional expenditures for developing and improving its information systems and acquiring EDP resources. However, such expenditures should not be authorized unless commensurate benefits can be demonstrated to equal or exceed the costs.*

*As indicated in the second section of this chapter, the organization of the State's EDP resources should be restructured to encourage and facilitate the use of EDP rather than to control and restrict it.*

### Lack of Departmental Accountability

As indicated in Chapter 2, prior studies have recommended that EDPD's central services should be charged back or sold to user departments under a transfer pricing scheme. And as discussed previously under the recommended management model, cost accounting and chargeback systems are important components of management control.

Administrative Directive 1977-2 (AD77-2) indicates that EDPD may "enter into a cost sharing agreement with other State agencies to provide EDP related services." However, EDPD continues to receive a direct appropriation from the general fund for the services it provides to the departments. While EDPD sends invoices for some services related to federal programs, essentially EDPD does not bill the departments for the services it provides.

For all practical purposes under the current environment, a department has unlimited access to an expensive resource the department is not required to pay for. This situation results in a lack of departmental accountability for the use of EDPD's resources.

In addition, the current situation contributes to a problem of coordination between the departments and EDPD. The departments are not required to contract for EDPD services in advance and they are not billed for services used in excess of estimates. As a result, there is a tendency to underestimate, or fail to thoroughly communicate, departmental requirements for EDPD's resources. This causes difficulties in EDPD's planning efforts and it can result in the need to acquire hardware, personnel, and other resources that were not anticipated.

Finally, the current situation requires that EDPD maintain sufficient computer processing, personnel, and other resources to respond to unknown peak demands for services. This can result in the State paying for more resources than it really needs.

***Recommendation.*** *The Legislature should enact legislation requiring that EDPD operate on a self-sustaining basis as an internal service fund (or revolving fund) rather than as part of the general fund. As such, EDPD should maintain cost accounting and chargeback systems and bill user departments for services provided.*

*EDPD should operate on a not-for-profit basis, and charges to user departments should be based on the costs of services provided. Standard rates for EDPD's services should be established annually. If actual costs for the year exceed amounts billed, the user departments could be billed for additional year-end charges to cover the deficit. If charges for the year exceed costs, the user departments could receive credits. Alternatively, the difference could be retained in the internal service fund and EDPD's rates could be adjusted to make up the deficit or eliminate the excess in subsequent years. In any event, under an internal service fund arrangement, EDPD's rates should be adjusted annually so they match actual costs as closely as possible.*

*With EDPD operating as an internal service fund, user departments should negotiate service agreements with EDPD annually and they should include anticipated EDPD costs in their budgets.*

*To ensure continuing efficiency and the reasonableness of the charges that would be proposed by EDPD, the departments should have the option to secure the services of commercial service bureaus or consultants where the services would be cheaper than EDPD's, where expertise is not available at EDPD, or where the services cannot be provided within the time required by the users.*

The foregoing recommendation is in support of holding departments accountable for their use of EDP resources. It is also in support of holding EDPD accountable for its service charges to the departments. While the departments should be allowed to use commercial service bureaus or consultants as a safeguard against unreasonable charges, EDPD should enjoy a significant cost advantage over the private sector in providing EDP services. The principal advantage is that there is no profit margin that EDPD needs to recover. In addition, under current state

policies and practices, EDPD does not have to bear some of the direct expenses that are significant costs of doing business by private concerns. These include such expenses as rent, utility costs (electricity), taxes (income, excise, real property), and payments for equipment already in place. For the size of EDPD's operations, these avoided costs can amount to many thousands of dollars a year.

**Inappropriate Priority Setting**

The Governor's EDP Advisory Committee was organized in 1978 to establish statewide priorities for the development of computer assisted information systems. The committee meets quarterly to set priorities for, and review the progress of, major EDP projects. The committee establishes one statewide priority list for the major EDP projects for all the departments.

As of September 30, 1985, the updated list of priorities included the following:

- Thirty-three projects have been completed since the committee's establishment of the list in April 1978.
- Fourteen projects have been removed from the list:
  - One was completed as part of another project.
  - Four were combined with other projects currently on the list.
  - Two are to be developed at a future date.
  - Three were removed due to a lack of progress in development efforts.
  - Four were removed for other reasons.
- Twenty-five projects are currently on the list to be completed; several are under development but most have not been started:
  - Seven have been on the list for seven years.
  - Ten have been on the list for 3-5 years.

— Five have been on the list for 1–2 years.

— Three have recently been added to the list.

This approach to setting statewide priorities for specific departmental systems is contrary to the concept of giving departments authority and responsibility for the EDP resources they use and holding them accountable for the results. In addition, this approach is contrary to the priority setting process of the recommended EDP management model described previously.

***Recommendation.*** *The role of the Governor's EDP Advisory Committee should be revised. The committee should not set priorities for, and monitor progress of, specific departmental EDP projects. Instead, the committee should set priorities for, and monitor progress of, EDP projects aimed at developing common systems and shared data bases used by multiple departments.*

### Lack of Broad Representation for Statewide Priority Setting

The members of the Governor's EDP Advisory Committee have been from the Department of Budget and Finance, the Department of Accounting and General Services, the Governor's office and intermittently another department on a rotating basis. The committee is chaired by the representative from the Department of Budget and Finance and staff support is provided by EDPD. In recent years, the designated representative from the Governor's office has not been available to attend the quarterly meetings of the committee.

As indicated previously, the role of the committee should be to set priorities for, and monitor the progress of, common systems projects. The setting of priorities for common systems requires broader representation than two or three

departments. While B&F and DAGS are two of the larger users of EDPD's central facility, other departments also use EDPD's facility, and they are likewise impacted by decisions made by the committee.

***Recommendation.*** *The membership of the Governor's EDP Advisory Committee should be reconstituted to provide for broader representation regarding statewide priorities. Department heads or their designees from representative large and small departments should be assigned to the committee. Alternatively, all the departments could be represented on the committee. Because the opportunities to develop common systems are limited in number, the committee members' work efforts should not be burdensome.*

### The Organization of the State's Electronic Data Processing System

The State's statutes are silent regarding the organization and management of the State's EDP resources. As a result, there is no legislative policy guiding the direction of the State's EDP function. The policy direction comes instead from the Governor's Administrative Directive 1977–2.

In the following paragraphs, we comment on the inappropriateness of AD77–2 in today's environment, and we recommend a restructuring of the organization of the State's EDP system. Because of the importance and impact of the restructuring on the entire State, we believe that the Legislature should enunciate a policy regarding the organization and management of the State's EDP resources, and that the Governor should replace AD77–2 with a new administrative directive implementing the legislative policy.

**The State's data processing concept.** The concept of the State's EDP function is defined in AD77-2 as "a large central computer facility and data base accessed by minicomputers connected to the central facility by communication lines. The minicomputers will be remotely located in centralized areas to give departments distributed processing capability backed up by the computing power, speed and data handling capabilities of the central facility."

The concept of distributed data processing described in AD77-2 is appropriate in light of today's technology. The concept is well supported by the current trends in EDP management described previously. However, the specific language of AD77-2 is too limiting where it describes minicomputers. Microcomputers and other computer-based equipment can now be connected to a central facility in a distributed processing configuration.

**University of Hawaii.** Under AD77-2, the Director of Finance has the responsibility to "exercise functional and operational control over all data processing equipment and personnel in the State of Hawaii." EDPD carries out this responsibility on behalf of the Director of Finance.

In September 1985, Governor George R. Ariyoshi directed that arrangements be made to grant the University of Hawaii relative autonomy from the state administration's control. As a result of this directive, the Director of Finance will no longer have functional or operational control over the University's EDP function. Hence, the sections of AD77-2 pertaining to the University of Hawaii are no longer appropriate.

**Operational control.** AD77-2 charges the Director of Finance and EDPD with "operational control of all EDP hardware and software in the State central facility, plus satellite computer installations located throughout the State, excluding the Department of Transportation." According to AD77-2, the satellite computer

installations are to be staffed by EDPD personnel. However, under AD77-2, state agencies have "operational control of all teleprocessing devices (i.e., visual display terminals and associated equipment)."

Having EDPD operate, staff, and control the central computer facility is appropriate. EDPD has demonstrated that it can provide central computer services to state agencies. However, emphasis should be placed on building and maintaining a service oriented computer utility operated by EDPD. The utility services should include computer processing, telecommunications networking, common systems development and maintenance, and shared data base development and maintenance. In addition, the computer utility services should include systems development and maintenance for agencies when such a capability does not exist within those agencies.

Having individual agencies operate and control their teleprocessing devices is appropriate and practical. However, having EDPD staff the departmental computer installations as indicated in AD77-2 is inappropriate because it is contrary to the concept of giving the departments authority and responsibility for the EDP resources they use and holding them accountable for the results.[1]

Having the departments operate and control their own computer facilities is consistent with the ideas presented in earlier chapters regarding a recommended EDP management model and the current trends related to the organization and management of the EDP function. Also, the departments are nearly unanimous in their expressed desires for greater autonomy relative to the EDP function.

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1. It should be noted that most of the departmental computer installations technically have not been satellite installations because they have been stand-alone computers not linked to EDPD's computers.

Further, over the last several years, various departments have acquired minicomputers and microcomputers for departmental use. In practice, the departments, including the Departments of Social Services and Housing, Education, and Planning and Economic Development, rather than EDPD, have staffed their departmental computer installations and have maintained operational control of the EDP hardware and software in their departments.

**Functional control.** AD77-2 charges the Director of Finance and EDPD with functional control (approval) "of all EDP hardware and software acquisition, whether by lease or purchase." It also charges the director with functional control of all agencies' requests for any contracted EDP services provided from outside state government, regardless of the source of funds. In addition, the directive charges the Director of Finance and EDPD with functional control of the establishment, reclassification, and filling of permanent and temporary EDP positions.

By having functional control over EDP hardware, software, contract services, and personnel, the Director of Finance and EDPD essentially have total control over a department's or an agency's expenditures for data processing. When exercised to its fullest extent, such broad control can be detrimental to a department's ability to carry out its mission. As indicated previously, requiring approvals at each request for an EDP resource acquisition adds unnecessary steps and introduces unnecessary delays. But more importantly, central control over specific departmental EDP expenditures is contrary to the concept of giving departments authority and responsibility for the EDP resources they use and holding them accountable for the results.

As long as a department has received approval for its programs and its budgets, it should be able to allocate its resources in the ways its management decides will best accomplish program goals within available funds.

AD77–2 is inappropriate in charging the Director of Finance and EDPD with functional control of essentially all the State's EDP resources. Each department and agency should have functional control of its own EDP resources.

**Statewide planning.** AD77–2 assigns to the Director of Finance and EDPD the responsibility for aggregating individual department and agency EDP biennial plans into a statewide EDP plan. This responsibility is consistent with the concepts described in this report regarding a recommended EDP management model, current EDP management trends, and the State's EDP planning process. As operator of the State's central computer facility, EDPD is in the best position to develop the statewide EDP plan. Therefore, having EDPD responsible for the statewide EDP plan is appropriate.

**Cost sharing agreement.** AD77–2 specifically indicates that "a cost sharing agreement may be entered into between a State agency and the Department of Budget and Finance for the purpose of billing the requesting agency for EDP related services performed by EDPD." As indicated previously, a cost accounting and chargeback system for EDPD's operations provides an essential mechanism for holding departments and agencies accountable for their use of EDP resources. Hence, cost sharing agreements are appropriate.

**Technical leadership.** AD77–2 charges the Director of Finance and EDPD with the responsibility "to provide technical leadership in the field of data processing, mechanization and computer use." Such leadership is appropriate and consistent with the recommended EDP management model and the current trends in EDP management described previously. Indeed, technical leadership should receive greater emphasis.

As the operator of the State's central computer facility, EDPD is in an excellent position to provide technical leadership to the State. Such leadership

should be in the form described previously in Chapter 3 under the *Changing Role of the Electronic Data Processing Manager.* That is, EDPD should be "oriented towards facilitating, guiding, and promoting change" rather than controlling it. EDPD should use leadership techniques such as "communication and education processes, standards (e.g., for data, communication, privacy and security), and other indirect controls (e.g., steering committees, policies, guidelines, and individual persuasion)." In general, EDPD should provide proactive advisory services to the departments and agencies to assist them in applying current and emerging user-dominated EDP technologies.

**Organizational placement.** Finally, there is the consideration whether EDPD's organizational placement in the Department of Budget and Finance is appropriate. In this report, we have stressed the importance of viewing the EDP function as a *service* function rather than as a control function. However, the principal mission of B&F, its orientation, and its environment revolve around *control.* This is by no means a criticism of B&F. Indeed, control is B&F's job. However, since EDPD's function should be *service,* the function had best be performed in an environment where control is not the dominating influence.

In the City and County of Honolulu, EDP is organizationally constituted as a separate department. However, the State Constitution's limitation on the number of executive departments has been a significant constraint over the years in the Legislature's consideration of additional departments. Of all of the existing executive departments where EDPD might more appropriately be located, it appears that the Department of Accounting and General Services is the likeliest candidate. The department does have some control functions, such as preauditing, but its control is not as pervasive as B&F's. Its principal mission is to provide statewide

services and support services to the rest of state government. Such a mission would be consistent with the performance of EDP functions.

***Recommendation.*** *The State needs to make a major and fundamental change in its policy regarding the organization and management of its EDP resources. The Legislature should enunciate a new policy which encourages, rather than controls, the cost-effective use of EDP technology as a means for improving the quality, efficiency, and effectiveness of the State's programs and services. The new policy should emphasize the following:*

- *The functional and operational control over data processing should be transferred from the Department of Budget and Finance (and EDPD) to the departments. The departments should be given the authority and responsibility, and they should be held accountable, for their efficient and effective use of data processing. Control over EDP expenditures should be exercised through the State's normal program planning and budgeting process.*
- *EDPD should be service oriented.*
  - *EDPD should continue to provide computer processing, systems development and maintenance, training, and other centralized EDP services to the departments. However, EDPD should operate as an internal service or revolving fund. The departments should negotiate service level agreements with EDPD, the departments should budget for EDPD services, and EDPD should bill the departments for the services it provides.*
  - *EDPD should provide increased proactive EDP coordinating, advisory, and consultative services to the departments to facilitate the cost-effective use of EDP technology.*

- *Increased use of EDP technology and modernization of existing automated systems should be encouraged to improve the productivity of state personnel and increase the quality, efficiency, and effectiveness of state programs and services.*

*In formulating the new policy, the Legislature should consider the placement of EDPD in the State's organizational structure. It will be essential for EDPD to operate with a service orientation. Currently, EDPD resides in the Department of Budget and Finance, a department whose mission is primarily control oriented. Given the State's current organizational structure, the Department of Accounting and General Services, whose mission is primarily service oriented, would be the logical alternative organizational placement for EDPD. EDPD should be placed in the department or agency which can best ensure that EDPD operates with a service orientation.*

*Once the legislative policy has been established and the placement of EDPD has been determined, the Governor should issue a new administrative directive. The directive should guide the implementation of the policy and it should set forth the specific roles and responsibilities of the organizations involved in the operation and management of the State's EDP resources.*

The organizations whose roles and responsibilities need to be specified include the following:

**Department users.** These are the individual managers, supervisors, and staff members who use EDP resources in the performance of their work.

**Department management.** This group consists of the department heads and other executive level managers of a department.

**Department electronic data processing services.** This organization includes the managers and staff members responsible for performing a department's EDP systems development, maintenance, and operation functions. It also includes the department's data processing coordinator.

**EDPD utility services.** This organization is the part of EDPD that provides central computer utility services. The utility consists of EDP systems development, maintenance, and operation functions performed on behalf of the departments and agencies.

**EDPD advisory services.** This organization is the part of EDPD that provides technical leadership and proactive EDP advisory services to the departments and agencies.

**Governor's EDP Advisory Committee.** This committee establishes priorities for and monitors major EDP projects for the development of common systems and shared data bases.

**Other agencies.** These include the Department of Budget and Finance, the Office of the Attorney General, the Department of Accounting and General Services, and the Department of Personnel Services, all of whom play important roles in managing the State's EDP function.

Our recommendations for the specific roles and responsibilities of these organizations are outlined in the following exhibits under the EDP management elements of planning, priority setting, execution, and control.

## Exhibit 6-1

## Planning

### Department Users

- Develop strategic and operating program plans
- Identify information needs
- Develop program budgets

### Department EDP Services

- Develop strategic and operating EDP plans
- Incorporate technology in EDP plans
- Develop EDP budgets
- Negotiate service level agreements with EDPD Utility Services

### Department Management

- Approve departmental program plans
- Approve departmental EDP plans
- Approve departmental budgets
- Review and concur with the statewide EDP plans

### EDPD Utility Services

- Assist departments develop EDP plans
- Develop strategic and operating plans for the EDPD Utility Services
- Incorporate technology in EDPD Utility Services plans
- Develop budget for the EDPD Utility Services
- Negotiate service level agreements with departments

### EDPD Advisory Services

- Develop standards and guidelines for EDP planning
- Review and comment on departmental and EDPD Utility Services plans
- Assist departments develop EDP plans
- Develop statewide strategic and operating EDP plans
- Incorporate technology in statewide EDP plans
- Identify the need for common systems and shared data bases
- Research and promote emerging technology

### Department of Budget and Finance

- Approve departmental budgets

## Exhibit 6–2

## Priority Setting

### Department Users

- Prepare project valuation assessments for major EDP projects
- Prepare service requests for small EDP projects and maintenance activities

### Department EDP Services

- Assist in preparing project valuation assessments and service requests

### Department Management

- Establish departmental policies for priority setting
- Approve project valuation assessments and service requests
- Set departmental priorities for major EDP projects and service requests
- Sponsor common system and shared data base projects as appropriate

### EDPD Utility Services

- Assist users in preparing project valuation assessments and service requests

### EDPD Advisory Services

- Establish standards and guidelines for project valuation assessments and service requests
- Review and comment on project valuation assessments
- Recommend common system and shared data base projects to the Governor's Advisory Committee

### Governor's Advisory Committee

- Set priorities for common system and shared data base projects
- Recruit sponsoring departments for common system and shared data base projects
- Support departmental budget requests for common system and shared data base projects

## Exhibit 6–3

## Execution—Personnel Recruiting, Hiring, and Training

### Department EDP Services

- Recruit, hire and administer departmental EDP personnel
- Participate in staff transfer program with EDPD Utility Services
- Participate in statewide EDP training program
- Provide EDP staff training to supplement statewide EDP training program

### Department Management

- Approve EDP training expenditures
- Comply with DPS policies and procedures

### EDPD Utility Services

- Recruit, hire and administer EDPD Utility Services personnel
- Participate in staff transfer program with departments
- Develop and conduct statewide EDP training program
- Participate in statewide EDP training program
- Provide EDP staff training to supplement statewide EDP training program
- Comply with DPS policies and procedures

### EDPD Advisory Services

- Recruit, hire and administer EDPD Advisory Services personnel
- Identify and suggest to DPS necessary changes to EDP personnel practices
- Identify and suggest to EDPD Utility Services necessary changes in statewide EDP training program
- Assist in conducting training on emerging technology

### Department of Personnel Services

- Establish and monitor compliance with EDP personnel practices
- Assist EDPD Utility Services in developing and conducting statewide EDP training program

## Exhibit 6–4

## Execution—Resource Acquisition

### Department Users

- Initiate requests to acquire EDP resources
- Conduct competitive procurements

### Department EDP Services

- Initiate requests to acquire EDP resources
- Conduct competitive procurements
- Negotiate EDP vendor contracts

### Department Management

- Approve requests to acquire EDP resources
- Approve EDP vendor selections
- Approve EDP contracts

### EDPD Utility Services

- Assist departments with EDP resource acquisitions and contract negotiations

### EDPD Advisory Services

- Establish EDP compatibility standards and acquisition guidelines
- Assist departments with EDP resource acquisitions and contract negotiations
- Review and comment on technical content of EDP contracts
- Maintain and disseminate model EDP RFIs, RFPs and contracts to department EDP functions
- Negotiate statewide EDP volume purchasing discounts and master contracts
- Assist DAGS in establishing procurement standards and guidelines

### Attorney General

- Review EDP contracts to ensure they are legally sound

### Department of Accounting and General Services

- Establish and monitor compliance with EDP procurement standards and guidelines
- Review EDP contracts to ensure funds are available and procurement standards are followed
- Assist in determining how economies can be realized through statewide EDP volume purchasing discounts and master contracts

## Exhibit 6–5

## Execution—Systems Development, Maintenance, and Operations

### Department Users

- Participate in systems development and maintenance projects

### Department EDP Services

- Perform systems development and maintenance projects
- Participate on quality review teams for systems development projects
- Operate departmental computers

### Department Management

- Approve products of phases of systems development projects
- Approve completed systems maintenance service requests

### EDPD Utility Services

- Provide systems development and maintenance services to departments
- Provide central computer operations services to departments
- Provide user liaison and customer support services to departments
- Provide proactive consulting services to departments
- Participate on quality review teams for systems development projects
- Perform systems development and maintenance services for common system and shared data base projects

### EDPD Advisory Services

- Develop standards and guidelines for systems development projects
- Participate on quality review teams for systems development projects
- Provide proactive consulting services to departments

## Exhibit 6–6

## Control

### Department Users

- Conduct post implementation reviews of systems development projects

### Department EDP Services

- Plan and control departmental systems development and maintenance projects
- Prepare progress reports for major projects
- Participate in post implementation reviews of systems development projects
- Schedule and control departmental computer operations
- Develop, implement and maintain system security, privacy and other internal controls
- Measure and report on the performance of Department EDP Services
- Monitor performance of the EDP program and adjust EDP plans and actions accordingly

### Department Management

- Approve system design alternatives analyses
- Monitor progress and approve continued funding of major projects
- Approve completed post implementation reviews
- Monitor compliance with operational and management controls
- Monitor performance of the EDP program and adjust program plans and priorities accordingly

### EDPD Utility Services

- Assist in planning and controlling systems development and maintenance projects
- Plan and control common system and shared data base projects
- Prepare progress reports for major projects
- Participate in post implementation reviews of systems development projects
- Schedule and control central computer operations
- Develop, implement and maintain system security, privacy and other internal controls
- Measure and report on performance of the EDPD Utility Services
- Monitor performance of the EDP program and adjust EDP plans and actions accordingly

EDPD Advisory Services

- Develop standards and guidelines for management controls
- Develop standards and guidelines for system security, privacy and other internal controls
- Review and comment on system design alternatives analyses
- Review performance of the EDP program and recommend changes

Governor's Advisory Committee

- Monitor progress and approve continued funding of common system and shared data base projects

# Chapter 7

# ELECTRONIC DATA PROCESSING PLANNING

Hawaii state government's increasing reliance on electronic data processing (EDP), coupled with rapid advances in EDP technology, necessitates having an effective EDP planning mechanism in place to meet the State's growing information processing requirements.

In Chapter 4, we reviewed the nature and role of EDP planning relative to a state government environment. In this chapter we examine the actual use of EDP planning by the State.

## Summary of Findings

The State has recently made progress toward improving its EDP planning process. However, an improved detailed EDP planning methodology is needed for EDP strategic and operational planning at departmental and statewide levels. And continued attention is needed to improve the overall quality of the plans and the corresponding project valuation assessments (PVA).

## The Nature and Role of Electronic Data Processing Planning

The nature and role of EDP planning in state government are described in our discussion of an EDP management model in Chapter 4 of this report. As indicated in that discussion, effective management of EDP begins with departmental program

goals, objectives, and plans; and approved departmental budgets containing revenue and expenditure plans for the EDP function. EDP budgets must be derived from a well-defined EDP planning process which results in the development of both strategic and operational EDP plans. In addition, statewide EDP plans are needed to coordinate individual departmental EDP plans and optimize the use of the State's EDP resources where appropriate.

### The Electronic Data Processing Planning Process in the State

The existence of an EDP planning methodology is important to ensure that program goals and objectives are addressed in the EDP planning process. Moreover, it establishes a standard for development of uniform EDP plans in the departments. Because the State is currently upgrading its EDP planning process, a complete methodology has not yet been finalized.

The Department of Budget and Finance realized that the former approach to EDP planning in the State needed to be improved. The Electronic Data Processing Division (EDPD) subsequently initiated the Distributed Information Processing and Information Resource Management (DIPIRM) planning process in response to this need. Because active user participation is critical to the success of any planning process, EDPD requested that the departments develop their own DIPIRM plans as input into the statewide DIPIRM plan. All departments seeking to develop information systems were required to develop DIPIRM plans.

Each department's plan describes: departmental background information, existing departmental data processing and office automation systems and resources,

departmental requirements for information processing, priorities, and schedules for systems development and implementation, policies and procedures for information resource management, and system support services.

In addition, the plans include project valuation assessments for the departments' high priority projects.

The DIPIRM planning process is a significant positive step because it represents the first coordinated EDP planning process by all departments. Prior to the DIPIRM planning process, very few departmental data processing plans had been completed.

To assist the departments in implementing their DIPIRM plans, a $1.4 million priority fund was budgeted in fiscal year 1986. Part of the rationale for the fund is that departments have been reluctant to prepare EDP plans because only limited funds have been available to EDPD and the departments to implement new application systems.

It is expected that the State will use this funding mechanism for only one more year. At that time, the DIPIRM planning process should be sufficiently established to allow the individual departments to fund their EDP activities through the normal state budgeting process.

Because formalized EDP planning was new to many of the departments, EDPD took several steps to facilitate the DIPIRM planning process, including the following:

- To determine the status of data processing in the departments, a detailed inventory was taken of data processing, word processing, data communication, and related office equipment throughout the state government.

- To aid the departments in the preparation of their plans, EDPD prepared and distributed a set of guidelines for the DIPIRM plans. Use of the guidelines resulted in uniform organization of the departmental plans.
- To encourage the proactive participation of EDP users within the departments, EDPD initiated the formation of departmental Distributed Information Resource Management committees to prepare and continuously update their plans. In addition, a statewide DIPIRM committee has been formed with representatives from EDPD and user departments. Its current objectives are to develop the guidelines for reviewing the completed plans and allocating the priority fund, and to recommend the method for funding the departmental DIPIRM planning process in the future.

In addition to the assistance provided by EDPD, most of the departments enlisted the help of outside data processing professionals to prepare their DIPIRM plans. Of the 13 plans we reviewed, 8 were prepared with the assistance of Wang, 2 with IBM's help, 1 with help from Northwest Regional Educational Labs, and 2 by the departments on their own. Time and resource constraints, coupled with the desire to produce quality plans, were cited as the most common reasons for using outside assistance.

Having reviewed the departmental DIPIRM plans, EDPD is incorporating the results into a statewide DIPIRM plan. At the time of our review, only an outline of the statewide plan was completed. The outline indicates that the plan will describe the State's EDP program, its problems, and its directions; the statewide distributed processing, data communications, and office automation networks; the status of

departmental automation efforts; and an action plan and budget for implementing the plan.

EDPD required the preparation of project valuation assessments for the projects each department plans to complete in the next biennium. The project valuation assessment process evolved from the State's systems development methodology, SDM/70. A PVA is essentially a cost benefit analysis or feasibility study. The completed PVAs are used to quantify the cost-effectiveness of the applications for each department and determine their rank as an aid in allocating the $1.4 million priority fund. Common systems (identical applications used in separate departments) were given the highest priority by the DIPIRM committee.

### Conclusions

The DIPIRM planning guidelines include elements of both strategic and operational EDP planning. For example, the definition of information processing requirements points to strategic planning, while the PVAs, project priorities, and implementation schedules point to operational planning. EDPD indicated that it did not include some important strategic planning tasks in the departmental DIPIRM guidelines. EDPD wanted to scale back the effort so that the departments would not be overwhelmed with their first DIPIRM planning process.

Nevertheless, attempting to combine strategic and operational planning in a single plan handicaps the DIPIRM planning process. This combined approach is contrary to the accepted methodology of having the strategic plan provide the framework for directing the operational plan. Separating the strategic and operational plans into separate documents would further improve the State's EDP planning process.

Use of hardware vendors for assistance in the DIPIRM planning process should be re-evaluated. Hardware vendors have a significant financial interest in the implementation of the plans. Their recommendations may be correctly or incorrectly perceived as not being objective. For example, one vendor identifies image processing as a desirable application to be implemented while it is the only major source for that technology. Other states have specific procedures in place to avoid this potential conflict of interest. Such procedures exclude hardware vendors from bidding on equipment or services derived from any plans they prepare on behalf of the State.

Although past plans indicate increasing demands for EDP services in the State, the current budget document does not reflect this growth in the personnel, hardware, or software expenditure projections through 1990. The improved DIPIRM planning process should allow EDPD to include more meaningful projections in its biennium budget.

Considering the short time period for preparation, the brevity of the guidelines, and the newness of the process, the departmental DIPIRM plans we reviewed are of good quality. However, there are a number of specific areas where the plans could be improved. For example, while the plans include lists of development projects, they generally do not include either the applications, or the data and location architectures we would expect to find in strategic EDP plans. Some of the plans also include specific hardware configurations without indicating the relationships between the hardware and the departments' information processing requirements and transaction volumes. Furthermore, the project valuation assessments included in the plans are not prepared to the level of detail or thoroughness we would expect to see as justification for major EDP projects.

*Recommendations*

*An improved, detailed Distributed Information Processing and Information Resource Management planning methodology should be developed by EDPD. It should address both strategic and operational EDP planning at departmental and statewide levels. Several planning models are available for use, such as the Business Systems Planning approach and the Concept/90 strategic planning methodology. EDPD should evaluate these and other EDP planning methodologies.*

*Departmental and statewide strategic EDP plans should be developed and updated at least each biennium. Departmental and statewide operational EDP plans should be developed each biennium and updated annually. The strategic plans should cover the same six–year period as the program budget projections. The operational plans should cover the biennium.*

*As indicated in a previous chapter of this report, a project valuation assessment should be used as one of the key checkpoints in the life cycle of a systems development project. Department management should place greater emphasis on thorough preparation of project valuation assessments.*

## Chapter 8

## MANAGEMENT CONTROL

Management control consists of policies, standards, procedures, methodologies, guidelines, and productivity aids to ensure that electronic data processing (EDP) resources are being acquired and utilized efficiently and effectively. In this chapter, we discuss our findings related to the Electronic Data Processing Division's (EDPD) management control and focus on those aspects where opportunities exist for making improvements or where situations merit special comment.

### Summary of Findings

1. A management improvement program, which includes action plans for correcting problems and making improvements in the State's EDP system has been initiated within the past year by the Department of Budget and Finance (B&F) and EDPD. The improvement program should be expected to span a period of two or three years to be fully effective.

2. There is a perception that the State offers lower salaries than the private sector or other governments in Hawaii for computer programmers and data processing systems analysts. However, we found that the State's salary schedule for these positions does not deviate significantly from corresponding salary schedules reported in national surveys. And despite opinions to the contrary, EDPD's rate of turnover for programmers and analysts appears to be below national averages.

3. The State's standards and procedures for EDP contracting and resource acquisition need to be improved. Specific procedures need to be more formally documented and better communicated to the departments. Sole source EDP procurements should be limited. EDP-related contracts should be reviewed by qualified personnel to ensure that the contracts are technically sound and that they protect the State's interests. The State should continue to expand its use of volume purchasing agreements and master contracts for EDP resources. And the State should establish a policy preventing hardware vendors from initially serving as consultants in studies which involve the recommendation of hardware and subsequently providing the recommended hardware to the State.

4. EDPD needs to improve its computer performance management and capacity planning functions to optimize the performance of existing hardware and software and better plan for upgrades to meet future demands. In this regard, service agreements between user departments and EDPD are needed to facilitate the performance management and capacity planning functions and to provide a means for the departments to measure EDPD's performance.

5. Significant productivity improvements could be made in EDPD's operations in the areas of systems development and computer operations. Continued emphasis is needed by EDPD on using fourth generation systems development and data base management software. While EDPD operates large, sophisticated, state-of-the-art computers, certain aspects of the operation of the computers are outdated and inefficient. There is a great need for thoroughly reviewing EDPD's computer room operations and evaluating and implementing alternatives to modernize and enhance the operations.

## Electronic Data Processing

## Management Improvement Program

The Department of Budget and Finance and EDPD have recognized the need for improving the State's EDP program in general and EDPD's performance in particular. Two recently prepared documents demonstrate this recognition.

The first is the February 1985 *Report to the Governor on the Status of the State's Electronic Data Processing Program* prepared by the Department of Budget and Finance. The second is a notebook prepared recently by EDPD management containing elements of a management improvement program for EDPD.

The report to the Governor itemizes a number of challenges and issues facing the State in its use of EDP. The report summarizes the status of the State's EDP program within EDPD and the departments. It also itemizes a number of problems facing EDPD in the areas of planning, personnel, application systems development, user relationships, technical EDP training, and facilities. In addition, the report itemizes several problems facing the departments in the areas of increased user demand for EDP services, staff support, lack of management understanding and commitment, education and training, and an absence of plans.

The report also identifies some of the major trends in the State's use of computers: greater movement toward distributed data processing; development of a strategy for improved information resource management (i.e., managing data and information as a statewide resource); and increased use of microcomputers, word processing, and office automation.

In conclusion, the report states that "EDPD has initiated an ambitious and aggressive program of improvements for the next two years." Some of the major

components of the program cited in the report are initiation of an improved EDP planning process involving the development of Distributed Information Processing and Information Resource Management (DIPIRM) plans; development of strategies for information resource management; establishment of an Information Resource Center to assist users in locating data and information, evaluating hardware and software, and solving computer-related problems; establishment of a computer network; provision of increased education and training; initiation of cost-control programs; and development of a program to monitor third party contracts.

Internally, EDPD management has taken steps to assess its own problems and develop plans for correcting them. This process started with a management planning session in which problems were itemized and objectives were discussed. One result of this process is a notebook containing elements of an internal management improvement program. The notebook contains a prioritized list of problems; descriptions of the problems and their impact on EDPD's performance; and action plans for correcting the problems, including detailed work steps, personnel assignments, and scheduled completion dates.

### Personnel

Our interviews with data processing coordinators and managers in the various departments and with managers in EDPD revealed two general personnel concerns. First, almost without exception, the managers expressed concern that the State's pay scale is low. They believe the State's salaries are lower than those for equivalent positions in other governmental entities and the private sector, particularly for computer programmers, analysts, senior technicians, and managers.

The belief was also expressed that the City and County of Honolulu has a pay structure that provides qualified EDP professionals higher compensation for equal work. The perceived differences in salaries were cited as the reason the State has difficulty hiring and retaining EDP personnel.

Second, managers and data processing coordinators expressed concern that too many trained people are leaving the State for other jobs. They perceive this turnover of personnel to be excessive and problematic. They believe the turnover rate is higher than normal. Furthermore, they believe the loss of trained people is a problem because of the resulting losses of continuity and the delays and high costs involved in recruiting, hiring, and training qualified replacements. One of the reasons most frequently cited for the high turnover was that the State is not able to pay salaries high enough to retain good people.

**Salaries.** In our review, we attempted to validate the perceptions that problems exist with the State's salary structure for the key EDP job classifications of computer programmer and data processing systems analyst. We selected these classifications because they were said to be the biggest problems, they represent the greatest number of personnel in professional positions, and they relate to authorized and filled positions in EDPD and in the departments.

The results of our analysis indicate that the State's salary schedule for computer programmers and data processing systems analysts does not deviate significantly from corresponding salary schedules reported in national surveys. Furthermore, we found that the pay scale used by the City and County for these job classifications provides equal compensation for equal work.

In our analysis of the salary levels, we reviewed the following documents: State of Hawaii job classification specifications for programmer and analyst

classifications; City and County of Honolulu job classification specifications for programmer and analyst classifications; State of Hawaii salary schedules; *Datamation* magazine's 1985 salary survey; and a publication by Robert Half of Hawaii, Inc. titled *Prevailing Financial and Data Processing Starting Salaries, 1985.*

In the following sections we compare State of Hawaii EDP job classification specifications to those of the City and County of Honolulu, and the State of Hawaii EDP salary scale to data processing salary scales reported in the national surveys.

***State of Hawaii electronic data processing job classification specifications compared to those of the City and County of Honolulu.*** We compared the classification specifications of the State of Hawaii to those from the City and County of Honolulu to find the closest match, position for position, for programmers and analysts. We used the following as the matching criteria:

- Typical tasks assigned to an incumbent at that level.
- General experience requirements for the particular classification.
- Supervisory experience, if any, required for the particular classification.

Although the perception is that salaries are better at the City and County, our comparison of classification specifications reveals only a difference in the analyst series numbering scheme. We find that the salary ranges paid for essentially equal duties and experience are the same. For example, the job classifications indicate the duties and the salary range for the Computer Programmer II position are essentially the same for the City and the State. As another example, the job classifications indicate the duties and the salary range for a Data Processing Systems Analyst (DPSA) I at the City are essentially the same as those of a DPSA III at the State.

However, we also find one difference. The City and County expresses its experience requirements in whole years while the State uses half-year intervals. The result is that the State requires six months more experience than the City and County for entry into certain levels in the series.

Exhibit 8-1 displays a comparison of State and City and County job classifications. It shows the number of years of specialized, supervisory, and total experience required for each level of the computer programmer and the data processing systems analyst classifications.

***State of Hawaii electronic data processing salary scale compared to data processing salary scales nationally.*** We compared salary information collected from the State to that reported by the *Datamation* and Robert Half surveys.

The *Datamation* survey presents brief descriptions of the duties associated with the position titles used to distinguish between various classifications. There are fewer job titles in the Robert Half survey than in the *Datamation* survey, so they do not match the State's programmer and analyst series on a one-for-one basis. Nevertheless, we matched survey descriptions and position titles as closely as possible with the State's classification specifications to arrive at the most equitable comparison.

In the Robert Half survey, salaries for positions in the data processing field in Hawaii are said to be 15 percent below the national average. Because the *Datamation* survey is based on averages derived from the continental United States, we applied the 15 percent geographical variance factor derived by Robert Half to the *Datamation* data to develop adjusted salary levels for Hawaii.

Exhibit 8–1

Comparison of Selected State of Hawaii
and City and County of Honolulu
Data Processing Job Classifications

| Range | Class Title | Level | | Specialized Experience* | | Supervisory Experience* | | Total Experience* | |
|---|---|---|---|---|---|---|---|---|---|
| | | State | City | State | City | State | City | State | City |
| SR 12 | Computer Programmer | I | I | 0 | 0 | 0 | 0 | 0 | 0 |
| SR 15 | Computer Programmer | II | II | 0.5 | 0.5 | 0 | 0 | 0.5 | 0.5 |
| SR 18 | Computer Programmer | III | III | 1.5 | 1 | 0 | 0 | 1.5 | 1 |
| SR 21 | Computer Programmer | IV | IV | 2.5 | 2 | 0 | ** | 2.5 | 2 |
| SR 24 | Computer Programmer | V | V | 3.5 | 3 | ** | ** | 3.5 | 3 |
| SR 26 | Computer Programmer | - | VI | - | 4 | - | 1 | - | 4 |
| SR 12 | D.P. Systems Analyst | I | - | 0 | - | 0 | - | 0 | - |
| SR 15 | D.P. Systems Analyst | II | - | 0.5 | - | 0 | - | 0.5 | - |
| SR 18 | D.P. Systems Analyst | III | I | 1.5 | 1 | 0 | 0 | 1.5 | 1 |
| SR 21 | D.P. Systems Analyst | IV | II | 2.5*** | 2 | 0 | 0 | 2.5 | 2 |
| SR 24 | D.P. Systems Analyst | V | III | 3.5*** | 3 | ** | ** | 3.5 | 3 |
| SR 26 | D.P. Systems Analyst | VI | IV | 3.5*** | 3 | 1 | 1 | 4.5 | 3 |
| SR 28 | D.P. Systems Analyst | VII | V | 3.5*** | 4 | 2 | 2 | 5.5 | 4 |

* Expressed in years.
** Supervisory aptitude only is required.
*** For DPSA IV and higher, 1 year of the required experience must have been at a level comparable to the DPSA III in the State government.

We calculated the averages being paid to people in EDPD in each of the classifications being reviewed. We also calculated the midpoint of each salary range. This gave us a median indication not affected by the step levels currently occupied by the employees.

Exhibit 8–2 displays a comparison of state salary information to data reported in the *Datamation* and Robert Half surveys. Shown in the exhibit are the State's job classifications, the corresponding *Datamation* and Robert Half position titles, *Datamation* and Robert Half national average salaries and average salaries adjusted for Hawaii, and the State's salary range midpoints and actual average salaries for EDPD.

As shown in the exhibit, the state salary range midpoints and the averages of actual salaries for EDPD personnel do not deviate significantly from Hawaii salaries reported in the national surveys.

However, as the surveys indicate, Hawaii salaries average about 15 percent less than mainland salaries. This fact, coupled with Hawaii's high cost of living, makes it difficult for Hawaii state government, as well as private industry, to compete with the mainland for top quality personnel. Nevertheless, based on the data reported in national surveys, the State's salaries for programmers and analysts appear to be competitive with local conditions.

Because our comparison of salaries was limited, and because so many people expressed concern about low salaries, this issue should continue to be monitored. It may be appropriate for the Department of Personnel Services to evaluate the desirability of conducting further study into the salary situation.

## Exhibit 8–2

### Comparison of Selected State of Hawaii Data Processing Salaries to National Surveys

| Position | | Description | | Thousands of Dollars | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| State Classification | Salary Range | Datamation Position Title | Robert Half Position Title | Datamation National Average For Govt. | Robert Half National Average | Datamation Adjusted Average* | Robert Half Adjusted Average* | State Salary Range Midpoint | Actual Average Salaries for EDPD |
| Computer Programmer II | SR 15 | Junior Applications Programmer | - | 19.6 | - | 16.7 | - | 20.0 | 16.8 |
| Computer Programmer III | SR 18 | Intermediate Applications Programmer | - | 24.4 | - | 20.7 | - | 22.8 | 18.9 |
| Computer Programmer IV | SR 21 | Applications Programmer | Programmer | 25.7 | 24.0 | 21.8 | 20.4 | 26.0 | 23.9 |
| Computer Programmer V | SR 24 | Senior Applications Programmer | - | 30.8 | - | 26.2 | - | 29.8 | - |
| D.P. Systems Analyst IV | SR 21 | Systems Analyst | Systems Analyst | 28.0 | 36.5 | 23.8 | 31.0 | 26.0 | 22.3 |
| D.P. Systems Analyst V | SR 24 | Senior Systems Analyst | Project Leader | 34.5 | 36.5 | 29.3 | 31.0 | 29.8 | 27.1 |
| D.P. Systems Analyst VI | SR 26 | Lead Systems Analyst | Project Manager | 37.2 | 39.0 | 31.6 | 33.2 | 32.7 | 31.5 |
| D.P. Systems Analyst VII | SR 28 | Manager | Manager | 41.6 | 40.5 | 35.4 | 34.4 | 35.8 | 36.7 |

* Adjustments are based on the Robert Half survey showing Hawaii salaries 15% below the national average.

**Turnover.** The number of authorized EDPD programmer and analyst positions have averaged approximately 91 over the last three and one-half years. These positions include branch and section heads who are identified as managers. Based on the data we reviewed, the number of filled positions was 65 as of June 1982, 74 as of June 1984, and 72 as of November 1985.

We also collected information on specific programmers and analysts who had left EDPD during the time period covered by our review. We then considered these departures from several viewpoints and generated the following annualized turnover rates for the different sets of parameters.

The annualized turnover rate, if all 18 programmers and analysts who left EDPD during the period of study are included in the calculation, is approximately 7 percent.

Considering this situation from a broader perspective, the view of the situation as it affects the State as a whole, we calculated the annualized turnover rate excluding two specific types of departures—interdepartmental transfers and retirements. The reasons for these exclusions are outlined below:

- Employees who transfer to another department remain in the state government as viable resources. Because the State retains the benefit of their services, they should not, in our opinion, be considered as totally lost; therefore, their transfers reasonably could be excluded from the turnover statistics.
- Although retired personnel are indeed lost resources, the primary purpose of the investigation into the turnover issue was to attempt to determine what the severity of the problem was and what was causing the problem. Because retired personnel were not induced to leave by adverse state

policies, inequitable salary structures, or any other such problems, their departures are not attributable to a turnover problem. Therefore, they reasonably could be excluded from the turnover statistics.

With these individuals excluded, the annualized turnover rate for EDPD programmers and analysts is less than 5 percent.

During the period of study, the State terminated two employees for less than satisfactory service. Since the State initiated these terminations, rather than their being caused by problems affecting state EDP personnel generally, they too reasonably could be excluded from the turnover statistics.

With these two individuals excluded, the annualized turnover rate for EDPD programmers and analysts is less than 4 percent.

Since many comments were made about the number of people who had left state employment for the City and County of Honolulu, we also looked at where the departing employees went. We found that only one programmer resigned from EDPD to work for the City during the period of study. The most frequent destination for departing employees was the federal government, which managed to attract only four analysts or programmers over three and one-half years.

Regardless of which statistic is used, EDPD's rate of turnover for programmers and analysts is well below national averages. For example, an article in *Datamation* magazine on salaries and related issues (September 15, 1985 issue) reported that the national average for development and maintenance personnel (equivalent to the programmer and analyst classifications that we considered in EDPD) was 8.5 percent for the 1985 survey, down from 10.7 percent in the 1984 survey.

## Electronic Data Processing

### Resource Acquisition

EDPD and user departments acquire a variety of EDP resources in the course of developing, implementing, maintaining, and operating EDP systems. The policies and procedures regarding EDP resource acquisition are established by the Department of Accounting and General Services (DAGS) and EDPD on behalf of the Department of Budget and Finance.

Both DAGS and EDPD are involved in the process of EDP resource acquisition by the departments. For example, under Administrative Directive 77–2, requests for the acquisition of data processing hardware, software, and contract services must be submitted to the Director of Budget and Finance for review and approval. EDPD is the coordinating agency assigned to conduct the reviews. In addition, proposed contracts must be submitted to DAGS for review to ensure that authorized funds are available for the procurements. Requests for the acquisition of communications hardware, software, and consultant services also must be submitted to DAGS for review and approval.

Section 103–22, Hawaii Revised Statutes, requires that expenditures of public money in excess of $4,000 be made through the competitive bid process, except for purchases which do not admit of competition. The burden of proof that a purchase does not admit of competition is the responsibility of the department requesting the sole source purchase. DAGS has the responsibility of ensuring that the intent of the law is not being circumvented and that all expenditures are made in accordance with requirements of the statutes.

The procedures governing the State's EDP acquisition process are not well documented. And according to management personnel we interviewed in the

departments, the specific EDP acquisition procedures and requirements are not well communicated. For example, there are no standard forms in use for requesting approval of an EDP acquisition.

There is an absence of formal guidelines, standards, or requirements for the technical content and format of EDP-related contracts. Published information in this area would help ensure consistency, completeness, and appropriateness of technical specifications as well as general terms and conditions. Furthermore, there is an absence of formal requirements or procedures for EDP technical reviews of contract specifications and related contract language prior to contract execution. Such reviews must be performed by personnel technically knowledgeable in the appropriate areas.

On a limited basis, the State currently uses competitive procurements to establish volume purchasing agreements, master contracts, and master price lists. These procurements permit departments to acquire items covered by the contracts and listed on the price lists without having to conduct separate competitive procurements. We understand that EDPD is planning to expand its involvement in establishing volume purchasing agreements and master contracts. We believe these plans are appropriate and that increased use of the agreements and contracts will make a positive contribution toward increasing the State's use of EDP technology.

We could find no restrictions against allowing hardware vendors who are engaged by the State for studies which recommend hardware acquisitions to subsequently sell such hardware to the State. Indeed, as noted in our discussion of EDP planning, hardware vendors have recently assisted several departments in the preparation of departmental EDP plans which identify specific hardware needs.

***Recommendation.*** *In Chapter 6 of this report regarding the organization of the State's EDP system, we make recommendations for improving the EDP resource acquisition process. Our specific recommendations relate to the realignment of responsibility and control of EDP acquisitions. The Department of Accounting and General Services and EDPD should formalize and document the EDP resource acquisition procedures, and they should clarify and communicate their roles and responsibilities, as well as those of the departments.*

*EDPD should implement procedures and assign qualified personnel for the review of EDP–related contracts to ensure that technical specifications, as well as general terms and conditions, are appropriate and consistent across procurements and that the contracts adequately protect the State's interests. The EDP–related contracts also should continue to be reviewed by legal counsel before they are signed. In this regard, model EDP contracts should be developed and maintained by EDPD. They should include standard terms and conditions, representative technical specifications, standard acceptance criteria, and ongoing performance criteria.*

*The State should continue to limit its use of sole source procurements. Competitive procurements enhance the State's potential to acquire goods and services at considerable savings and they reduce the State's exposure to the possibility of procurements being influenced by conflicts of interest.*

*EDPD also should continue to expand its use of volume purchasing agreements and master contracts to take maximum advantage of competitive procurements of large numbers of like items and to encourage standardization and compatibility.*

*The state administration should establish a policy preventing hardware vendors from initially serving as consultants in studies which involve the recommendation of hardware configurations or specifications and subsequently providing the*

*recommended hardware to the State. This does not mean that hardware vendors must be precluded from contracting with the State to perform consulting services, but in those instances where they do, they should be precluded from profiting financially from their own recommendations.*

**Performance Management and Capacity Planning**

Computer system performance management and capacity planning are technical functions aimed at optimizing the performance of computer hardware and software and planning for upgrades to meet future demands. These functions are normally performed in a large data center like EDPD by a small group of highly skilled and trained personnel. Such individuals typically use a variety of software packages specifically designed to measure the performance of computer systems and assist in planning the hardware and software configurations to optimize performance.

When performed effectively, computer system performance measurement and capacity planning yield substantial benefits for the associated costs. For example, acquisition of additional hardware or software can be delayed until actually needed, terminal response time can be improved, and more work can be processed faster without additional hardware or software. In general, an effective computer performance and capacity planning function can save substantial sums of money.

**Direct access storage device management.** The direct access storage device (DASD) system refers to the computer system disk drives that contain user and system data. It is important that the application, user, and system data sets be isolated in the disk configuration to assure optimum performance of data retrieval. Additionally, it is important to monitor and manage the DASD subsystem to assure:

- The disks are being optimally utilized and space is not wasted.
- The files on the disks are efficiently allocated and not obsolete.
- The disks are organized to optimize performance and data retrieval.

DASD management is not formally performed by EDPD. There is no automated software in place to monitor DASD usage and provide for data migration of obsolete files. As such, this function is seldom performed.

The successful implementation of DASD management would provide positive benefits to EDPD. First, it would assure optimum utilization of the disks. It is common for DASD management and data archiving to save between 10 and 20 percent of DASD space and potentially delay future disk capacity upgrades. The price of the software could be justified with deferrals of equipment upgrades. Additionally, the DASD management function would help assure that the disk configuration is performing optimally.

***Recommendation.*** *EDPD should implement a formal direct access storage device management function. This function should reside in the Computer Systems Services Branch and should be responsible for performing the following duties:*

- *Evaluate the available direct access storage device management software and acquire an automated package to perform direct access storage device management.*
- *Identify the ownership of all system and user data sets. A migration strategy should be developed to isolate like-kind user, application, and system data in the disk configuration.*
- *Develop standards and guidelines regarding size and age limits of disk data sets.*

- *Develop warning and violation reports to notify data set owners of data sets not adhering to standards.*
- *Develop an automated archiving function (using the direct access storage device management software) to migrate obsolete data sets, and data sets that violate standards, to tapes.*
- *Develop procedures to permit users to restore and recreate archived data from tape.*

**Performance management.** Since computer systems are comprised of many complex, interrelated components, tuning and balancing the various components are required to optimize system performance and assure efficient use of the resources. In a highly complex operating environment, such as EDPD's computer configuration, the performance of the application systems and the system in total is affected by many complex performance parameters. Without proper performance tracking reports, it is impossible to ascertain if the computer configuration is optimally tuned and providing the highest quality service to the users.

Effective performance management provides management with the tools to assure that the systems and resources are properly tuned and configured, thus providing adequate cost-effective service to the users. It enables management to monitor service to the users and react rapidly when this service is affected by a performance related problem.

A formal performance management function does not exist within EDPD. There are no procedures in place to monitor and evaluate the efficiency of the computer operating environment. Performance measurements are not formally reported for use in the management control of the EDP system. Instead,

performance data is gathered by various individuals within EDPD and used occasionally to monitor the performance of the computer system components. However, this information is not consistently gathered and summarized in a form that would permit management to make effective decisions regarding computer system performance.

***Recommendation.*** *EDPD should implement a formal performance management function. This function should reside in the Computer Systems Services Branch. In general, this function should be responsible for managing total computer system performance and performing system tuning regularly. Specifically, it should:*

- *Develop management level reports to track the response times and throughput (i.e., workloads processed per hour) of the on-line systems, TSO, ADABAS, and batch jobs. These reports should be developed to track response time and throughput by time of day. The reports should include such items as average response time and throughput, number of on-line transactions and batch jobs, the average central processing unit (CPU) time consumed by each transaction type and batch job category, and the average wait time for each category of work. The data for the reports should be gathered from the various software monitors used at EDPD and maintained in a centralized performance data base. The SAS package used by EDPD has special facilities to create and maintain this data base. Relatively inexpensive software is available that utilizes SAS code to develop management level reports.*
- *The management level reports should provide a historical comparison of daily activity to the trends maintained in the central performance data*

*base. This information can then be used as a basis for evaluating system changes and their effects on system performance and user service. The reports can be used to track the response before and after system and application changes and will provide an indication of the corresponding impacts of the changes.*

**Service level agreements.** Currently there are no service level agreements between EDPD and the users, and hence, there are no measures of acceptable levels of service.

Standards exist for response times for the on-line systems. However, there are no standards for batch job throughput and turnaround or systems development timeliness. Additionally, EDPD does not measure adherence to the standards. The standards that exist are EDPD standards and do not consider the response times, throughput, and timeliness needs of the users required to support their program functions.

Service level agreements are negotiated contracts between the users and the data processing department describing the various services that data processing will provide the users and describing both data processing's and the user's roles in the relationships. Additionally, the agreements describe the user's required performance levels which data processing agrees to provide. Optionally, the agreements could address chargeback issues and agreements to provide rebates or reduce the charge rates for deferred or nonpeak usage.

Service level agreements are an essential management planning tool in a large data processing installation providing service to multiple user organizations. Without service level agreements, the following concerns exist:

- Adequate capacity planning is difficult to perform.

- Work is difficult to effectively schedule.
- Meaningful comparisons of data center performance in relation to user needs are difficult or impossible to make.
- Optimum utilization of existing data processing resources is difficult to achieve.

***Recommendation.*** *Service level agreements should be developed for all users of EDPD. The first step involves holding discussions with the major system users to address data processing service needs. During these discussions, the costs associated with providing different levels of service should be addressed. The discussions should lead to agreements between EDPD and the users. The agreements should address the following points at a minimum:*

- *Level of central processing unit and teleprocessing network availability,*
- *Time requirements for processing test requests,*
- *Terminal response times for all on–line systems,*
- *Production schedules and deadlines,*
- *Peak processing requirements, and*
- *Systems development schedule adherence.*

*Once the agreements are implemented, management reports should be created to monitor service to users. The reports should track deviations from agreed–upon performance levels to provide management with an indication of when corrective actions are needed. The overall benefits of user service level agreements should be improved user awareness and satisfaction with EDPD services.*

**Capacity planning.** EDPD does not use a formal methodology or systematic approach to computer utilization monitoring and capacity planning. Additionally, there are no management level reports in place to track resource utilization and

system capacity on a consistent basis. IBM performs periodic studies for EDPD assessing usage growth using a high level analysis. These studies are not meant as a replacement for internal capacity planning.

Capacity planning addresses the usage of existing computer hardware and focuses on the justification for future hardware to support projected user requirements. Capacity planning provides the necessary level of justification to assure that the correct level of hardware is in place to support the system workload.

EDPD does not have any capacity planning software that would enable it to effectively perform capacity analysis internally. The IBM studies are insufficient for EDPD to use on a continual basis to understand the reasons for growth and evaluate alternatives for delaying computer upgrades and acquisitions. Periodically, EDPD produces some summary statistics of resource usage that are used to analyze the capacity of the system. We do not believe that these reports are sufficient to provide EDPD with the management information necessary to:

- Make effective capacity decisions;
- Identify applications, users, and systems that are contributing to the growth of utilization;
- Track peak load demands to determine if capacity upgrades can be delayed by shifting workloads to nonpeak periods; and
- Validate the accuracy of IBM's studies.

***Recommendation.*** *A formal capacity planning function should be established in EDPD. The function should be responsible for evaluating and selecting a suitable capacity planning methodology. Capacity planning software should be acquired that will allow EDPD to effectively summarize and report on computer usage by applications, users, and systems.*

*The reporting of computer usage should be tied directly to particular departments or program functions of the State. This will provide EDPD and user management with the mechanism to predict future workload growth. The reports should be created to separate usage by shifts within the day. This information can be used to evaluate if workload shifting is possible.*

The implementation of capacity planning by EDPD will provide tangible benefits which include assurances of justified and adequate resources, and it will provide a control mechanism to help reduce future hardware costs. The IBM studies could still be performed periodically to validate the methodology used by EDPD.

**Computer utilization.** As indicated above, summary statistics are not available regarding EDPD's computer utilization. In order to determine the approximate breakdown of computer utilization by department, we reviewed detailed computer job accounting reports provided to us by EDPD. In the process of developing the summary computer usage statistics, we found that EDPD appears to be the largest single user of the central IBM computers, and that there is significant unused capacity on the computers.

Our review in this area was based on reports generated by the KOMAND system, which is the computer job accounting and resource utilization tracking system used by EDPD. We requested from EDPD the reports for all of the codes used to identify the entities receiving service for the most recent 12 consecutive month period available. The reports we received are for the months of October 1984 through September 1985. Because EDPD does not currently perform job accounting or utilization tracking on the IBM 4341 or the Wang VS 100 computers, we were limited in our analysis to information concerning the use of the large IBM 3081, IBM 3033, and IBM 3083 computers. Usage statistics for the IBM 3033

computer are contained in the reports only for the months of October through December of 1984, and statistics for the IBM 3081 computer, which replaced the IBM 3033 computer, are available only for March through September of 1985.

Our analysis looked at the CPU hours for each of the three machines as a measure of the amount of time that the computer is actively involved in the accomplishment of productive tasks. Because the machines process equivalent tasks at differing rates, it was necessary to apply industry accepted conversion factors to the CPU hour values to determine the amount of work performed by each computer in equivalent terms.

The data center at EDPD operates 24 hours a day, seven days a week. This means that during a one week period the data center operates 168 hours. Assuming a 95 percent computer reliability rate (instead of the customary 98 percent or 99 percent), the three computers are each operational for 160 CPU hours during the week. Assuming each computer is inoperable for the equivalent of a full day (24 hours) each week for preventive maintenance and other system maintenance and housekeeping activities, the time available drops to 136 CPU hours per week. Allowing for up to 30 percent of the computer capacity to be required for the operating system and other overhead activities, about 95 CPU hours are available for productive application processing per week, or about 400 CPU hours per month for each computer.

On average for the 12–month period ending September 1985, the KOMAND reports indicate the IBM 3083 computer was used in total about 167 CPU hours a month, or about 42 percent of the available 400 CPU hours. Similarly, the reports indicate the IBM 3081 computer was used about 123 CPU hours a month, or about 31 percent of the available 400 CPU hours for the seven–month period ending

September 1985. It is important to note that these percentages represent total CPU hours averaged over a 24 hour a day processing cycle. It is expected that on-line processing would result in significantly higher percentages of use during day shift prime time operations. Nevertheless, the monthly averages indicate that there is significant unused total capacity in the two large IBM computers operated by EDPD.

Following our analysis of the KOMAND reports, EDPD prepared some reports on prime time use of the IBM 3083 and IBM 3081 computers. The reports indicate that for the seven months from March through September of 1985, the IBM 3083 operated at an average of 50 to 60 percent of capacity and the IBM 3081 operated at an average of 20 to 30 percent of capacity during prime time. While these performance statistics support our analysis, it is critical to note that average usage is only one measure of computer performance. For on-line systems, peak usage is more important. If peak on-line usage exceeds 60 to 80 percent of capacity, terminal response time can degrade by orders of magnitude. The impact of the degradation is dependent on many performance-related factors in the computer and telecommunications hardware and software configurations. Sufficient excess computer capacity must be available so that performance goals can be met during heavy periods of on-line usage. Performance management and capacity planning systems and procedures must be in place to effectively match computer resources with user demands.

***Recommendation.*** *As noted earlier, a formalized computer performance management and capacity planning function should be implemented at EDPD and the requisite tools for analyzing computer performance should be acquired and used. With such functions and tools in place, the acquisition of computer equipment can be scheduled to more closely match total processing workloads, and batch and on-line*

*processing can be more effectively balanced to optimize computer utilization. In addition, computer utilization can be more accurately reported for each individual user.*

**Productivity Improvements**

As labor and other costs continue to rise, it is important to improve the productivity of personnel and other EDP resources. There are two areas in particular where productivity improvements could be made in EDPD's operations. We discuss these areas—systems development and computer operations—in the following paragraphs.

**Fourth generation systems development software.** Fourth generation languages are software tools which have been introduced in recent years to speed the development of application systems by several orders of magnitude. These tools are either end user or programmer oriented. End user tools allow non-data processing professionals to develop their own applications to access data. Programmer oriented tools are used to increase the productivity of the programmers. These fourth generation language tools also facilitate greater end user involvement by contributing to development of more flexible systems which can be modified with less effort.

Although the State had been slow to implement fourth generation language tools, EDPD has embarked on an ambitious program to accelerate their introduction. Most of the effort in this area has focused on installing programmer productivity tools rather than end user development tools on the EDPD computers. In addition to the NATURAL programming language on the IBM mainframe, a Wang system has been obtained that provides an advanced development environment for

the EDPD programmers. On the Wang system, the PACE and SPEED II products are being used in development projects on a pilot basis to assess their actual performance.

In addition, EDPD has established a committee to monitor technological advances in fourth generation languages and other productivity tools, and make recommendations for developing a strategy for the use of such tools and for the selection of specific products. This effort is being performed appropriately in concert with a review of data base management software.

The current version of the SDM/70 systems development methodology does not take advantage of the capabilities of these tools. For example, the accelerated development process provides an opportunity to demonstrate system prototypes to users before a system is fully implemented. The use of a prototype allows users to provide feedback early in the development process based upon their experience with the prototype system. This results in users playing a more significant role in the design and having a greater commitment to the system.

EDPD is in the process of acquiring an updated version of SDM/70 that is said to include the use of prototyping techniques. EDPD has also established a rationale for determining which of its several fourth generation software tools are to be used in a particular software development environment. However, the rationale has not been formalized in the SDM/70 methodology or other documented standards or procedures.

EDPD is also attempting to develop a strategy for coordinating or consolidating the various data base management systems and file access methods it now uses. This strategy is important in migrating to an environment which will support more efficient systems development efforts through more effective use of advanced fourth generation systems development software.

***Recommendation.*** *EDPD should continue to place high priority on using fourth generation systems development software. In particular, emphasis should be placed on the recent committee efforts, the upgrading of SDM/70 and related systems development standards and procedures, and the development of a strategy for consolidating data access methods.*

*In addition, EDPD should continue its efforts to ensure the maximum benefit from its new development tools by avoiding the proliferation of redundant and/or incompatible software. While a particular product may be effective on a stand–alone basis, differences in syntax and procedures can make it difficult to integrate all of the tools into a cohesive software environment.*

*EDPD's selection of productivity tools should pursue a goal of integration so as to present to the developer a single system image, thus reducing the learning curve required to master many different tools. This integrated approach, initiated by AT&T as a "programmer's workbench" has been extended to the development of analyst's and manager's workbenches as well. EDPD should evaluate the use of such workbench techniques.*

**Computer room operations.** EDPD operates large, sophisticated, state–of–the–art computers. However, certain aspects of the operation of the computers are outdated and inefficient. Examples of some of the manual, operator–intensive procedures, and outdated hardware and systems software currently being used by EDPD include the following:

- The processing environment is heavily oriented toward punched cards.
  - Card readers and card punches, the slowest components of a computer system, are used for data input and data output for the large central computers.

— Keypunch machines are used for certain data entry.

— Card sorters are used for sorting large numbers of cards.

— Considerable space is required for storing large numbers of cards.

- Operators control the flow of work into the computer systems by selecting the sequence and timing of loading card decks into the card readers.
- Operators manually control the processing priorities of jobs once they are submitted to the computer.
- Computer programmers are permitted to use the "write to operator" facility to have their programs send messages to and communicate with the computer operators during program execution. When this occurs, the program typically suspends operation and ties up computer resources until it receives a response from an operator.
- While the disk and tape drives can be shared by the different IBM computers, there is no automatic switching capability in place that can be controlled by software programs. Instead, operators must manually switch the drives to the appropriate computers.
- Some IBM 3330 model disk drives are still being used. These drives use removable disk packs which were introduced in the early 1970s. The drives have very limited storage capacity by today's standards, they use more electrical power and generate more heat than equivalent capacity drives available today, and they are more susceptible to damage due to the increased exposure of relatively frequent mounting and dismounting operations. But more importantly, the mounting and dismounting operations require inefficient manual intervention by computer operators.

- There is no automated tape library management system in use at the data center. As a result, the recordkeeping and handling of tapes are more inefficient than they should be.

***Recommendation.*** *The operation of the computer room at EDPD should be thoroughly reviewed and alternatives for modernization and enhancements should be evaluated and implemented as quickly as possible. Some of the many options available for improving EDPD's computer operations are the following:*

- *Phase out the punched card processing methods and equipment by converting to key–to–disk data entry equipment, paper warrants rather than card warrants, on–line data entry, TSO–submitted job control statements, pseudo card readers, etc.*
- *Implement an automated job scheduling system.*
- *Upgrade the IBM operating system software from JES2 to JES3.*
- *Prohibit programmers from using the "write to operator" facility.*
- *Modify the computer configuration to allow for automatic switching of disk and tape drives.*
- *Replace the IBM 3330 model disk drives with current state–of–the–art models.*
- *Implement an automated tape library management system.*

*In general, EDPD should place significant emphasis on upgrading hardware and software and developing standards and procedures for improving the efficiency of the computers and the computer operations personnel, and on training the personnel on the new techniques.*

## Data Base Management

EDPD has cautiously regulated the application of data base technology to application systems development. EDPD recognizes the inherent advantages to maximizing the use of its ADABAS data base management system and is in the process of developing data base policies and procedures. Until recently, lack of adequate vendor support for ADABAS has been an impediment to its use. EDPD has been able to elicit greater responsiveness from the ADABAS vendor. EDPD plans to train more of its staff in ADABAS to improve user support in the data base area.

EDPD is also evaluating data base system products from other vendors for applicability to the state government environment. For example, in addition to ADABAS in the IBM environment, two additional data base systems have recently been implemented to run under the PACE and SPEED II productivity tools on the Wang systems.

EDPD has established a Data Base and Application Development Strategy Committee to "provide input and assistance in the development of a data management strategy for the EDP Division and the State as a whole." The committee is comprised of EDP management and technical personnel. Recently formed, the committee is in the process of finalizing its charter of objectives and purpose.

Preliminary objectives of the committee are "to develop the short-term and long-term policies and strategies that are needed to develop a comprehensive management information data base and the eventual formulation of an Information Resource Management Program" and "to define the organizational and functional roles and responsibilities of the user agencies and the EDP Division regarding data management and data base management system support."

The formation of the committee is an excellent step toward developing needed statewide policies and strategies regarding data bases and data base management systems. However, we believe that a statewide "comprehensive management information data base" is neither desirable nor achievable. Certain shared data bases and data bases which are unique to departments are desirable and attainable. Such data bases should be developed under statewide policies, strategies, standards, and procedures, and they should be implemented using current data base management systems approved as part of the standards.

EDPD has also recently recommended that new application systems be developed, to the extent possible, independent of data base management systems or file access methods. This recommendation is intended to encourage the development of systems which can be changed easily after the new data base standards have been developed and new data base management systems have been implemented. This recommendation is appropriately directed at improving the efficiency and effectiveness of the applications development process.

*Recommendation*

*EDPD should continue to place high priority on the completion of data base and data base management system policies, strategies, standards, and procedures. The creation of a statewide comprehensive management information data base should be de-emphasized. Instead, emphasis should be placed on the overall strategies and policies regarding data management and data base management systems; the definition of roles, responsibilities, and organizational support structures; the evaluation and selection of specific data base management system software tools; and the standards and procedures for using the tools.*

## Chapter 9

## OPERATIONAL CONTROLS

Operational controls are the internal accounting and administrative controls concerned with the safeguarding of assets and the reliability of financial records. Operational controls are designed to provide reasonable assurance that the data center and its contents are physically secure, and adequate plans and procedures are in place to back up important files, programs, and documentation and to recover from processing interruptions.

As part of the annual statewide financial audit, the Department of Accounting and General Services (DAGS) has periodically contracted with certified public accounting firms to conduct reviews of operational controls of the Electronic Data Processing Division (EDPD) data center. These third party reviews evaluate the data center's general controls and the application controls of selected financial systems. The reports on the results of the reviews are used by the management of EDPD, the Department of Budget and Finance, EDPD's users, and the independent auditors of EDPD's users.

As part of our management audit, we reviewed EDPD's progress in implementing improvements in operational controls recommended in prior third party reviews. We also reviewed other issues of significance not addressed in the prior third party reviews.

Summary of Findings

1. EDPD's progress toward implementing recommendations of prior third party reviews has been limited. Outstanding items of particular concern include the following.

- Access is not secured to program source listings stored in the documentation library, job control language procedures stored on disk, and blank warrrants stored in the tape library.
- Policies and procedures are needed for identifying critical application systems for backup and offsite storage.
- Formal written procedures are needed for the systems programming function.
- The payroll system documentation has not been completed; yet the system has been used as a production system for over two years.

2. Our findings related to operational control issues not addressed in prior third party reviews include the following.

- Formal and comprehensive disaster recovery plans have not been established.
- An uninterruptible power supply and a backup generator of sufficient capacity for electrical power are not being used.
- An automated job scheduling system is not being used, and jobs run are not compared to jobs scheduled to ensure that only authorized jobs are run.
- An automated tape library management system is not being used.
- A written plan is needed that details the steps required to complete the implementation of the Resource Access Control Facility (RACF) data security software.

- Improvements are needed in the current implementation of RACF.
- Certain production jobs are being run using test version programs.

**Third Party Review Follow–Up**

EDPD's progress toward implementing recommendations of prior third party reviews has been limited. Outstanding items of particular concern include the following.

**Program source listings.** Program source listings can be accessed by persons who do not have a need to know. Although a closed circuit television monitor is located in the applications documentation library, the program source listings are still otherwise not secured. EDPD is currently looking into the installation of combination locks for the library.

***Recommendation.*** *The program source documentation should be secured in a locked room and access restricted to persons who have a need to know.*

**Job control language procedures.** Access to Job Control Language procedures stored on disk is not secured. The procedures library containing the Job Control Language to run production applications is stored in an on–line disk file and still remains accessible by programmers. Failure to secure access to the procedures library for on–line applications could expose EDPD to risk of errors or irregularities in processing financial accounting applications.

***Recommendation.*** *The procedures library should be secured using the Resource Access Control Facility and access restricted to computer operations personnel only.*

**Blank warrants.** Boxes of blank warrants acquired for use in the last fiscal year were stacked on the floor of the tape library awaiting destruction. The blank warrants were not secured and could be accessed by personnel within the area.

***Recommendation.*** *Pending destruction, blank warrants should be secured and safeguarded from unauthorized access.*

**Blank warrants and bonds.** Blanks for warrants and bonds are stored in the computer vault and accessible to all persons in the data center. A supply of blanks for warrants and bonds which are used in monthly processing are stored in the computer vault located in the data center. This vault remains accessible by all persons within the data center. Physical access controls are not in place to restrict vault access to operators only.

***Recommendation.*** *Physical security controls should be implemented to restrict computer vault access to operators only.*

**Offsite storage.** Backup copies of critical files, programs, and documentation were not located at an offsite storage location. An offsite storage location has been secured, and a bonded courier service transports backup tape files and programs to and from the offsite storage location daily. However, policies and procedures have not been established to identify critical applications or to identify the user departments responsible for backup and storage of those critical applications at the offsite location. Thus, only the computer operations division is backing up and sending critical files and programs offsite. Critical documentation is not stored offsite.

***Recommendation.*** *EDPD should establish policies and procedures for identifying critical applications for backup and offsite storage. The data processing coordinators should designate the persons within the user departments responsible for ensuring that files, programs, and documentation within critical applications are backed up and stored offsite. EDPD should also establish review procedures to ensure compliance with the policies and procedures.*

**Systems programming procedures.** Written procedures relating to systems programming have not been prepared. Our current review indicates that written procedures still have not been prepared. Such procedures should include:

- Periodic review of the PANVALET Worksheet I forms.
- Procedures to be followed when a security violation message is displayed on the CICS Master Terminal.
- Procedures to be followed in the review, approval, installation, testing, and acceptance of enhancements or changes to systems software provided by vendors.

***Recommendation.*** *Formal written procedures should be developed for the systems programming function in general and specifically for the functions listed above.*

**Payroll system documentation.** Payroll system documentation has not been completed. Under current procedures, a developed application cannot be considered a production system until adequate system documentation has been accepted by the computer operations staff. The payroll system, developed over two years ago and used as a production system, is still considered a test system because adequate documentation has not been developed and delivered to the operations staff. Additional programmer assistance is needed to generate the proper documentation. However, EDPD systems and programming management has indicated that this is not a priority issue.

***Recommendation.*** *Increased priority should be given by EDPD top management to develop adequate documentation for the payroll system.*

**Payroll data control function.** To ensure proper segregation of duties and to ensure input payroll integrity, the Department of Accounting and General Services

should consider assuming the data control functions for payroll instead of EDPD. In addition to processing the payroll system, EDPD is also responsible for correcting batch submissions, balancing the payroll change schedules, and accountability of the blank payroll warrants and spoiled printed payroll warrants. No efforts have been made to move responsibility for these functions from EDPD to DAGS.

***Recommendation.*** *To provide proper segregation of duties and to ensure the integrity of payroll data, the user department responsible for the system should assume the data control responsibilities. Appropriate action should be taken to transfer the payroll data control functions to the Department of Accounting and General Services.*

**Unemployment Insurance benefits system documentation.** There is a need to update the system documentation for the Unemployment Insurance benefits warrants application. This application has been in the process of being totally redesigned. However, the system documentation has not been updated.

***Recommendation.*** *The system documentation for the Unemployment Insurance benefits warrants application should be updated prior to its implementation.*

**Other Findings**

Our findings related to operational control issues not addressed in prior third party reviews include the following.

**Disaster recovery planning.** A disaster is defined as the inability to process at the data processing center when one or more of the following events occur:

- The entire data center is totally destroyed.
- The data center and/or equipment are partially destroyed.

- An electrical power failure occurs.
- An environmental failure occurs; e.g., the air conditioning system breaks down.
- Insufficient personnel exist due to labor disputes, toxic conditions, epidemics, or the like.

Considerable time and significant resources have been invested to develop data processing resources at EDPD. However, an up-to-date disaster recovery plan does not exist. Formal and comprehensive disaster recovery plans have not been established.

Although formal disaster recovery plans have not been developed, certain preventive measures have been taken by EDPD in the past, including the following:

- Upon request, tape backups are made of certain critical data files. These tape file backups are rotated to the offsite State Data Records Center. Backup tape storage is also provided in the computer room and in a vault in the tape library area.
- Preventive maintenance of the computer equipment is periodically scheduled.
- An alternative processing site agreement has been signed with the University of Hawaii.

Nevertheless, without a well defined disaster recovery plan, the State's computer operations could be severely disrupted if a disaster occurred.

***Recommendation.*** *As a first step in disaster recovery planning, we recommend that EDPD determine the economic and programmatic impacts of different types of computer disasters. EDPD should then develop a disaster recovery plan that addresses the risks and considers items such as the following:*

- *Processing alternatives for major system hardware and software components.*
- *Backup procedures to be followed by the user departments.*
- *Operations procedures to be used by the operations staff within EDPD.*
- *Processing priorities within each location.*

*We recommend that a committee be established to assist EDPD in drafting the plan. Committee members should include user department data processing coordinators, and operations, systems and programming and technical support staff from EDPD.*

**Electric power supply backup.** An uninterruptible power supply or a backup generator of sufficient capacity for electrical power is not being used for the EDPD data center. However, a power conditioner for the computers is installed. While there have not been significant power outages in the last few years, we were told there are many occurrences of power surges to disk drives which cause production jobs to ABEND (ABnormally END). Some form of electrical backup is usually provided for a data center of this size. A continuous power supply becomes increasingly important as more applications are converted to on-line processing.

***Recommendation.*** *Alternative power supplies including an uninterruptible power supply, backup generator, and dual electrical feeders available from the electric company should be evaluated by EDPD. The alternative solutions and the corresponding costs associated with implementation should be evaluated so that the most appropriate and cost-effective alternative can be selected for implementation.*

**Job scheduling system.** An automated job scheduling system is not being used by EDPD. While there are approximately 1,800 jobs run per day, the data control group manually schedules the jobs. The operations staff runs the jobs and sends the

output back to the data control group. However, no person is assigned to review the list of jobs actually processed against the list of jobs scheduled to verify that all jobs scheduled were run and that all jobs run were authorized.

The use of an automated job scheduling system can improve the internal controls over job processing. But more importantly, as noted elsewhere in this report, such a system can greatly increase the productivity of the computer operations personnel and improve the throughput of the computer systems.

***Recommendation.*** *EDPD management should evaluate the costs and benefits of an automated job scheduling system. In any event, jobs run should be compared to jobs scheduled on a daily basis.*

**Automated tape library management system.** An automated tape library management system is not being used by EDPD. Currently, EDPD maintains over 12,000 magnetic tapes used for production processing. While the data control section maintains a tape activity log for movement of tapes, no automated system is used. An automated tape library management system would provide EDPD with better control over its inventory of magnetic tapes and tape files. In addition to maintaining accountability for magnetic tape files and helping in the determination of when tapes should be scratched, sent to offsite storage, cleaned, or discarded, the system would increase the productivity of computer operations personnel.

An automated tape library management system is customarily used in a data center of this size.

***Recommendation.*** *EDPD should assign high priority to acquiring and implementing one of several commercially available automated tape library management systems.*

**Data security plan.** A data security plan, incorporating the RACF software security package, has not been fully implemented. The RACF security package, purchased and installed over the last three years, is not fully implemented for all critical data sets. In addition, a master data security plan relating to the use and control of RACF has not been formally developed or approved by EDPD management.

The overall strategy for determining data security requirements should originate with EDPD management. However, with RACF, some responsibilities for determining data security requirements are shifted from EDPD management to the system users, since data security requirements are directly related to data ownership issues. An overall strategy has not yet been developed. Also, an overall data security implementation plan that addresses the EDPD and user responsibilities does not exist.

***Recommendation.*** *To assure successful implementation of data security, EDPD should prepare a written plan that details the steps required to complete the Resource Access Control Activity (RACF) implementation. The plan should address:*

- *EDPD security policy and directives regarding data, program, and password security, describing the user and EDPD responsibilities for protecting data and maintaining password confidentiality;*
- *Ownership responsibility for establishing files in the system;*
- *Guidelines, policies, and procedures for adding new users, deleting access for terminated or transferred employees, and deactivating unused user access codes;*
- *Involvement and communication required by the user divisions to assure that security is promptly implemented;*

- *Guidelines for password expiration intervals and rules for new password creation;*
- *Guidelines for protecting system started tasks and TSO and CICS transactions;*
- *Tape volume protection including bypass label processing and interfaces to the tape library management system;*
- *Disk storage (DASD) volume protection to provide an increased level of security and control by restricting user access to specified DASD volumes;*
- *Protection of authorized program libraries, authorized programs, and sensitive utility functions;*
- *Implementation of computer operations procedures governing control over RACF and emergency bypass controls required in the event an operational emergency occurs;*
- *Documentation of the required data security organizational structure and responsibilities by level for all system administrators;*
- *Development of standard data security administration procedures. With RACF implementation, procedures should be centralized and controlled by the security administrator to assure that appropriate authorization and management approval have occurred before access is permitted; and*
- *Target dates and tasks required to meet implementation deadlines.*

**Data security system implementation.** The implementation of the RACF software security package used by EDPD could be improved. Specifically, the following items were revealed during our review of the RACF data security system and procedures:

- All critical resources and data sets are not secured by RACF. Only TSO and operating system data sets are secured.

- The command to remove the RACF security may be accessed by the computer operators in the computer room using the master terminal.
- Two former employees, terminated in April 1985, still were authorized to sign on to the system through RACF because their profiles have not been revoked.
- RACF reports are not generated to the security officer on a regular basis.

***Recommendation.*** *EDPD should include improvements in the implementation of Resource Access Control Facility in the data security plan. In the interim, the Resource Access Control Facility access authorizations for terminated employees should be revoked immediately. In addition, protection of critical data sets should be given top, immediate priority.*

**Running production jobs with test programs.** Certain production jobs are being run using test version programs. While EDPD procedures require that all production jobs run using production programs, there are certain jobs which are temporarily running with test versions of programs located in programmers' private libraries.

Production jobs running with test versions of programs are not adequately protected from unauthorized changes.

***Recommendation.*** *EDPD procedures should be enforced to prohibit running production jobs with test versions of programs.*

# PART IV

# RESPONSES OF THE AFFECTED AGENCIES

## COMMENTS ON THE RESPONSES OF THE AGENCIES

Copies of the preliminary draft of this audit report were transmitted to the Department of Budget and Finance (B&F) and the Department of Accounting and General Services (DAGS). The copies of the letters of transmittal are included here as Attachments 1 and 2.

The State Comptroller, responding for DAGS, expressed agreement that the electronic data processing (EDP) function should be service-oriented, that the applicable administrative directive should reflect such service orientation, and that DAGS would be the most logical department for the EDP function.

While agreeing for the most part with the recommendations relating to management control and operations, the Director of Finance disagrees with other recommendations, including the recommendation to assign the EDP Division to DAGS.

The Legislative Auditor received the following comments from Deloitte Haskins & Sells concerning the responses of the agencies:

> *"We are pleased that the comments from both departments represent very constructive responses to the audit.*
>
> *"We are particularly pleased that B&F's specific comments indicate concurrence with 29 of 34 recommendations in the report.*
>
> *"We would expect B&F to disagree with the three recommendations relating to the organization of the State's EDP function and the need for decentralized control. B&F's current mission under Administrative Directive 1977-2 includes centralized control and coordination of the State's various EDP resources.*
>
> *"B&F's comments present a number of arguments for centralized control. Those arguments identify the major risks involved with decentralizing control to the departments; specifically: loss of accountability, inefficient use of EDP systems and resources,*

*uncoordinated systems and data bases, incompatible hardware and software, and lack of cost–effective solutions to information processing problems. It is important to note that these risks are also present in an environment of centralized control.*

*"Nevertheless, it is critical that the Legislature, the Governor and the department heads recognize these risks and deal with them appropriately. As indicated in the report, we believe there are several key points in the EDP management process where controls must be exercised to minimize these and other risks. The five key control points are:*

*"1. Review and approval of strategic and operational EDP plans*

*"2. Prioritization, review and approval of project valuation assessments or feasibility studies*

*"3. Review and approval of project progress reports, with particular emphasis on the system design alternatives phase*

*"4. Analysis and approval of post implementation reviews*

*"5. Ongoing monitoring of key performance indicators for each major component of the EDP function, and appropriate corrective actions.*

*"As the report indicates, we believe the primary responsibility for exercising the key controls over the State's EDP system resides with the department heads. Nevertheless, as indicated in the list of responsibilities in Exhibits 6–1 through 6–5 on pages 93–99 of the report, the State's central control and service agencies play essential roles in promoting and monitoring the efficiency and effectiveness of the State's EDP system. These agencies, including the EDP Division (EDPD) of B&F, should provide increased proactive EDP coordinating, advisory and consultative services to the departments to facilitate, rather than restrict, the cost–effective use of EDP technology and minimize the risks identified above. The roles and responsibilities set forth in Exhibits 6–1 through 6–5 complement the State's constitutional system of checks and balances.*

*"In the report, we cite a number of problems with the existing organization and control of the State's EDP system. In addition, we describe a model for managing the EDP function which is a composite of successful management practices we as consultants have observed throughout government and private industry. The model serves as a baseline against which to evaluate practices of the management of EDP functions in general and state government EDP functions in particular. The model represents current practices which have evolved over many years.*

*"Our recommendations call for distributed information processing with decentralized control. We believe it is cost–effective for the State to operate both a central computer utility and distributed departmental computers. However, as noted previously, control over the use of EDP resources should be decentralized to the departments.*

*"Our recommendations state that the Legislature should consider the placement of EDPD in the State's organizational structure and that EDPD should be placed in the department or agency which can best ensure that EDPD operates with a service orientation. We believe that the legislative process of developing a new policy which encourages, rather than controls, the cost–effective use of EDP technology should include further analysis and debate regarding the placement of EDPD in B&F, DAGS or another agency.*

*"With respect to the organization of EDPD itself, B&F's comments regarding the need to reorganize EDPD are appropriate. In our audit, we took the position that new legislative policy should be established first, followed by issuance of a new administrative directive setting forth specific roles and responsibilities such as those identified in Exhibits 6–1 through 6–5. Once the policy, roles and responsibilities are enunciated, EDPD should be reorganized accordingly.*

*"In the interim, however, it is appropriate for EDPD to reorganize to better support its current mission. We concur with the planned organizational changes within EDPD outlined in B&F's comments. We also recommend that specific functions be included for improved computer performance management and capacity planning, and for improved user liaison in the systems development area.*

*"With respect to personnel salaries and employee turnover, B&F disagrees with our findings and conclusions. We believe or analysis is based on correct interpretation of factual evidence. However, some of B&F's comments appear to contradict our findings. As indicated in the report, it may be appropriate for the Department of Personnel Services and B&F to conduct further study into the salary and turnover situation. In this regard, consideration should be given to factors other than salary which impact the State's ability to recruit and retain qualified EDP personnel.*

*"DAGS' comments regarding the desire to maintain central control over the use of telecommunications resources parallel the arguments presented by B&F. We believe that telecommunications, as well as data processing utility services, should be provided centrally to gain the benefits of economies of scale. However, in keeping with the decentralized control environment we have recommended, DAGS should review and comment on, rather than approve, departmental plans and requirements for telecommunications."*

ATTACHMENT 1

THE OFFICE OF THE AUDITOR
STATE OF HAWAII
465 S. KING STREET, RM. 500
HONOLULU, HAWAII 96813

CLINTON T. TANIMURA
AUDITOR

April 7, 1986

*COPY*

Mr. Hideo Murakami
State Comptroller
Department of Accounting and General Services
State of Hawaii
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Murakami:

Enclosed are three copies, Nos. 4, 5, and 6, of our preliminary report on the *Management Audit of the Electronic Data Processing System of the State of Hawaii.* If you have any comments on the recommendations which affect your department, we ask that you submit them in writing to our office by April 28, 1986, for inclusion in the final report.

The Governor and the presiding officers of the Legislature have been provided with copies of this preliminary report.

Since the report is not in final form and changes may possibly be made to it, we request that you limit access to the report to those officials whom you wish to call upon for assistance in your response. Please do not reproduce the report. Should you require additional copies, please contact our office. Public release of the report will be made solely by our office and only after the report is published in its final form and submitted to the Legislature.

We appreciate the assistance and cooperation extended to the Deloitte Haskins & Sells audit team.

Sincerely,

Clinton T. Tanimura
Legislative Auditor

Enclosures

ATTACHMENT 2

THE OFFICE OF THE AUDITOR
STATE OF HAWAII
465 S. KING STREET, RM. 500
HONOLULU, HAWAII 96813

CLINTON T. TANIMURA
AUDITOR

April 7, 1986

*COPY*

Mr. Jensen Hee
Director of Finance
Department of Budget and Finance
State of Hawaii
State Capitol
Honolulu, Hawaii 96813

Dear Mr. Hee:

Enclosed are three copies, Nos. 7, 8, and 9, of our preliminary report on the *Management Audit of the Electronic Data Processing System of the State of Hawaii.* If you have any comments on the recommendations made in the report, we ask that you submit them in writing to our office by April 28, 1986, for inclusion in the final report.

The Governor and the presiding officers of the Legislature have been provided with copies of this preliminary report.

Since the report is not in final form and changes may possibly be made to it, we request that you limit access to the report to those officials whom you wish to call upon for assistance in your response. Please do not reproduce the report. Should you require additional copies, please contact our office. Public release of the report will be made solely by our office and only after the report is published in its final form and submitted to the Legislature.

We appreciate the assistance and cooperation extended to the Deloitte Haskins & Sells audit team.

Sincerely,

Clinton T. Tanimura
Legislative Auditor

Enclosures

ATTACHMENT 3

GEORGE R. ARIYOSHI
GOVERNOR

HIDEO MURAKAMI
COMPTROLLER

MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING
AND GENERAL SERVICES

P. O. BOX 119
HONOLULU, HAWAII 96810

April 25, 1986

RECEIVED
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OFC. OF THE AUDITOR
STATE OF HAWAII

Mr. Clinton T. Tanimura
Legislative Auditor
465 S. King Street
Honolulu, HI 96813

Dear Mr. Tanimura:

Thank you for allowing us the opportunity to review and respond to the preliminary draft of the "Management Audit of the Electronic Data Processing System of the State of Hawaii."

As noted in your report, the focus of the audit was the Electronic Data Processing Division (EDPD) of the Department of Budget and Finance (B&F). However, since several of the recommendations are directed at the Department of Accounting and General Services (DAGS), we would like to offer our comments on those recommendations.

Approval from DAGS Relating to Telecommunications Equipment and Services

The report states that the process of developing and implementing an application system involves many steps and too many centralized controls and that, once a project has been approved and included in the budget, approvals outside the user department should not be required. With particular reference to DAGS, the report states "(t)he department should coordinate with DAGS regarding telecommunications requirements throughout a major EDP project so that DAGS can appropriately plan for the impact of the project on its resources. However, once the department's executive management approves the project, specific approval should not be required from DAGS before work can proceed."

We agree that it is important for departments to coordinate their telecommunications requirements with DAGS. We believe, however, that approval by DAGS is necessary to ensure the effective and efficient use of telecommunication resources.

A report prepared by consultants entitled "Telecommunications Master Plan for the State of Hawaii" recommends communication resources to be managed centrally. This is to allow the State to take advantage of the economies afforded by deregulation, and new technology. In addition, the limited availability of radio frequencies, the scarcity of tower sites, the costly construction of conduit spaces within buildings and across public right-of-ways, and the constriction of these conduits resulting from the increasing demands by users make it essential for telecommunication resources to be centrally managed.

It should be noted that DAGS' telecommunications approval is primarily directed to ensuring the proper scoping of communications resources required to support a project so as to avoid unnecessary delays and minimize unanticipated costs during implementation.

Organizational Placement and Functional Control

Throughout the report, the point is repeatedly made that the EDP function should be viewed as a service function rather than a control function. The report states that the EDP function should be performed in an environment where control is not the dominating influence. Since the Department of Budget and Finance's mission is primarily control oriented, the report recommends that the Electronic Data Processing Division be placed in a department or agency which can best ensure that EDPD would operate with a service orientation. The report concludes that "(g)iven the State's current organizational structure, the Department of Accounting and General Services, whose mission is primarily service oriented, would be the logical alternative organizational placement for EDPD."

On a directly related matter, the report states that the Governor's Administrative Directive 77-2 (AD 77-2) gives the Director of Finance and EDPD functional control over all EDP hardware, software, contract services and personnel. Such broad control, the report states, can be detrimental to a department's ability to carry out its mission. The report concludes that "AD 77-2 is inappropriate in charging the Director of Finance and EDPD with functional control of essentially all the State's EDP resources. Each department and agency should have functional control of its own EDP resources."

We concur that the EDPD function should have a service function orientation, and AD 77-2 should reflect such orientation. We also concur that conceptually, other than the creation of a separate EDP department, DAGS would be the most logical placement of the EDP function.

EDP Resource Acquisition

The report notes that both DAGS and EDPD are involved in the process of EDP resource acquisition by the departments; but that the procedures governing the acquisition process are not well documented. The report recommends that DAGS and EDPD formalize and document the EDP resource acquisition procedures, and clarify and communicate their roles and responsibilities, as well as those of the departments.

Because of the technical nature of the computer environment, we agree that assistance should be furnished to the departments (particularly to those departments with little or no data processing staff) in developing technical specifications and contracts. The report recommends that EDPD implement procedures and assign qualified personnel to assist the departments.

On the acquisition of computer resources, DAGS' principal activities include: 1) the preparation of or assistance in the preparation of bid specifications; 2) the review and approval of requests by departments for sole source acquisitions; and 3) the determination of compliance with statutory requirements for competitive bidding. DAGS will continue to prepare or assist in the preparation of bid specifications for the departments.

On the matter of the statutory requirements for competitive bidding, the requirements have been of long standing and well known by all state departments and agencies. Thus, we do not think further documentation is needed. With regard to sole source acquisitions, however, the need for documentation of procedures became apparent. Thus, in August 1985, DAGS issued guidelines for departments to follow in requesting the Comptroller's approval on sole source acquisition of computer equipment. We believe the guidelines serve to clarify and establish the requirements for sole source consideration. In this regard, we agree with the recommendation in your report that the State should continue to limit its use of sole source procurements.

****

We again thank you for giving us the opportunity to review and comment on the report.

Very truly yours,

HIDEO MURAKAMI
Comptroller

# ATTACHMENT 4

GEORGE R. ARIYOSHI
GOVERNOR

JENSEN S. L. HEE
DIRECTOR

DENNIS K. GODA
DEPUTY DIRECTOR

HAWAII PUBLIC EMPLOYEES HEALTH FUND
EMPLOYEES' RETIREMENT SYSTEM
PUBLIC UTILITIES COMMISSION
OFFICE OF THE PUBLIC DEFENDER

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
STATE CAPITOL
P.O. BOX 150
HONOLULU, HAWAII 96810-0150

DIVISIONS:
BUDGET, PLANNING AND MANAGEMENT
ELECTRONIC DATA PROCESSING
FINANCE

Ref: 3614e

April 28, 1986

RECEIVED
APR 28 4 30 PM '86
OFC. OF THE AUDITOR
STATE OF HAWAII

Mr. Clinton Tanimura, Legislative Auditor
Office of the Legislative Auditor
Kekuanaoa Building, Suite 500
465 South King Street
Honolulu, HI 96813

COMMENTS ON MANAGEMENT AUDIT OF THE
ELECTRONIC DATA PROCESSING SYSTEM
OF THE STATE OF HAWAII

Dear Mr. Tanimura:

Thank you for the opportunity to review and provide comments to the draft report issued by your office entitled "Management Audit of the Electronic Data Processing (EDP) System, State of Hawaii." We are (a) providing general comments on the report, (b) a more specific review and commentary on the recommendations made by your consultant, and (c) a summary of our review. However, we would like to state that due to the complex subject matter of electronic data processing, the broad coverage of the management and technical issues addressed in the report, and the time available for review, the responses we have prepared are not as comprehensive as we would have liked. Nonetheless, we believe that the responses we have prepared provide a good beginning for continuing dialogue on edp in the Executive Branch of Hawaii State Government.

## A. GENERAL COMMENTS

The following are the general comments of the Department of Budget and Finance (DB&F).

### Recognition that Progress Is Being Made

We appreciate the acknowledgment made in the report that the State's EDP Program has been making progress in many areas. As stated in the auditors' draft report, the State's EDP Program has made considerable progress in:

- Initiating and developing a Distributed Information Processing and Information Resource Management (DIPIRM) project plan;
- Establishing an Information Resource Center;
- Initiating Volume Purchase Agreements with vendors;
- Improving communications with users by scheduling monthly meetings with user agency data processing coordinators;
- Establishing committees dealing with specific areas of concern;
- Initiating publication of quarterly newsletters to keep users informed of edp activities;
- Continuing a good computer operations program;
- Developing an internal management plan;
- Examining productivity tools and methods to improve analyst/programmer productivity;
- Acquiring other fourth-generation software tools such as PACE and SPEED II to improve the productivity and speed of application systems development;
- Developing and installing a local area network;
- Examining the various approaches to improved data base management; and,
- Preparing a report to the Governor on the status of the State's EDP Program.

All of these efforts are directed at improving data processing services to the users and demonstrate DB&F's firm commitment to improve the State's EDP Program and achieve the objective of using edp technologies to improve the efficiency and effectiveness of Hawaii State Government.

We also appreciate the recognition given by the auditors of the problems identified in our Report to the Governor on the Status and Future Directions of the State's Electronic Data Processing Program (February, 1985), Electronic Data Processing Division (EDPD) Internal Management Plan (November, 1985), and in meetings with our staff.

Many recommendations were of an "EDPD should continue"-type and support many of the activities that have either been developed in the past two years or are in the process of being developed. We were pleased to find that the problems identified by our staff were significant enough to be mentioned in the report.

## Agreement with Comment that Improvements are Needed

At the same time, we also agree with the report's assessment that improvements to the State's EDP Program are needed. The Report to the Governor on the State's EDP Program in 1985, the internal management plan, and activities conducted by the Program over the past years are based on the premise and understanding that improvements to the State's EDP Program are needed. However, we believe that improvements are rapidly being made and that there are few specific problems identified in the auditors' draft report that are not already being addressed by DB&F and EDPD.

## State's EDP Program is "Proactive"

DB&F is concerned that the audit is based in large part on the premise that DB&F is "control" and not "service" oriented. The premise is inaccurate and contradicted by the many positive aspects of the report that illustrate the effort being made to provide more services. DB&F calls attention to the positive service improvements made in the past years. The auditors' draft report quotes DB&F, in its Report to the Governor on the Status and Future Directions of the State's Electronic Data Processing Program, that:

> "The Electronic Data Processing Program is undertaking an ambitious and aggressive program to assist agencies to better integrate computer technologies into governmental operations. The Program is responding to the needs of user agencies by improving management, analysis and design, moving toward distributed processing, use of microcomputers, adaptation of word processing and office automation, and improved user support services. Should the EDP Program succeed in implementing this program over the next two years, State government should be in a good position to achieve the promises of improved information resource management."

The statement shows the strong commitment DB&F has to what the auditors have called a "proactive" EDP Program. More importantly, the statement is supported by the actions taken by DB&F to promote the EDP Program. The program, in essence, has long moved away from a "current services" approach by initiating many of the programs identified by the auditors and developing many others not mentioned in the report. DB&F is truly surprised and disappointed that the auditors who conducted the study failed to summarize those directions and represent them in a cohesive and coherent manner. DB&F feels that if the auditors accurately represented the program directions, the auditors would have concluded that DB&F is indeed very "service" oriented.

## Recommendations Based on Inadequate Problem Analysis and a Conceptual Model Instead of Real-World Management Analysis

DB&F is concerned that many of the key recommendations were developed not to solve specific management problems but rather to meet the "requirements" of the management model and philosophy explicated from pages 19 through 57 of the draft report. As a result, some of the key recommendations appear to be solutions in search of a problem.

Much of this could have been avoided if the problems of the State's EDP Program were clearly defined in terms of "causes" and "consequences." To illustrate this point, let's use an example of a classic transportation "problem."

A transportation problem statement could be stated as: "There are not enough highways." If this definition and conceptualization of the problem were accepted blindly, then there can only be one solution--build more highways. But, if the "problem" were clearly identified in a causal model based upon emphasizing "problems" as "consequences" of a range of factors, then a different and more concrete understanding of the problems could have been developed and a new set of alternative solutions identified.

To continue the example--what if the problem were defined as "traffic congestion" or "length of time it takes to get to work" instead of "not enough highways," then many more solutions such as mass transportation, staggered work hours, build more highways, and so forth could be developed. By identifying alternatives for solving problems, it is then possible to better analyze the relative effectiveness and efficiency of a particular solution.

DB&F believes that the auditors' recommendations clearly misdefined the problem. By defining the problem to be that EDPD is located in the "control oriented" DB&F, there could only be one solution--transfer EDPD to another agency or make it a separate department. If the auditors were more precise in defining the problems as consequences (e.g., length of time of review, time required to prepare justification for software declared standard by DB&F) and their causes (i.e., insufficient staff at EDPD to handle increased volume of requests, agency strategy of obtaining separate approvals for equipment under $4,000 to avoid competitive bidding), then it may be possible to develop recommendations to solve specific problems as well as identify many different alternative solutions. Instead, the auditors chose to rely on inadequate problem analysis and an academic and unsubstantiated model to draw its conclusion and so biased the analysis to one alternative.

## Organizational Placement and Reorganization

DB&F disagrees with the auditors' recommendations that to improve services, the Program should be transferred to the Department of Accounting and General Services (DAGS). There are many reasons for our disagreement.

First, the auditors' conclusions were biased by the way in which the problem was defined. As stated earlier, by defining the problem to be that EDPD is located in the "control oriented" DB&F, the auditors could only recommend one solution--transfer EDPD to another agency or make it a separate department. The report identifies problem areas in the State's EDP Program and develops recommendations around the perceived problem areas but it never addresses the issue of why--what are the causes for the problems. It is one thing to identify problems--another to understand why the problems occurred in the first place. To assert solutions without an understanding of the causes of problems is unsound and unjustifiable.

Second, the auditors' recommendation to transfer EDPD from DB&F is based on the premise that DB&F is "control" rather than "service" oriented. DB&F disagrees with this premise and suggests that the report confirms this fact. DB&F questions the auditors' statement when the audit itself identifies so many new edp programs and initiatives that soundly demonstrate our commitment to an improved service program. Clearly, the auditors have downplayed, but could not suppress, the significance of DB&F's progress in improving the State's EPD Program.

Third, the proposal of moving EDPD from DB&F to DAGS on the basis that the mission of DB&F is "control oriented" and the mission of DAGS is "service oriented" is without foundation when you consider the role of each department in State Government today. Both departments do not provide direct public service, but they provide support services to other State departments. As with all central service agencies, the services include some control functions which are necessary to achieve the goals of the Executive Branch.

DB&F is tasked with the Executive Branch's budgetary function; and without the controls or procedures that must be adhered to in this area, the State would be faced with budgetary chaos. The budgetary procedures are democratic in nature with all parties providing input into the process. These controls are necessary in order to provide "service" to departments within the Executive Branch. Similarly, DAGS is a much larger department by far over DB&F, and they also have had to institute control functions in order to provide the "service." Controls over procurement, building space, accounting, payments, and telecommunications are just some of the broad areas where DAGS exerts control.

DB&F also notes that the presumption in the audit that DAGS is a service agency is contradicted by other sections of the report that note the "control functions" that DAGS has in the areas of accounting systems, purchasing, contracting, funds certification, and telecommunications. DAGS performs many important control functions and is not the "service" organization that the auditors would have readers believe. All central service agencies have elements of both service and control.

Fourth, DB&F feels that placing EDPD under DAGS or any other department will not necessarily improve the service nature of the division. With the many positive statements made by the auditor about the EDP "proactive" Program, it seems that the recommendation to move the division to another department is ill-timed and unsubstantiated.

Fifth, even if the auditors' recommendations were enacted, the organizational transfer would most likely not solve the problem. Whether or not one State agency is more or less "control oriented" than another is debatable. But more significantly, it is not of sufficient import on which to base such a major recommendation.

The problem of a "control orientation" is basically a managerial problem based on the interpretation of managerial functions, responsibilities, and

activities. There can be no fundamental changes in attitudes and actions about controls without modifying this management perception, unless the State were willing to accept a completely "decentralized" model of edp management model. The "problem," simply stated, cannot be "reorganized away." It will not be solved by moving EDPD to DAGS or to any other department. It is a management problem that requires a managerial solution and DB&F has made the managerial commitment to improve and solve problems of the program.

Sixth, the placing of EDPD under DAGS rather than keeping it under DB&F should be done if there is shown a clear advantage to the State through such action. However, the auditors have not detailed any advantages or disadvantages as to why they are recommending such a move other than assert that DB&F is primarily "control oriented" and DAGS is "service oriented." If the intent of the auditors is to make EDPD a pure service organization, then it should be so stated and the proper organizational alternatives studied prior to making a recommendation.

Finally, the organizational placement of EDPD should be considered as part of a Statewide review of the organizational structure of Hawaii State Government. The last major organizational review was conducted in 1959 (Other than the Governor's Ad Hoc Commission on Operations, Revenues, and Expenditures, November, 1974).

## Unsubstantiated Conceptual Model of EDP Management

The model on which many of the key recommendations are based is unsubstantiated and "supported" by citing a number of academic sources dating to 1983 and 1984. DB&F points out that 1983-1984 was a period of incredible expansion in the computer industry. Considerable financial resources were being expended to acquire computers. Industry and academic analysts were predicting at that time that the home computer market would expand and all businesses and families would be acquiring computers in proportions of geometric growth well into the 1990s. There was no end in sight to the dollars the American public was willing to commit for computerization.

Academic and edp trade-press articles during this period dutifully reflected this trend in continued expenditures. But, today, hard data on the number of organizations (size, public/private, etc.) supporting the success of decentralized processing and control is not available and certainly not presented by the auditors. Some anecdotal cases of decentralization were mentioned by the auditors in the report, but DB&F believes that more data should have been presented to support the conceptual model and its conclusions. A pre-selected sample size of three would not even meet the burdens of proof in a small-size sample.

Further, DB&F believes that such data is not available to justify the claims of the auditors. The computer industry confronted a major slump in 1985 and it is continuing into 1986. One reason frequently cited by industry analysts is that the uncontrolled expenditures of the earlier years did not yield the types of returns anticipated and that there has been a failure in

the decentralized "end-user" support model to optimize resources. This has led many public and private organizations into a period of retrenchment where edp controls are being firmed up to ensure that the investment in edp resources provides adequate returns.

DB&F believes that the auditors' model of edp management should be carefully examined before acceptance and should not be the base for real-world recommendations until the model can be substantiated and justified with factual data.

## Audit of the EDP System Mistitled

DB&F does not believe that the title of the report, "Management Audit of the Electronic Data Processing System of the State of Hawaii," is entirely accurate and may be misleading. One reason for this statement is that the audit does not review edp management, systems, operations, and procedures of departments, even though the departments have substantial roles and responsibilities for many of the edp activities in State Government. The audit also does not address many other important components of the State's EDP Program, such as problems in intragovernmental sharing of edp resources or the State's role in intergovernmental data processing.

An excellent example of decentralized control in the edp area is data communications. According to Administrative Directive 1977-2, modems and data communications are the responsibility of the departments. As a result, departments have built their own data communication networks in an inefficient, fragmented, and costly manner.

For example, two agencies with offices in State buildings on the neighbor islands currently lease separate data communication lines from the EDPD to the neighbor island offices. Technologically, it is possible to share the leased phone lines with no disruption to the service and reduce the line cost by one-half after the first six months. However, with decentralized control, and a lack of central management control, the agencies have not shared the communication facilities. DB&F has brought this to the attention of the central telecommunications agency and line sharing solutions are being planned to reduce costs to the taxpayer. The monies saved through this line sharing program will save the taxpayers about $40,000 per year. The same problem exists in other areas because of decentralized control and costs the taxpayers about $60,000 per year unnecessarily.

This and many other cases of real-world problems of decentralized control were brought to the attention of the auditors. However, none were reported in the audit.

## Models of Organizing Electronic Data Processing

In the draft report, the auditors used the terms "decentralized" and "distributed" almost interchangeably. In fact, the two terms represent very different approaches to organizing edp technology and management.

There are three basic models for the organization and management of information processing systems--centralized, decentralized, and distributed.

1. Centralized

The "centralized" model of organizing computing is based on the concept of a large central computing system with "dumb" terminals attached. In this model, all computing for organizational units are accomplished through a central computing services unit.

The "economies of scale" of centralization are the major advantages of the model and most small states have some form of strong centralization. The main problems with full centralization are (1) the separation of users from central site staff leading to a real (or perceived) lack of responsiveness; (2) loss of flexibility due to the need for rigid procedures; and (3) difficulty in establishing and maintaining priorities. The model of centralization was appropriate when systems were more complex and required specialization of knowledge and skills. However, present technology makes the exclusive use of this approach unnecessary.

2. Decentralized

The "decentralized" model is based upon smaller, decentralized computer systems basically performing the functions and tasks of smaller organizational units. This model provides for maximum autonomy and flexibility for the departments but is very expensive since it results in duplication of resources (i.e., separate hardware, separate software), incompatibility of hardware and software, inability to share data and other edp resources such as hardware, software, data communications facilities and personnel, lack of uniformity and consistency in development practices, inhibition of statewide information use, and restriction of smaller agencies in their ability to secure computer services. The decentralized model also restricts the ability of the organizational units to share data and information resources and encourages inefficiency in data base management.

3. Distributed

The "distributed processing" model is preferred and based upon the use of both centralized and decentralized computing capabilities and relies on a processing hierarchy in which some applications are developed and operated at a central host while other applications are developed and maintained at the department and user levels. In the distributed processing model, terminals and systems are able to access other computer systems as necessary for a given application.

Distributed information processing further implies that departmental mini and/or microcomputers and associated devices at a user's location assume some of the processing load, passing required data to the central computer for integrated statewide processing. Distributed processing reduces the load on the central processor, provides improved response to the information needs of

all levels of departmental managers, and enables cost-effective sharing of computer resources. At the same time, it provides remote users access to the central computer systems when required.

## Inaccurate Representation of State Directions

The audit is based on the premise that the State's EDP Program was always based on a distributed processing model of electronic data processing. As evidence, the audit points to Administrative Directive (AD) 1977-2 that calls for an architecture of data processing based on minicomputers attached to mainframe computer systems. The premise is inaccurate.

Until 1983, the State of Hawaii's policy direction was based upon large, centralized mainframe computers with terminals in user agencies. Although plans were developed for satellite "minicomputers" (actually small mainframes), no sites were developed. Very little information processing capacity existed in State agencies. However, to improve the speed of system development and responsiveness and to implement new and innovative computer applications such as integrated word/data processing, electronic spreadsheets, office automation, and decision-support systems, many State agencies have since acquired mini and/or microcomputers under the State's direction of Distributed Information Processing (DIP). The direction of DIP has made real the conceptualization of data processing as originally envisioned in AD 1977-2 and has extended the concept to promote minicomputers in departments, not just in satellite data processing centers.

At the same time, DB&F points out to the auditors that Distributed Information Processing requires that agencies have distributed processing capability. However, it does not necessarily mean that all agencies need to have large and independent computers. For example, in smaller agencies, computing resources could be shared until such time as dedicated processors may be required. An example is the Departments of Labor and Industrial Relations and Personnel Services that are located in one building and are willing to share a large minicomputer to achieve the benefits of distributed processing capability without two separate processors. Such sharing of a processing capabilities would enable the shared use of personnel, software, facility, and other hardware resources and result in many benefits and dollar savings to the State.

Distributed processing will also result in agencies needing to acquire more personnel resources. And the State DIPIRM calls for such a distribution of resources. At the same time, it does not mean that all agencies need to have separate staffs for systems development and computer operations. The auditors' report needs to be carefully read for it seems to confuse the various models of organizing electronic data processing, but still derives important conclusions from the confusion.

## User Satisfaction

DB&F is pleased that the auditors' study of user perceptions reveals that users:

- Are generally satisfied with the services provided by EDPD;
- View the DIPIRM planning process as an important step in improving communications between departments and DB&F;
- Understand that increased personnel resources in departments and EDPD are required to implement automation;
- Want to be more involved with EDPD, particularly in providing input on areas of statewide impact;
- Are reasonably well-satisfied with EDPD's operational production services, except for on-line terminal response time; and
- Have "expressed optimism that under the new director of EDPD, there might be acceleration of the use of information technology in the State."

The findings provide a good base from which to gauge the progress of the State's EDP Program over time.

DB&F also appreciates the auditors' acknowledgment of the current efforts of the department to improve its responsiveness and increase user satisfaction. It is certainly true that:

- EDPD management is scheduling vendor presentations and demonstrations at departmental data processing coordinators' meetings to increase user awareness of emerging technology;
- A new emerging technology function has been established by EDPD to stay abreast of the rapid advances in information technology;
- The Information Resource Center in EDPD has been formed to assist users in locating data and information, evaluating different computer hardware and software, solving specific computer-related problems, and learning about new technologies;
- The recently implemented DIPIRM planning process has provided users with an opportunity to begin shaping their future data processing environment;
- EDPD management has also made progress in positioning the State to take advantage of discount buying plans available from some vendors;
- Communication within the data processing community of the State has been facilitated by the formulation of committees dealing with specific areas of concern; and

- Communication between the departments and EDPD has been improved as illustrated by the establishment of a newsletter published by EDPD.

DB&F also notes that a principal characteristic and difficulty of government is that it must constantly deal with the tension between budgets and increased demands for services. The public, as both taxpayers and consumers of services, when asked, will always be able to identify areas where they are dissatisfied with either the service received or the amount they have to pay.

Government-wide service programs also face these same pressures in government. We believe that it would be very difficult, if not impossible, to receive perfect marks in user satisfaction for any of the government-wide support service programs such as accounting, purchasing, facilities management, budget, personnel, and legal services. If perfect marks were achievable, then perhaps the amount of resources committed to a particular program may be excessive. As a result, if survey results are close to satisfactory, then the program may be doing a good job.

In the area of electronic data processing, the auditors' study demonstrates this principle. Most users were satisfied with the operational aspects of the State's program. The users demonstrated some dissatisfaction with "control." DB&F recognizes that users want flexibility and functional control in the acquisition of hardware and software, operational control of edp hardware and software, and the freedom to develop their own specific application systems, under their control, without any review. However, DB&F believes such autonomy needs to be balanced with prudent management that requires a certain amount of "control."

## B. SPECIFIC COMMENTS

### 1. Recommendation: Organization and Excessive Controls (pp. 77-78)

The requirements for EDPD and the Department of Accounting and General Services (DAGS) to approve individual requests for hardware, software, contract services, and personnel and for the Governor's EDP Advisory Committee to set priorities for and monitor departmental projects should be eliminated. Roles and responsibilities of the departments, EDPD, DAGS, and others should be redefined as part of restructuring the organization of the State's edp system. Recommended roles and responsibilities are outlined in an earlier section of this chapter.

#### Technical Comments

DB&F has two minor technical comments to make regarding this recommendation. First, there is a technical inaccuracy in the statement that EDPD approves requests for edp-related equipment. It is DB&F, under the Governor's AD 1977-2, that reviews requests for edp hardware, software, and consultation services.

EDPD prepares technical recommendations to DB&F on the requests. EDPD reviews requests to ensure that the technical solution proposed is feasible, is cost-effective with respect to other edp alternatives, the proposed edp system meets EDPD development standards, and that the hardware, software, and other services are compatible with those supported by EDPD.

The Budget, Planning, and Management (BPM) Division also conducts a review to determine if funding for the edp acquisition is available, conducts a program evaluation to determine if automation is the best solution to a problem, and does not commit the State without appropriate authorization and funds. Based on the recommendations provided by the divisions, DB&F issues an approval or disapproval.

Second, DB&F cannot respond to the parts of the recommendation that refers to DAGS' approvals. However, DB&F notes that DAGS' authority to review edp hardware, software, and consultant contracts are related to the State's purchasing laws.

Comments on Substance of Recommendations

DB&F strongly disagrees with this recommendation. The "control" function in reviewing edp-related expenditures is to ensure both benefit/cost and cost/effectiveness in the use of edp resources. It is a concern of every large private entity, federal, state, and local government and is generally a requirement to ensure governmental accountability and prudent use of public funds.

With regards to elimination of budget and edp review in public or private sector entities, DB&F is not aware of any large private or public institution that does not have its budget department or information processing agency review requests for hardware, software, or contractual services. DB&F suggests that the auditors contact the National Association of State Budget Officers (NASBO), the National Association of State Information Systems (NASIS), and other public sector associations (i.e., county or city government) to find out which states or local government agencies do not have either the budget or edp organization review specific requests for hardware, software, and contractual services. DB&F does not believe that the auditors will find much support for this recommendation.

DB&F further suggests that private companies of all sizes be examined systematically to determine if centralized budget and edp benefit/cost and cost/effectiveness reviews are not undertaken in a manner similar to the State of Hawaii. DB&F is in constant contact with many private companies and has found that they all have similar review procedures as the State. Most large companies not only provide strict controls on what equipment can be acquired but often directly acquire the equipment for their regional, branch, and field offices.

Further, the corporate models of "decentralization" quoted in the report are anecdotal and should not be represented as a generalization that edp

operations in the private or public sector, in Hawaii or the nation, operate in a decentralized manner.

For comparative purposes, DB&F would appreciate receiving a list of large private corporations that provide as much flexibility as Hawaii State Government in acquiring general-purpose computer systems such as minicomputers from different vendors. DB&F is unaware of studies or other data that confirms the assertion by the auditors that many large corporations have decentralized control to regional or branch offices for acquiring equipment, building systems, and contracting for consultation services. DB&F does not believe that as a percentage of all computerized companies that "decentralized" dp functions predominate; and therefore, far more data of actual cases are needed to validate the anecdotal generalizations by the auditors.

DB&F does concur, however, that many public and private sector entities have adopted distributed processing as the organizational model for information processing. That is, we agree that the public and private sectors have acquired and distributed considerable computer resources to users in the form of micro and minicomputers. (The State of Hawaii also has moved in this direction.) This does not mean, however, that these organizations have adopted the decentralized model of information processing or have lessened their central control. It simply means that organizations have "distributed" or placed computer power where most needed.

## Program Concerns with Elimination of Central Control

There are many potential problems that could arise from the elimination of control over the acquisition of edp-related hardware, software, and related services. DB&F further suggests that the elimination of controls could potentially create substantial problems in the cost-effective development and management of edp systems. What follows is a brief discussion of some of the problems that could arise.

### Eliminating Controls will Decrease Accountability and Increase the Difficulty in Achieving the Promises of Information Resource Management

DB&F is surprised by the recommendation for elimination of central control and the call for "decentralization," coupled with a call for increased accountability for the use of edp resources by departments. Will decentralizing control to 17 different State agencies promote long-term cost-effectiveness or accountability? Or, can the State expect more cases of inefficient use of edp systems and resources as in the case of data communications? Which agency will monitor the activities of the 17 different departments? How will the Legislature and public hold these agencies accountable for information processing?

Further, will decentralization enable the State to implement a long-term strategic program in information resource management? Or, can the State expect to have systems developed in the manner of the infamous "Winchester House," the famous house built in a piecemeal manner by an eccentric with

corridors leading nowhere, rooms built in odd sizes and forms, and edges of doors not matching the floors? More specifically, can we expect more coordination in data base and systems development by decentralizing control? Or, can we expect the State to end up with many different and incompatible systems? Furthermore, how can data base development be accomplished without control? These questions are but a few that need to be thoroughly addressed before a recommendation to eliminate control can be accepted.

Compatibility

Even with control procedures in place, State policymakers have found that there are problems that remain with the acquisition of edp-related hardware, software, and services. For example, the 1985 session of the Legislature found that one State agency had 11 different types of word processing, data entry, terminal, microcomputer, and other edp equipment, making it very difficult to develop an integrated approach to automation and almost impossible to share computer resources such as printers, communication devices, and software. The Legislature expressed its concern with the review and approval and acquisition processes that led to this situation and noted that more advanced planning was needed to be undertaken. DIPIRM plans were the result. DB&F is concerned that the recommendation for eliminating "controls" will result in a proliferation of incompatible hardware, software, and of staffing that could potentially cost the State hundreds of thousands of dollars annually, both in real terms (i.e., inability to share resources, etc.) and "soft terms" (loss of productivity).

Control Over Expenditures

In the course of conducting the audit, DB&F informed the auditors conducting the audit of several cases where the control over the expenditure of funds served important public purposes. In one case discussed with the auditors, a minicomputer system was acquired by an agency using federal funds. The system was justified on the basis that the software was unique to a particular vendor. However, when the software arrived, the system did not meet the requirements of the user. As a result, the system was not used for the purposes for which it was acquired. This left the State vulnerable to penalties if a federal audit were to be conducted. Monitoring by the Governor's EDP Advisory Committee made it possible for this problem to be detected and corrected in time for software to be developed, thus reducing the risk of penalties from an audit.

DB&F also informed the auditors of another instance where DB&F found that an agency was attempting to acquire a computer system for which sufficient funds were not budgeted and against DB&F lease vs. purchase policy that calls for outright purchase, if possible, to avoid the high interest charges often found in computer rental, lease payment, and time-payment acquisitions. The expenditure would have committed the State to a long-term operational expense which was not authorized by the Legislature that same year. Without ongoing reviews, these acquisitions would probably have occurred unchecked.

## Problems of Inadequate Control

DB&F is further surprised that the auditors conducting the audit did not provide for an analysis of the problems associated with providing complete autonomy to the departments in computer-related acquisitions. Some of the problems that were discussed with the auditors but not reported in the audit are as follows.

### Contracts for Software Development

DB&F suggested, for example, that the auditors review agency-developed software contracts executed by agencies of State Government to determine if the software was developed on time, within costs, and without "fatal" design or programming errors. Several recent cases were offered for review to the auditors but none of these was reported in the audit report. These systems would have pointed to the need for more continuous monitoring of application development projects by the Governor's EDP Advisory Committee and EDPD.

Considering the millions of dollars expended for software development contracts in recent years, DB&F is surprised that these problems were not reviewed or included in the auditors' report.

Further, it appears that this recommendation is contradicted by the recommendation made on page 123 that:

> "EDPD should implement procedures and assign qualified personnel for the review of EDP-related contracts to ensure that technical specifications, as well as general terms and conditions, are appropriate and consistent across procurements and that the contracts adequately protect the State's interests. The EDP-related contracts also should continue to be reviewed by legal counsel before they are signed. In this regard, model EDP contracts should be developed and maintained by EDPD. They should include standard terms and conditions, representative technical specifications, standard acceptance criteria, and ongoing performance criteria."

DB&F wonders how this recommendation can be implemented if the authority to review and approve requests for hardware, software, and contract services is eliminated and if functional control is divested to the agencies. DB&F also is concerned about the reasons why these cases were not examined and verified by the auditors.

### Improvements to the Review Process

At the same time that DB&F disagrees with the recommendation to eliminate controls on the acquisition process, DB&F believes that improvements are needed in the review process for hardware, software, and contractual services. Since 1982, there has been an increase in requests for edp hardware, software, and related services. Table 1, below, indicates the growth in the number of requests from 1982 to present.

Table 1
YEARLY GROWTH OF REQUESTS FOR EDP HARDWARE, SOFTWARE & RELATED SERVICES
IN PERCENTAGES
(INDEXED BY NUMBER OF REQUESTS MADE IN 1982)

| | 1982 | 1983 | 1984 | 1985 | 1986* |
|---|---|---|---|---|---|
| NUMBER OF REQUESTS | 100 | 141 | 218 | 386 | 103 |
| PERCENTAGE GROWTH | ** | 41% | 118% | 286% | *** |

*As of 4/25/86; **Base year; ***Incomplete data

Since 1982, DB&F has provided departments with considerably more flexibility in acquiring edp-related hardware, software, and services. This is indicated by the data demonstrating the dramatic increase in edp-type hardware acquired by agencies since 1982.

From 1982 to present, the State's EDP Program has increased its computing capability by at least fivefold. Table 2, below, shows the number of different approvals that have been given for microcomputers, minicomputers, terminals, word processing systems, and end-user peripherals such as printers, graphic plotters, and other devices.

Table 2
APPROVED REQUESTS FOR EDP HARDWARE FROM 1982 TO 1986
AND AVERAGE INCREASE IN PERCENTAGES
(INDEXED BY NUMBER OF REQUESTS MADE IN 1982)

| YEAR | TERMINALS | | WP EQUIP. | | MICROS | | MINIS | | PRINTERS | | OTHERS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | # | % | # | % | # | % | # | % | # | % | # | % |
| 1982 | 24 | | 17 | | 3 | | 2 | | 10 | | 3 | -- |
| 1983 | 28 | 16.7 | 14 | -- | 11 | 266.7 | 2 | 0 | -- | | 3 | |
| 1984 | 14 | -- | 12 | -- | 58 | 1833.3 | 2 | 0 | 31 | 210 | 5 | 66.7 |
| 1985 | 92 | 283.3 | 12 | -- | 402 | 13300 | 6 | 300 | 360 | 3500 | 40 | 1233.3 |
| 1986 | 94 | ** | -- | -- | 110 | ** | 9 | ** | 102 | ** | 37 | ** |
| TOTAL | 252 | | 55 | | 584 | | 21 | | 503 | | 88 | |

*Excludes the Department of Education and the University of Hawaii
**Incomplete data

The above data indicates the growth in computer use by State agencies and does not include the growth at EDPD of 400% since 1982. In addition, some of the State agencies have acquired sizable minicomputer systems with considerable capability. Some of these agencies include:

| Year Approved | Year Installed | Department | Type System |
|---|---|---|---|
| 1983 | 1984 | Social Services and Housing | IBM S/36 |
| 1983 | 1984 | Education/Libraries | DEC 11/780 |
| 1983 | 1984 | Health/Mental Health Division | Wang VS-85 |
| 1984 | 1985 | Accounting and General Services | IBM S/36 |
| 1984 | 1985 | Education | DEC 11/780 |
| 1984 | 1984 | Planning and Economic Development | Wang VS-80 |
| 1984 | 1984 | Hawaiian Home Lands | Wang VS-25 |
| 1984 | 1986 | Commerce and Consumer Affairs | Wang VS-15 |
| 1985 | 1985 | Education/McKinley High School | IBM S/36 |
| 1985 | 1985 | Education/Libraries (Upgrade) | DEC 11/785 |
| 1985 | 1986 | Education/Libraries | DEC 8600 |

In 1984, a major step toward giving departments even more authority in this area was initiated with the DIPIRM planning process. A major objective of the planning process was to provide assurance that the departments' strategic and operational plans are in place prior to the acquisition of hardware and software.

In response to the concerns of the 1985 Legislature, DB&F has also accelerated its efforts to complete the development standards for hardware and software and has developed application placement guidelines. These standards and guidelines will provide the departments with the necessary tools for the acquisition and implementation of data processing hardware and software and considerably more flexibility in acquiring edp-related equipment.

In 1985, DB&F approved, in whole, the requests made by the agencies to implement Phase I of the DIPIRM plans, and in most cases, provided concurrent approval to the agencies under AD 1977-2 to reduce the need to obtain further approvals.

In 1985, DB&F also implemented a new procedure to reduce the time it takes for departments to obtain the Governor's and DB&F's approvals for contract services DB&F by instituting a system of concurrent reviews of the requests. This new procedure reduces redundant reviews and the time it takes to obtain necessary approvals.

Also in 1985, DB&F implemented an interim standards for microcomputer and related software and developed a program to competitively bid for computer hardware and software and to establish a price list to expedite acquisition once approvals have been obtained. The auditors conducting the audit recognize these efforts in another supportive recommendation that calls for the continued competitive bid process to establish price lists. The continued

use of competitive bids to establish price lists has reduced the acquisition time (by several months) through the elimination of the need for agencies to bid items on a piecemeal basis. The program also ensures efficiency in the system by eliminating redundancy in the bidding processes and saves departments considerable amounts of time.

Finally, in 1986, DB&F will issue new procedures for the review and acquisition of edp-related hardware, software, and consultant services. These procedures will call for a yearly computer purchase plan and a three-tiered structure to expedite review of requests for edp-related acquisitions.

2. Recommendation: The State's Use of EDP Technology (p. 79)

The Legislature and the Governor should encourage increased use of EDP technology and modernization of existing automated systems to improve the productivity of State personnel. In doing so, the State should be prepared to make additional expenditures for developing and improving its information systems and acquiring EDP resources. However, such expenditures should not be authorized unless commensurate benefits can be demonstrated to equal or exceed the costs.

As indicated in the second section of this chapter, the organization of the State's EDP resources should be restructured to encourage and facilitate the use of EDP rather than to control and restrict it.

Comment by Department of Budget and Finance (p. 79)

DB&F agrees with this recommendation but suggests that it should have been phrased:

> "The Legislature and the Governor should continue encouraging the increased use of edp technology and modernization of existing automated systems to improve the productivity of State personnel."

Over the years, the Legislature and the Governor have given tremendous support to the State's EDP Program. The State of Hawaii, excepting the University of Hawaii, expends about $15 million annually on edp-related activities. The Executive Branch of the Hawaii State Government has expanded its computing power by over 300% in the past two years. Within the confines of limited funds, DB&F has received support in most of its edp requests from the Legislature and the Governor. In the past two years, the Hawaii State Legislature funded the requests almost in whole.

The data on computer acquisitions by departments illustrated in Table 2 illustrates the point that many edp requests by agencies have been supported by the Legislature and Governor.

In the area of personnel, again excepting the University of Hawaii, the State's EDP Program has grown from about 164 positions in FY 1971-72 to more than 380 positions in 1986. In FY 1971-72, all of the authorized positions

were centralized in the State's EDP Program. Today, however, approximately 146 of the 380 positions are located in the user departments.

The edp personnel in the departments provide the vital functions of edp planning, preparing requirement statements, conducting feasibility studies, and performing economic analyses, in addition to developing and maintaining application systems. The central agency technical and professional staff perform similar functions for departments with common systems as well as for departments with limited or no edp staff.

Recent Support from Governor and Legislature

In 1985, for example, DB&F requested from the Governor and the Legislature, $1.5 million in FY 1985-86 to begin implementation of the DIPIRM plan. The request was fully funded by the Legislature and almost all of the funds have already been distributed to user departments to develop and implement priority systems in accordance with their own approved edp plans.

In 1985, DB&F also requested an $800,000+ appropriation from the Legislature to upgrade its minicomputer system and install a state-of-the-art local area network (LAN) in the civic center complex. LAN is a specially developed technology to enable resource sharing and high-speed data communications. The Legislature approved this project in whole, and when the LAN is completely implemented, the system will deliver high-speed data communication service and provide considerably more processing capability to the departments.

Please note that the Legislature supported this project at the same time the local phone company was studying and installing its own network using the same technology. The Legislature, in doing so, demonstrated foresight in budgeting for high technology in State Government. DB&F looks forward to their continued support in the future.

In 1986, DB&F recommended and the Governor approved for inclusion an additional $1 million in the 1986-87 Supplemental Budget to continue the implementation of DIPIRM. The Legislature has fully funded this request. Indeed, the Legislature and the Governor have been very supportive of the EDP Program in the State Government.

It should also be noted that DB&F may be requesting a substantial increase in the FB 1987-1989 to implement some of the higher priority recommendations of the auditors.

Benefit Cost

DB&F agrees with the recommendation that expenditures for developing and improving information systems "should not be authorized unless commensurate benefits can be demonstrated to equal or exceed the costs." However, DB&F suggests that the auditors modify the statement to include "and the system is cost-effective with respect to other alternatives."

The reason for including, at a minimum, "cost-effectiveness" in the auditors' recommendation is clear. An edp system can yield a "benefit to cost" ratio exceeding one but still not be an activity that the public should fund. Benefit/cost or "B/C" will only reveal that an edp solution will have a "return" greater than the "investment" in, or cost of, an edp solution. It does not reveal whether the edp activity is the most cost-effective means for solving a problem. As such, B/C is limited as a policy guideline or an analytic tool.

Cost-effectiveness or "C/E" should be included as a policy guideline. It helps to ensure that the public investment in the edp system yields the greatest return.

For example, edp application systems can be developed on a micro, mini, or mainframe computer using very different software and requiring different personnel and other resources. Assume for a moment that an agency proposes to develop a system on a mainframe computer and the estimated benefits will exceed the costs by 10% or have a B/C ratio over a given period of time of 1.1. Assume also that the same system could be developed on a minicomputer or microcomputer and would yield a ratio of 1.2 and 2.1, respectively. Should the Legislature and the Governor approve the request by an agency because the agency requested an authorized expenditure and the B/C ratio exceeds 1.0? DB&F does not believe so. DB&F believes that it is in the public interest to fund the alternative that yields the greatest return, and in this example, believes that the system developed on the microcomputer would yield the greatest return.

DB&F also believes that it is the responsibility of EDPD to review the requests to ensure that the cost-effectiveness of various edp solutions is examined prior to the commitment of resources and that a major purpose of the BPM Division is to examine and ensure that the edp alternative yields a higher C/E ratio than other non-edp solutions such as increasing personnel, reorganization, or a modification in the operational flows and cycles in a department.

Clearly, benefit/cost cannot be the sole policy criterion authorizing expenditures for an edp project. Cost-effectiveness must be included in the policy criterion.

3. Recommendation: Lack of Departmental Accountability (pp. 80-81)

The Legislature should enact legislation requiring that EDPD operate on a self-sustaining basis as an internal service fund (or revolving fund) rather than as part of the general fund. As such, EDPD should maintain cost accounting and chargeback systems and bill user departments for services provided.

EDPD should operate on a not-for-profit basis, and charges to user departments should be based on the costs of services provided. Standard rates for EDPD's services should be established annually. If actual costs for the

year exceed amounts billed, the user departments could be billed for additional year-end charges to cover the deficit. If charges for the year exceed costs, the user departments could receive credits. Alternatively, the difference could be retained in the internal service fund and EDPD's rates could be adjusted to make up the deficit or eliminate the excess in subsequent years. In any event, under an internal service fund arrangement, EDPD's rates should be adjusted annually so they match actual costs as closely as possible.

With EDPD operating as an internal service fund, user departments should negotiate service agreements with EDPD annually and they should include anticipated EDPD costs in their budgets.

To ensure continuing efficiency and the reasonableness of the charges that would be proposed by EDPD, the departments should have the option to secure the services of commercial service bureaus or consultants where the services would be cheaper than EDPD's, where expertise is not available at EDPD, or where the services cannot be provided within the time required by the users.

Comment by Department of Budget and Finance (pp. 80-81)

DB&F generally agrees with this recommendation and notes that the need for an improved chargeback system was stated as a major program direction in the Report to the Governor in 1985. DB&F, it should be noted, has a fully developed, federally approved, chargeback system already in place for edp activities funded by the federal government. Further, DB&F has initiated a new service-level agreement based on program chargebacks for personnel resources assigned to the user agencies.

At least four general-funded agencies will be charged for unbudgeted application systems development services in FY 1985-86. Currently, these charges are for services not budgeted in the EDP or agency program but are critical to the departments. The billing process is authorized through a Memorandum of Understanding signed by the Director of Finance and the agency head requesting services.

However, implementing a complete chargeback system for general-funded edp activities will have to be carefully studied, planned, and phased-in over a period of time. The reason is that cost-center accounting and chargebacks is complex and has not yet been proved to have a benefit-cost ratio. Software is required to monitor jobs, cost-center allocation models need to be built, billing procedures need to be established, safety valves need to be developed in case of delays associated with project delays, changes in budget structure, and positioning EDPD organizationally to account for all of the funds transfers cannot be developed overnight.

DB&F will work toward implementing this recommendation and seek resources necessary for the study and planning of a cost accounting system during the next biennium.

4. Recommendation: Inappropriate Priority Setting (p. 83)

The role of the Governor's EDP Advisory Committee should be revised. The committee should not set priorities for, and monitor progress of, specific departmental EDP projects. Instead, the committee should set priorities for, and monitor progress of, EDP projects aimed at developing common systems and shared data bases used by multiple departments.

Comment by Department of Budget and Finance (p. 83)

DB&F does not concur with this recommendation. Should the role of the Governor's EDP Advisory Committee be limited to only those common and shared systems mentioned in the recommendation, the State runs the risk of facing many of the problems identified with a lack of management control.

- Without involvement of the Committee in the development of specific systems, the central agency may not be aware of computer resource requirements until the time of implementation. This may be too late for the central agency to provide adequate computer support because equipment acquisition, which may be needed to run the system, usually takes years to acquire, considering the budgetary, bidding, and ordering processes.

- The Committee must maintain its authority to prioritize and monitor development efforts so that communications between the requester and provider of services could be maintained throughout the development cycles.

- The Committee must be involved in applications development to minimize or eliminate development of redundant systems resulting in unnecessar6y expenditures of public funds.

It should be noted that the Committee was established by the Governor in 1978 to set priorities for the development of application systems because a survey conducted by DB&F revealed that the requests for application development services far exceeded the short-term availability of human and computer resources.

5. Recommendation: Lack of Broad Representation for Statewide Priority Setting (p. 84)

Membership of the Governor's EDP Advisory Committee should be reconstituted to provide for broader representation regarding statewide priorities. Department heads or their designees from representative large and small departments should be assigned to the committee. Alternatively, all the departments could be represented on the committee. Because the opportunities to develop common systems are limited in number, the committee members' work efforts should not be burdensome.

Comment by Department of Budget and Finance (p. 84)

DB&F agrees that the Governor's EDP Advisory Committee should be reconstituted to provide for broader representation. DB&F also agrees that designees should come from large and small departments. However, DB&F suggests that perhaps five members would be ideal to enable the committee to function better as a working policy group. DB&F will propose to the Governor the expansion of the Committee to include a number of representatives from other agencies on a rotational basis so that each agency would have the opportunity to understand the functions of the Committee and participate in its deliberations.

DB&F also believes that the role of the Committee should be expanded to include such tasks as reviewing and approving the distribution of DIPIRM funds and presiding over conflicts and problems between departments on edp matters.

Special Comments

Before continuing with specific comments to the auditors' recommendations, we would like to present some comments on user satisfaction.

6. User Satisfaction (pp. 61-69)

DB&F has some concerns with the Summary of Findings and Conclusions reached by the auditors on this subject.

Interpretation of Survey Data

The auditors, in their explanation of the survey methodology, stated that the "Respondents used a 1 to 5 scale where 1 = poor, 2 = fair, 3 = good, 4 = very good, and 5 = excellent." Assuming that 3 = good, then scores of 3.0 or better should indicate good service. Scores less than 3.0 should indicate somewhat less than good, fair, or poor service depending on the average.

If the interpretation of the scaling technique is as represented, then the data indicates that EDPD is providing good service in many areas but needs to improve in some. DB&F's analysis of the data follows.

- Turnaround Time: The auditors' report notes that the average response was 3.5. The data clearly indicates that users are very satisfied with the turnaround time. More importantly, the survey indicates that 13 of 15 or 87% of the responses ranged in the good to excellent category.

- Response Time: The auditors' report notes that the average response was 2.7. The data indicates that 7 of 14 or 50% of the responses ranged in the good to excellent category. There were no users that felt that response time was poor. It should be noted that turnaround time and response time could be improved by increasing the power of the computer system.

- Schedule Adherence: The auditors' report notes that the average response was 3.4. The data clearly indicates that users are very satisfied with the ability of EDPD to "consistently deliver products, perform services, process according to schedules, or meet deadlines agreed upon by users and EDPD." More importantly, the survey indicates that 13 of 15 or 87% of the responses ranged in the good to excellent category.

- System Reliability: The auditors' report notes that the average response was 3.6. The data clearly indicates that users are very satisfied with the ability of EDPD to ensure system reliability and integrity. More importantly, the survey indicates that 15 of 16 or 94% of the responses ranged in the good to very good category with no user indicated that the reliability was poor.

- Special Requests: The auditors' report notes that the average response was 2.7. However, the data also indicates that 54%, or the majority of users, felt that EDPD was good in responding to special requests. The data indicates that EDPD can make improvements in this area. But the data does not support claims that EDPD is completely non-responsive in meeting the needs of users.

- New or Expanded Services: The auditors' report notes that the average response was 2.4. The data also indicates that 59% of the users stated that EDPD was not responsive to requests for new or expanded services.

## Comments on Summary of Findings

The auditors' survey of user satisfaction by service area reveals, at a minimum, that the majority of users believe that EDPD's service for ongoing projects is good. The survey does identify areas that EDPD needs to improve but does not justify the auditors' summary of findings that the "level of service from EDPD is not what it should be, the State's EDP environment is overcontrolled, and the user departments should have greater autonomy to meet their data processing needs." Those conclusions need to be balanced with the errors that departments have made with software contracts, minicomputers acquired for one purpose and used for another, and so forth.

## Comments on Conclusion

The auditors' conclusion states that:

"Based on the responses to the questionnaires, we have drawn the following conclusions about the level of satisfaction perceived by users of the State's EDP system."

"Basic user needs appear to be met, but improvements are clearly needed. Forty percent of the users questioned about how well the current systems are meeting their needs appeared to be satisfied (score of 4 or 5); however, 30 percent appeared to be unsatisfied (score of 1 or 2)."

If 40% of the respondents scored a "4" or "5" and if 30% of the respondents scored a "1" or "2," what happened to the interpretation to the other 30%? DB&F believes that an appropriate interpretation of the data in Exhibit 5-1 is that 40% of the respondents felt that users were very satisfied with the systems developed, 30% were simply satisfied, and 30% were unsatisfied. However, DB&F's interpretation of the data is that, in total, 70% of the respondents appeared to be satisfied with the current systems in place and only 30% dissatisfied.

At the same time, DB&F is further concerned with the "external validity" of the question that the auditors used to support the claim that "basic user needs appear to be met, but improvements are clearly needed." DB&F firmly believes that improvements to the State's EDP Program are needed but not necessarily because 30% of the users feel existing application systems do not meet their needs. A more direct question related to a user's overall satisfaction would have been a more valid question from which such a conclusion of overall satisfaction could be drawn.

7. Personnel Salaries (p. 113)

The auditors examined the personnel pay issue and concluded that the salary levels of State edp employees were comparable to national pay scales and that there was no problem with losing personnel.

Comment by Department of Budget and Finance

DB&F does not agree with the analysis that State dp salaries are comparable to those of the City, Federal, and private sector. Although the auditors make convincing arguments to substantiate their claim, the fact of the matter is that the Department of Personnel Services is unable to recruit a sufficient number of qualified systems analysts and computer programmers at the III, IV, and V levels.

The auditors used salary range comparisons to illustrate their point. However, the salary range comparisons are invalid because a mid-point really is not used in the State's system. The State does not automatically have a step increment for each year of State service. The mid-point in salary comparisons is good for those that use the full-pay range. However, because we hire at the first step in the pay scale, it is very misleading to use the mid-point of the pay scale as a comparative basis because the mid-point is considerably higher than the first step.

Further, DB&F suggests that the auditors should have used the recently published 1985 Electronic Data Processing Pay Rate Survey, published by the

Hawaii Employers Council. The survey by the Council clearly shows that the Federal Government pays substantially more than does the State for most of the professional dp positions. Even the Public Employees Compensation Appeals Board (PECAB) has agreed with our contention that there is a discrepancy between the Data Processing Systems Analyst IV, SR-21; DPSA V, SR-24; DPSA VI, SR-26 classes in the City and County of Honolulu and the State. During the PECAB hearings, a former deputy director of the Department of Data Systems, City and County of Honolulu, has gone on record to substantiate that while the duties of the positions at the City and State are essentiall, the same, there is a significant discrepancy between the pay scales of the subject classes.

The discrepancy in salaries between the State and the other public and private edp organizations in Hawaii, according to the 1986 Electronic Data Processing Pay Rate Study, is significant. For example, the State's data base manager is an SR-21, paid $2,100 a month, and is not recognized as a data base manager. According to the data provided by the Hawaii Employers Council, the mean salary for a data base manager was $2,700 a month. This is quite alarming when one considers that there are no data processing operations in Hawaii the size of the State's.

In the turnover area, we believe that the auditors have erroneously presented a misleading picture. The auditors fail to recognize that the job opportunities in Hawaii are limited in comparison to the mainland. The limited job opportunities will tend to make the turnover rate in Hawaii much lower than the mainland. In this regard, it makes no sense to compare the State's turnover rate to the national average. It would make more sense to compare the State's turnover rate to the City, to the Federal Government or to the private sector in Hawaii.

If the salaries were comparable, DPS should not have recruitment problems and EDPD should not have to resort to unsatisfactory alternatives such as hiring through shortage category provisions or downgrading positions to trainee levels in order to fill vacant positions.

As discussed with the auditors, six senior employees left EDPD from 1980 to 1986 for employment with the City and County's Department of Data Systems. During this period, no employees moved from the City to EDPD. We attribute this to the higher pay offered by the City for less work and responsiblity.

Regardless of the figures used, the fact remains that over the past six years, EDPD has lost over 15 senior employees to higher paying jobs in the City and County of Honolulu, the Judiciary, the Legislative Reference Bureau, the Federal Government, and the private sector.

To build a strong edp program requires capable personnel. Unfortunately, the State's civil service system does not have provisions to reward exceptional employees with merit pay increases. DB&F will continue to work with DPS to improve salaries of data processing professionals.

8. Recommendation: Organizational Placement (pp. 90-91)

The State needs to make a major and fundamental change to its policy regarding the organization and management of its EDP resources. The Legislature should enunciate a new policy which encourages, rather than controls, the cost-effective use of EDP technology as a means for improving the quality, efficiency, and effectiveness of the State's programs and services. The new policy should emphasize the following:

- The functional and operational control over data processing should be transferred from the Department of Budget and Finance (and EDPD) to the departments. The departments should be given the authority and responsibility, and they should be held accountable, for their efficient and effective use of data processing. Control over EDP expenditures should be exercised through the State's normal program planning and budgeting process.

- EDPD should be service oriented.

  -- EDPD should continue to provide computer processing, systems development and maintenance, training, and other centralized EDP services to the departments. However, EDPD should operate as an internal service or revolving fund. The departments should negotiate service level agreements with EDPD, the departments should budget for EDPD services, and EDPD should bill the departments for the services it provides.

  -- EDPD should provide increased proactive EDP coordinating, advisory, and consultative services to the departments to facilitate the cost-effective use of EDP technology.

- Increased use of EDP technology and modernization of existing automated systems should be encouraged to improve the productivity of state personnel and increase the quality, efficiency, and effectiveness of state programs and services.

In formulating the new policy, the Legislature should consider the placement of EDPD in the State's organizational structure. It will be essential for EDPD to operate with a service orientation. Currently, EDPD resides in the Department of Budget and Finance, a department whose mission is primarily control oriented. Given the State's current organizational structure, the Department of Accounting and General Services, whose mission is primarily service oriented, would be the logical alternative organizational placement for EDPD. EDPD should be placed in the department or agency which can best ensure that EDPD operates with a service orientation.

Once the legislative policy has been established and the placement of EDPD has been determined, the Governor should issue a new administrative

directive. The directive should guide the implementation of the policy and it should set forth the specific roles and responsibilities of the organizations involved in the operation and management of the State's EDP resources.

Comment by Department of Budget and Finance (pp. 90-91)

DB&F has expressed its concerns about the way in which the auditors defined the "problem" resulting in a recommendation for transferring EDPD to another agency or making it a separate department.

Management and Control

There will always be a need for management and control whenever there is a limited resource. It is our firm belief that there is a need for central agency management and control over the data processing resources in State Government; otherwise, there will be a major duplication of effort and resources resulting in chaos and gross mismanagement of the data processing resources in the State. However, we also believe that there is a need for departments to gain more independence in deciding how best to incorporate data processing solutions to improve their ability to meet their functional responsibilities and to be more responsible for their actions.

In line with this, we have encouraged the distribution of sizable computing capabilities to the departments with the full intent that these capabilities will be under the management and control of the departments. DB&F's stated DIP direction is to provide departments with minicomputer and microcomputer computing capabilities that provide user-friendly utilities and development tools that will enable the departments to satisfy most of their data processing requirements with in-house clerical and professional staff and minimize the department's need for data processing professionals.

For those complex minicomputer and microcomputer applications that require the support of edp professional people as well as those applications that should be developed on the central host mainframe computer, EDPD will provide professional staff support on a cost-reimbursement basis. Under this arrangement, EDPD will provide analysts/programmers on a full-time, permanent, and on-site basis. These professionals will administratively be attached to EDPD and will be assigned to the department on a one- to two-year rotational basis.

This strategy will ensure that data processing professionals including those assigned full time to the outside departments do not become stagnated because of their lack of training and experience with a variety of assignments, equipment, and applications.

We have already entered into official Memorandum of Understanding agreements with four departments under this type of arrangement.

## Movement of EDPD Under DAGS

DB&F disagrees with this recommendation and has responded to this recommendation in its general comments. Placing EDPD under DAGS will not necessarily enhance the service nature of the division. As stated in our general comments to the audit, DB&F believes that the auditors misdefined the problem, and as a consequence, could only conclude that a transfer of EDPD to a "service" oriented agency was the solution.

DB&F would like to further state that "problems" in government cannot be simply "reorganized away." Management problems require managerial solutions.

Further, the auditors suggest that DAGS is a service agency that is not "control" oriented. Yet, as identified by the auditors, DAGS has substantial control-oriented functions in the edp area, as well as in other functional responsibilities under the Comptroller, State of Hawaii.

## Reorganization of EDPD

As discussed earlier, the way in which the auditors defined the problem is significant because it biased the analysis of alternatives. One way in which the definition of the problem affected the analysis is that it led to a failure by the auditors to consider many other important factors that would normally be included in a management and program evaluation. For example, why does the auditors' recommendations deal only with the organizational placement of EDPD rather than the organization of EDPD itself? Is EDPD currently organized to support all of the tasks that EDPD is attempting to accomplish? Or, are organizational changes necessary to improve the delivery of services to edp users?

DB&F believes that if the auditors had clearly identified the problems in a manner that did not bias the "solution," then many other penetrating questions would have been asked. DB&F firmly believes that the auditors should have at least examined the problems associated with the organization of EDPD.

As discussed with the auditors, DB&F is in the process of reorganizing EDPD to enable more support services to be provided to the departments. The purpose of the reorganization is to position EDPD to be better able to deliver support services to users, promote and encourage the prudent use of edp technologies, and to ensure that the use of edp technologies are optimized. The reorganization promises to better position EDPD to be a strong, proactive end-user support program.

The current organization consists of four branches and two staff offices as follows:

The Administrative and Technical Services Branch (ATSB) consists of a Planning and Training Section, a Technical Standards and Methods Section, and a Fiscal Section.

The Application Systems Development Services Branch (ASDSB) is a single entity branch.

The Computer Systems Services Branch (CSSB) consists of an Operating Systems Section and a Data Base and Data Communications Section.

The Computer Operations Services Branch (COSB) consists of a Technical Support Section and a Computer Operations Section.

The Secretarial and Clerical Staff is a single entity organizational segment.

The Special Projects Office is a single entity organizational segment.

To organizationally position EDPD to provide improved services to user agencies, DB&F has proposed that four new sections be established and that two existing sections be modified by transferring certain functions to other organizational segments. The new sections are:

A Distributed Systems Support Section (DSSS) under the Computer System Services Branch.

An Information Resource Center (IRC) within the Administrative and Technical Services Branch.

An Office Automation Support Section (OASS) within the Administrative and Technical Services Branch.

A Network Control Center (NCC) within the Computer Operations Services Branch.

A Project Management Office (PMO) under the Division Chief's Office.

A Special Projects and Planning Office (SPPO) under the Division Chief's Office.

The proposed Distributed Systems Support Section will provide analytical and technical support for the distributed information processing hardware and software including minicomputer systems, office automation, application development productivity aids, and rented hardware and software for other distributed systems.

The proposed Information Resource Center will be the first line of contact between EDPD and the State user community and will provide "user-friendly" support for all user agencies, especially in the area of microcomputers.

The proposed Office Automation Support Section will provide support and assistance in the rapidly growing area of office automation, which includes word processing, graphics, and electronic mailing systems.

The Network Control Center will formalize network management functions which are currently being performed on an ad-hoc basis by COSB and CSSB.

The proposed Project Management Office (PMO) will assume the project management functions associated with application systems development. Such functions include scheduling projects, estimating costs and manpower requirements, and ensuring adherence to EDPD and user requirements. PMO will also assume the responsibility of preparing personal services bids and contracts related to application development and will conduct project evaluation, an activity presently performed by the ATSB.

The planning function of the existing Planning and Training Section would be transferred to the proposed Special Projects Staff, and the new organizational entity would be renamed the Special Projects and Planning Office. This office will incorporate the planning function currently assigned to the Planning and Training Section. This will elevate the planning function to a position where it may interact directly with the Division Chief and coordinate dp planning throughout State Government. This will also allow the training function to be concentrated in a single-purpose entity.

The existing Data Base and Data Communications Section would be split into two separate sections--the Data Base Management Section and the Data Communications Support Section.

The Data Base Management Section will assume expanded data base and data base management functions of the current Data Base and Data Communications Section in the CSSB.

The Data Communications Support Section will assume expanded data communications and networking functions of the current Data Base and Data Communications Section in the CSSB.

EDPD must be prepared to meet the changing needs and requirements of dp users in the Executive Branch of State Government, especially in the newly emerging areas of micro/minicomputers, office automation, and data communications. New organizational segments must be established to streamline and improve current functional responsibilities of the division and to provide technical and user-oriented support in all phases of state-of-the-art computer technology.

9. Recommendations: EDP Planning (p. 107)

An improved, detailed Distributed Information Processing and Information Resource Management planning methodology should be developed by EDPD. It should address both strategic and operational EDP planning at departmental and statewide levels. Several planning models are available for use, such as the Business Systems Planning approach and the Concept/90 strategic planning methodology. EDPD should evaluate these and other EDP planning methodologies.

Departmental and statewide edp plans should be developed and updated at least each biennium. Departmental and statewide operational edp plans should be developed each biennium and updated annually. The strategic plans should cover the same six-year period as the program budget projections. The operational plans should cover the biennium.

As indicated in a previous chapter of this report, a project valuation assessment should be used as one of the key checkpoints in the life cycle of a systems development project. Department management should place greater emphasis on thorough preparation of project valuation assessments.

Comment by Department of Budget and Finance (p. 107)

DIPIRM Planning

DB&F agrees with the recommendation. Prior to the beginning of the DIPIRM planning process, EDPD did evaluate IBM's Business Systems Planning (BSP) approach and methodologies similar to Deloitte, Haskins & Sells' Concept/90. Both approaches were rejected for several reasons.

First, developing "strategic plans" in the mode of the BSP does not yield a plan that can be operationalized. A representative of IBM's Information Systems Group advised DB&F that the BSP was not an appropriate model for developing the types of plans that would enable program decisions to be made. IBM's recommendation was to use an approach that was implemented with several agencies and based upon a subset of the Application Transfer Team methodologies. The recommendations were provided to DB&F during the early phases of the planning process.

Second, methodologies such as SDM/70 (similar to Concept/90) would have taken State personnel at least two years to complete. DB&F was concerned that requiring agencies to first develop a "strategic" plan and then an "operational" plan would have appeared to the agencies as more "paperwork."

It was our intent that the departmental DIPIRM plans be developed as soon as possible. At the same time, we agree that more rigorous planning is required and will work the recommendation into the annual DIPIRM updates.

Ongoing Planning Process

DB&F concurs with the recommendation that the planning process should be institutionalized with biennial "master" plans and annual departmental plans. DB&F has already institutionalized this recommendation.

DB&F also agrees that the plans were generally well prepared. At the same time, DB&F recognizes that this is a first-time effort of the departments, the plans will not adequately satisfy all strategic and operational planning requirements. However, the plans provide the departments with a viable working plan and tool in which to better manage their operations. We are confident that over the next two years, the plans will evolve to be

effective operational and strategic planning documents that will adequately address the auditors' concerns. While we did not intend that the strategic portion address a six-year period, this recommendation will be taken into consideration.

Importance of Project Valuation Assessments

DB&F also agrees that department managers should place more emphasis on the project valuation assessment (PVA) documentation. The PVAs are an important document because it is the first major step in the application development process and should be carefully prepared since it sets the basis for the ensuing application development activities. DB&F will continue to work with departments to place more emphasis on the training and accurate preparation of the PVA documents.

10. Recommendation: EDP Resource Acquisition (pp. 123-124)

In Chapter 6 of this report regarding the organization of the State's EDP system, we make recommendations for improving the EDP resource acquisition process. Our specific recommendations relate to the realignment of responsibility and control of EDP acquisitions. The Department of Accounting and General Services and EDPD should formalize and document the EDP resource acquisition procedures, and they should clarify and communicate their roles and responsibilities, as well as those of the departments.

EDPD should implement procedures and assign qualified personnel for the review of EDP-related contracts to ensure that technical specifications, as well as general terms and conditions, are appropriate and consistent across procurements and that the contracts adequately protect the State's interests. The EDP-related contracts also should continue to be reviewed by legal counsel before they are signed. In this regard, model EDP contracts should be developed and maintained by EDPD. They should include standard terms and conditions, representative technical specifications, standard acceptance criteria, and ongoing performance criteria.

The State should continue to limit its use of sole source procurements. Competitive procurements enhance the State's potential to acquire goods and services at considerable savings and they reduce the State's exposure to the possibility of procurements being influenced by conflicts of interest.

EDPD also should continue to expand its use of volume purchasing agreements and master contracts to take maximum advantage of competitive procurements of large numbers of like items and to encourage standardization and compatibility.

The State administration should establish a policy preventing the hardware vendors from initially serving as consultants in studies which involve the recommendation of hardware configurations or specifications and subsequently providing the recommended hardware to the State. This does not mean that hardware vendors must be precluded from contracting with the State

to perform consulting services, but in those instances where they do, they should be precluded from profiting financially from their own recommendations.

Comment by Department of Budget and Finance (pp. 123-124)

Purchasing

DB&F concurs with this recommendation. EDPD has an excellent working relationship with the Purchasing and Supply Division of DAGS and we should be able to jointly formalize and document the edp resource acquisition procedures and clarify and communicate our respective roles and responsibilities, as well as those of the user departments. As a matter of fact, EDPD started internal discussions on this matter in early 1985 and drafted a contract in mid-1985 to prepare such a manual. However, this project was temporarily suspended due to other higher priority work.

Model Contracts for Consultation

DB&F concurs with this recommendation. This area of responsibility has been of concern to us in recent years especially since the State began accelerating the development of computer-assisted application systems through consultant contracts. The contract mentioned in the first paragraph also required the consultant to develop model edp contracts.

Limits to Sole Source

DB&F agrees that the State should continue to limit its use of sole-source procurements. Competitive procurements do enhance the State's ability to acquire goods and services at considerable savings.

Volume Purchase Contracts

DB&F agrees. The State, as acknowledge by the auditors, has been very successful in obtaining volume purchase discounts for edp hardware and software. In the vast majority of cases, the State has been able to obtain contracts that provide discounts that exceed even the Federal General Services Administration contracts.

As important, however, is that the State has been successful in obtaining volume maintenance contracts as well. The savings DB&F has been able to make for the State of Hawaii in this area involves hundreds of thousands per year and have been taken advantage of by other governmental jurisdictions including the Judiciary, Legislature, and counties.

Vendors Profitting from Consultation

Although we generally agree with the recommendation, we believe that a certain amount of discussion (which may be construed as serving as consul-

tation by some) may take place with hardware vendors in the acquisition of computer equipment. In this rapidly changing technology, it is almost impossible for State employees to keep abreast with current technology, and most equipment vendors provide valuable information. To completely preclude them from participating in studies which subsequently result in equipment bid specification may not always be advantageous to the State. There is a fine line between serving as consultants and providing information. We want to make it clear that we intend to continue holding discussions with hardware and software vendors which will result in the most cost-effective acquisition for the State.

DB&F agrees that the use of vendor consultants to actually prepare the bid specifications, justifications for sole source acquisitions, or studies to recommend purchase of specific equipment sold or represented by the consultant will not be allowed.

11. Recommendation: Performance Management and Capacity Planning (pp. 125-126)

EDPD should implement a formal direct access storage device management function. This function should reside in the Computer Systems Services Branch and should be responsible for performing the following duties:

- Evaluate the available direct access storage device management software and acquire an automated package to perform direct access storage device management.
- Identify the ownership of all system and user data sets. A migration strategy should be developed to isolate like-kind user, application, and system data in the disk configuration.
- Develop standards and guidelines regarding size and age limits of disk data sets.
- Develop working and violation reports to notify data set owners of data sets not adhering to standards.
- Develop an automated archiving function (using the direct access storage device management software) to migrate obsolete data sets, and data sets that violate standards, to tapes.
- Develop procedures to permit users to restore and recreate archived data from tape.

Comment by Department of Budget and Finance (pp. 125-126)

DB&F concurs with the recommendation. The direct access storage device (DASD) management function does reside in the Computer Systems Services Branch (CSSB). Most of the functions identified above are being performed but need to be formally documented.

Requests for disk storage space from the user agencies are reviewed and allocated by CSSB. A part of this review is to verify that existing standards are being adhered to, and if not, the requester is notified and asked to make the necessary corrections. In addition, technical specifications of the requested disk storage space are analyzed for efficiency and recommendations for improvements are made to the requester.

Management of the disk storage inventory is presently done manually and reports on the distribution and availability of disk storage space are produced on request. This function is expected to be automated through the acquisition of a disk storage management software package. Investigation into the various alternatives has been under way for some time and active procurement of a product is being planned during the coming fiscal year. A significant consideration in scheduling such an implementation is the number of man-hours that will be required.

Size and age standards and guidelines do exist and are being enforced for disk data sets that are stored in an area called TEMPSTOR. Data sets that fall into this category are small and highly active. Those data sets in TEMPSTOR that do not meet either the size or age (activity) requirements are purged weekly. This function and the archiving/restore functions are not proceduralized and will be automated through the acquisition of a disk storage management software package.

12. Recommendation: Performance Management (pp. 127-128)

EDPD should implement a formal performance management function. This function should reside in the Computer Systems Services Branch. In general, this function should be responsible for managing total computer system performance and performing system tuning regularly. Specifically, it should:

- Develop management level reports to track the response times and throughput (i.e., workloads processed per hour) of the on-line systems, TSO, ADABAS, and batch jobs. These reports should be developed to include such items as average response time and throughput, number of on-line transactions and batch jobs, the average central processing unit (CPU) time consumed by each transaction type and batch job category, and the average wait time for each category of work. The data for the reports should be gathered from the various software monitors used at EDPD and maintained in a centralized performance data base. The SAS package used by EDPD has special facilities to create and maintain this data base. Relatively inexpensive software is available that utilizes SAS code to develop management level reports.

- The management level reports should provide a historical comparison of daily activity to the trends maintained in the central performance data base. This information can then be used as a basis for evaluating system changes and their effects

on system performance and user service. The reports can be used to track the response before and after system and application changes and will provide an indication of the corresponding impacts of the changes.

Comment by Department of Budget and Finance (pp. 127-128)

DB&F concurs with this recommendation. Currently, a real-time performance monitor is implemented on the computer systems and being used daily by the Computer Systems Services Branch staff. This software monitor provides the system programmers with a "window" into the processing activities within the computer systems. It displays activities in the different performance groups and processing areas.

An accompanying real-time monitor is used to track the performance of the on-line partitions. It displays processing activities within the on-line partitions and highlights potential degradation conditions.

These products do not, however, collect usage or save historical performance data which prevents EDPD from doing performance bottleneck analyses over a longer duration. Alternatives are being investigated to acquire this capability. For the on-line environment, several products are being reviewed to collect usage data such as number of transactions, CPU utilization, and average response times for performance, accounting, and billing purposes.

A software product to collect performance and usage information for ADABAS has also been recently acquired and is being implemented for productive use. A performance monitor for TSO is currently being investigated to determine if it will fit in with plans for TSO accounting and billing. A relatively inexpensive software package called MXG that utilizes SAS code is being researched for its ability to perform statistical functions and produce management-level reports.

All of the products under review establish and maintain a centralized data base for collecting performance and accounting data. One of EDPD's major considerations in selecting one of these packages is to look for the most cost-effective alternative that can accomplish all of the required functions. We agree that given the proper tools and the data, a wide variety of management reports on performance and user service levels can be produced. This is the goal EDPD will strive to meet in the upcoming fiscal biennium. DB&F will request the funds required to acquire these software packages in the Biennium Budget, 1987-1989.

13. Recommendation: Service Level Agreements (p. 129)

Service level agreements should be developed for all users of EDPD. The first step involves holding discussions with the major system users to address data processing service needs. During these discussions, the costs associated with providing different levels of service should be addressed. The discussions should lead to agreements between EDPD and the users. The agreements should address the following points at a minimum:

- Level of central processing unit and teleprocessing network availability,
- Time requirements for processing test requests,
- Terminal response times for all on-line systems,
- Production schedules and deadlines,
- Peak processing requirements, and
- Systems development schedule adherence.

Once the agreements are implemented, management reports should be created to monitor service to users. The reports should track deviations from agreed-upon performance levels to provide management with an indication of when corrective actions are needed. The overall benefits of user service level agreements should be improved user awareness and satisfaction with EDPD services.

Comment by Department of Budget and Finance (p. 129)

DB&F is in agreement with this recommendation. We already have such agreements in place for federally funded programs and have recently moved towards establishing such agreements with those programs that request that such an agreement be formalized as a part of the Memorandum of Understanding process. Our past experience with the service agreement approach is that it needs to be implemented together with some type of chargeback arrangement. Service agreements do not work out well with agencies or programs who are not paying for the services that we provide.

14. Recommendation: Capacity Planning (pp. 130-131)

A formal capacity planning function should be established in EDPD. The function should be responsible for evaluating and selecting a suitable capacity planning methodology. Capacity planning software should be acquired that will allow EDPD to effectively summarize and report on computer usage by applications, users, and systems.

The reporting of computer usage should be tied directly to particular departments or program functions of the State. This will provide EDPD and user management with the mechanism to predict future workload growth. The reports should be created to separate usage by shifts within the day. This information can be used to evaluate if workload shifting is possible.

Comment by Department of Budget and Finance (pp. 130-131)

DB&F concurs with this recommendation. EDPD is well aware of the need to develop, formalize, and implement a capacity planning function. There is a definite urgency for adopting a capacity planning methodology and the associated procedures to implement it.

In addition to the requirement to collect, manipulate, and analyze computer utilization data, there is a great need to model the potential effects of new systems to be developed and major expansions to existing ones. The speed with which application systems can be developed today places the capacity planner in a difficult position for assessing when the computer system will need to be upgraded to support all of the processing requirements.

Presently, EDPD is evaluating one of the better capacity planning and modeling software products available today. The major capabilities being evaluated are usage statistics and establishment of trends, performance measurements and detection of bottlenecks, modeling of the effects of future workloads, and sizing of the processing capabilities for the planning of computer system upgrades. The intention is to pursue the acquisition of a software product to perform all of these functions as soon as possible.

A separate effort has been underway since late 1985 to extract usage information by application system for accounting and billing purposes. Analysis of the current data available indicates that usage information is readily available for batch application systems, but for on-line application systems, only a limited amount of departmental information is available. There is no on-line information available at the application level because the current processing for CICS and TSO do not include an application identifier, nor do the sign-on screens contain an application identifier. To date, the following areas have been identified as requiring major modifications--CICS transaction ids, CICS sign-on, and TSO sign-on. Also a major effort will be required to build a cross-reference table to match the application code and the individual usage data. EDPD is striving to complete its efforts in this area by the end of this year.

Although limited on-line usage information is available at the department level, it requires considerable amounts of manual effort to extract the data. The procedures are being reviewed to automate the extraction and reporting function thereby reducing the manual effort and the lead time to prepare the reports.

The collection of usage information by shifts is another task that requires much manual effort and will also be reviewed for optimization through automation.

15. Recommendation: Computer Utilization (pp. 133-134)

As noted earlier, a formalized computer performance management and capacity planning function should be implemented at EDPD and the requisite tools for analyzing computer performance should be acquired and used. With such functions and tools in place, the acquisition of computer equipment can be scheduled to more closely match total processing workloads, and batch and on-line processing can be more effectively balanced to optimize computer utilization. In addition, computer utilization can be more accurately reported for each individual user.

Comment by Department of Budget and Finance (pp. 133-134)

DB&F concurs with this recommendation. As mentioned in the response to the Performance Management Recommendation on pages 127-128, the Systems programming staff utilizes a real-time performance monitor on the computer systems. It provides them a "window" into the processing activities within the computer system and highlights conditions that will lead to performance degradations. This monitor, however, does not collect historical data for performance analyses over a longer duration.

Various alternatives for acquiring this capability are being reviewed, including the capacity planning and modeling software product under trial mentioned in the response to the Capacity Planning Recommendation on pages 130-131.

The expectation is that the combination of these products and development, formalization, and implementation of the proper procedures will greatly enhance EDPD's ability to manage computer utilization, performance, and capacity planning.

16. Recommendation: Productivity Improvements (p. 136)

EDPD should continue to place high priority on using fourth-generation systems development software. In particular, emphasis should be placed on the recent committee efforts, the upgrading of SDM/70 and related systems development standards and procedures, and the development of a strategy for consolidating data access methods.

In addition, EDPD should continue its efforts to ensure the maximum benefit from its new development tools by avoiding the proliferation of redundant and/or incompatible software. While a particular product may be effective on a stand-alone basis, differences in syntax and procedures can make it difficult to integrate all of the tools into a cohesive software environment.

EDPD's selection of productivity tools should pursue a goal of integration so as to present to the developer a single system image, thus reducing the learning curve required to master many different tools. This integrated approach, initiated by AT&T as a "programmer's workbench" has been extended to the development of analyst's and manager's workbenches as well. EDPD should evaluate the use of such workbench techniques.

Comment by the Department of Budget and Finance (p. 136)

EDPD will definitely continue its efforts to improve productivity as well as service to its user community. We will continue our efforts to acquire the latest fourth-generation systems development software and to develop an effective strategy for consolidation of our information resource base with a minimum of redundant and incompatable software tools. We will also look into the "programmers workbench" technique initiated by AT&T.

17. Recommendation: Computer Room Operations (p. 138)

The operation of the computer room at EDPD should be thoroughly reviewed and alternatives for modernization and enhancements should be evaluated and implemented as quickly as possible. Some of the many options available for improving EDPD's computer operations are the following:

- Phase out the punched card processing methods and equipment by converting to key-to-disk data entry equipment, paper warrants rather than card warrants, on-line data entry, TSO-submitted job control statements, pseudo card readers, etc.
- Implement an automated job scheduling system.
- Upgrade the IBM operating system software from JES2 to JES3.
- Prohibit programmers from using the "write to operator" facility.
- Modify the computer configuration to allow for automatic switching of disk and tape drives.
- Replace the IBM 3330 model disk drives with current state-of-the-art models.
- Implement an automated tape library management system.

In general, EDPD should place significant emphasis on upgrading hardware and software and developing standards and procedures for improving the efficiency of the computers and the computer operations personnel, and on training the personnel on the new techniques.

Comment by Department of Budget and Finance (p. 138)

DB&F concurs with most of these recommendations. EDPD will be looking not only at the computer room operations, but the entire Computer Operations Services Branch will be reviewed and evaluated as a continuing program to improve services and integrity. Many of the recommended options are already being worked on and others have been researched, evaluated, and recommended to responsible sections and agencies.

In 1985, EDPD informed all users of our facilities that we plan to phase out punch card processing by the end of 1986 and that the agencies should look at and convert to alternative input methods. To discourage card punching systems, the Data Entry Section of our central facility has not had card punching equipment for the past four years. Our Data Control Section has been using TSO routines for job submissions and job status checks since March, 1985.

EDPD has a project for the conversion, during the next fiscal year, of the State's warrants from a card to paper system. This project team has been

working together with DAGS to make the transition from card to paper warrants as smooth as possible. Procurement efforts for special document processing equipment to automate the handling of paper warrants are well under way.

The acquisition and implementation of an automated job scheduling system is addressed elsewhere.

EDPD does not feel that the IBM operating system should be upgraded from JES2 to JES3 at this time. This alternative was reviewed previously and no positive action was taken as the resource required under JES3 could not justify the changeover. As the size of the computer center operation grows, this alternative will again be reviewed.

Programmers have been instructed not to use the "write to operator" facility, but there are a few programs written many years ago that have not been modified to eliminate this feature. EDPD is working to have the programmers correct this condition.

This feature to allow for automatic switching of disk and tape drives has been reviewed in the past but was not implemented. In the case of disk drives, we already share them among the processors so there is no need for any switching. All programs executing on any processor can access any of the disk drives. For tapes, the automatic feature will disrupt our entire operation since it switches the entire bank (control unit) and individual tape drives cannot be accessed by each processor at will. Operators will then be mounting and dismounting tapes each time the system automatically switches the drives to attach to another processor.

The conversion from 3330 model disk drives to current state-of-the-art models started with the bidding process last November. A string of new disk drives were installed in February, 1986 and the physical conversion of data files from the 3330 type devices to the new models has already been started.

The acquisition of an automated tape library management system is addressed elsewhere.

18. Recommendation: Data Base Management (p. 140)

EDPD should continue to place high priority on the completion of data base and data base management system policies, strategies, standards, and procedures. The creation of a statewide comprehensive management information data base should be de-emphasized. Instead, emphasis should be placed on the overall strategies and policies regarding data management and data base management systems; the definition of roles, responsibilities, and organizational support structures; the evaluation and selection of specific data base management system software tools; and the standards and procedures for using the tools.

Comment by Department of Budget and Finance (p. 140)

DB&F largely agrees with the recommendation. The development of "overall strategies and policies regarding data management and data base management

systems" is indeed an important centralized planning function (page 29) which EDPD is beginning to address more formally with its Data Base and Application Development Strategy Committee. Many organizations are now coming to grips with these questions as the potential for Information Resource Management is recognized and as the methodologies for doing so are becoming more mature.

However, it is not quite correct to report that EDPD has "cautiously regulated the application of data base technology to application system development." In fact, EDPD has sponsored more than one class to explain and promote the advantages of the data base approach. Rather than overly regulated, some bottlenecks have resulted due to need for more personnel to service overlapping development projects. However, as reported, the level of staffing and the appropriate organization are under review by the Data Base and Application Development Strategy Committee.

There is also a factual error in reporting that the Data Base and Application Development Strategy Committee has emphasized "statewide" data base development. The word "statewide" does not appear in its statement of purpose and objectives. Rather, it is partly concerned with State-level data bases. By this, we mean data bases which can be shared by more than one department. This is consistent with the recommendation made throughout the report that such sharable data bases can be important State assets which need to be proactively planned and centrally managed.

19. Recommendation: Program Source Listings (p. 143)

The program source documentation should be secured in a locked room and access restricted to persons who have a need to know.

Comment by Department of Budget and Finance (p. 143)

DB&F agrees with the recommendation. All program source documentation should be secured in a locked room with access restricted to persons who have a need to know. However, DB&F is unable to accomplish this until we are able to increase the space of our documentation library. This is one of the reasons we have requested a second computer facility. Such a move has already been started and the first planning phase has been incorporated into the capital improvements budget.

20. Recommendation: Job Control Language Procedures (p. 143)

The procedures library should be secured using the Resource Access Control Facility and access restricted to computer operations personnel only.

Comment by Department of Budget and Finance (p. 143)

DB&F agrees with the recommendation. EDPD has been in the process of implementing procedures for the use and security of procedure libraries that will be easily secured. The final implementation plans that will include production status procedures are being studied so that they will be consistent with plans to implement an automated job scheduling system.

Currently, several major projects are using these facilities. They have provided initial feedback on productivity gains and comments on the applicability of procedures set in place to provide assistance with the facility. Security for these procedure libraries is controlled through Resource Access and Control Facility for the duration of the test implementation period.

21. Recommendation: Blank Warrants (p. 144)

Pending destruction, blank warrants should be secured and safeguarded from unauthorized access.

Comment by Department of Budget and Finance (p. 144)

DB&F agrees with the recommendation. Following recommendations of the most recent Third Party Audit of our computer center by the certified public accounting firm of Coopers and Lybrand, DB&F has officially notified DAGS that EDPD will no longer be responsible for storing and handling the blank warrants and savings bonds effective July 1, 1986. This action, when finalized in July, 1986, makes the concerns and recommendations of the auditors regarding blank warrants a responsibility of DAGS.

In addition, the related control functions for the processing and handling of warrants and savings bonds will also be returned to DAGS. These functions include:

- Delivering warrants and vouchers to DAGS Pre-Audit.
- Ordering U.S. Savings Bonds from the Federal Reserve Bank.
- Mailing Savings Bonds issue stubs to the Federal Reserve Bank.
- Typing deposit slips and sales report and listing voided Savings Bonds on a worksheet.
- Balancing the Savings Bonds Issued Report.
- Delivering Savings Bond sales report, deposit slips to Central Payroll for auditing.
- Going to fourth floor for Comptroller's and Administrative Services Officer's signatures on Savings Bond forms.
- Typing Savings Bond issue vouchers.
- Delivering Savings Bonds with reports to Pre-Audit.
- Binding Savings Bonds register.
- Typing warrants (voids, reissues, stop payments).

- Coding warrant status transaction sheet.
- Delivering payroll warrant and statements to Pre-Audit for signatures.

22. Recommendation: Physical Security Controls (p. 144)

Physical security controls should be implemented to restrict computer vault access to operators only.

Comments by Department of Budget and Finance (p. 144)

DB&F does not agree with this recommendation as computer operators are generally restricted from entering the vault in the computer operations area. Critical documents, backup tapes, and blank warrants and bonds are stored in the vault that is maintained by the data control clerks. To allow only operators access to the vault would place severe logistical constraints on the normal operations since operators would then have to work away from the computer room and it would defeat the basic security principles of separating warrant printing from inventory control.

23. Recommendation: Offsite Storage (p. 144)

EDPD should establish policies and procedures for identifying critical applications for backup and offsite storage. The data processing coordinators should designate the persons within the user departments responsible for ensuring that files, programs, and documentation within critical applications are backed up and stored offsite. EDPD should also establish review procedures to ensure compliance with the policies and procedures.

Comment by Department of Budget and Finance (p. 144)

DB&F concurs with the recommendation. EDPD will renew its efforts to identify critical applications by establishing policies and procedures for offsite storage of files, programs, and documentation. Over the past years, EDPD has examined the idea of offsite storage of critical files and did recommend to user agencies that were interested in such a program.

In 1985 EDPD started a program of storing critical system files at an offsite location on a daily basis. This program can be expanded to include data files and computer programs if user departments would like to participate. It is our objective to establish both policies and procedures, then work with user department staff to identify their critical files that should be accommodated at an offsite location. Procedures for the review of any existing program to ensure compliance with policies and procedures will have to be established for the offsite storage program. Funding for an elaborate and expanded offsite storage program has not been budgeted, but if State facilities and staff could be utilized, the cost of such a program would be reasonable.

24. Recommendation: Systems Programming Procedures (p. 145)

Formal written procedures should be developed for the systems programming function in general and specifically for the functions listed above.

Comment by Department of Budget and Finance (p. 145)

DB&F concurs with the recommendation. The systems programming function covers a wide range of tasks, making formal written procedures somewhat difficult. General procedures followed by the systems programming staff, such as research, testing, validation of functions, and implementation, will be documented. The specific procedures incorporated in each specialty will be documented separately.

Periodic Review of the PANVALET Worksheet I

DB&F agrees with this recommendation. The PANVALET Worksheet I which is the form used to request the transfer of source programs from the production to test libraries is regularly reviewed by a systems programmer when they are forwarded from the control clerk in the Computer Operations Services Branch. The requesting agency of the source program move is matched against the source program on the form. Inconsistencies with existing naming conventions that identify the owner agency invokes a process to validate the authorization for the request. A way to formalize this process along with a review of the PANVALET Worksheet I will be pursued.

Procedures Following a Security Violation Message

DB&F agrees with this recommendation. The availability of a software product that will efficiently capture the security violation messages upon being displayed is being researched. With our present facilities, the operational overhead to collect this information is not justifiable as it would be an extremely burdensome process. It would involve highly inefficient use of computer, disk, storage, and operations personnel resources. The procedures and facilities that are implemented and formalized will be included in the CICS operational procedures and overall data security plan.

Procedures for System Acceptance

DB&F agrees with this recommendation. Procedures for the activities mentioned above do exist and are followed by the systems programming staff but have not been formally documented. As mentioned earlier, general documentation will be created to guide the performance of these tasks. Details for specific software products are often provided by the vendor and usually included in the procedures. Upgrades to new versions and changes to existing versions of software are initially tested by the systems programming staff, then programmers/analysts outside of systems programming are usually asked to pilot the new versions or changes before they are implemented.

There are no formal change management procedures in place yet, but the systems programming staff maintain their own documentation of new versions and

changes to any software product. Formal change management procedures are being developed by EDPD and existing documentation on the software products will be included in them.

25. Recommendation: Payroll System Documentation (p. 145)

Increased priority should be given by EDPD top management to develop adequate documentation for the payroll system.

Comment by Department of Budget and Finance (p. 145)

DB&F agrees that top priority should be given by EDPD management to complete the operational documentation of the payroll system and the documentation of the system will be completed this year. However, the completion of the documentation is the responsibility of DAGS and has not been a very high priority for the agency. Since DAGS is the controlling agency for the payroll system, DAGS controls the activities of the payroll project staff.

While we have made schedules and established deadlines to complete the operational documentation, the payroll project team has not been able to dedicate time to this effort because of the demanding processing schedules and varied activities that must be supported within the payroll process. There is always a constant need to incorporate system changes to meet the demanding requirements of the user. The fact that the payroll system programs are already a patchwork of fragmented changes, makes the incorporation of changes and subsequent testing very tedious and time consuming. Because of these ever-compounding problems, DB&F took a leadership role in 1977 and again in 1985 to get DAGS to acquire or develop a new payroll system for the State. Both of these efforts failed. In fact, DAGS did not even make the effort to include a Project Valuation Assessment for a new payroll system in their recently completed departmental DIPIRM Plan.

26. Recommendation: Payroll Data Control Function (p. 146)

To provide proper segregation of duties and to ensure the integrity of payroll data, the user department responsible for the system should assume the data control responsibilities. Appropriate action should be taken to transfer the payroll data control functions to the Department of Accounting and General Services.

Comment by Department of Budget and Finance (p. 146)

On April 4, 1986, DB&F issued a memorandum informing the Comptroller that the payroll data control functions and other similar functions for other DAGS applications will not be performed by DB&F as of July 1, 1986.

27. Recommendation: Unemployment Insurance Benefits System Documentation (p. 146)

The system documentation for the Unemployment Insurance benefits warrants application should be updated prior to its implementation.

Comment by Department of Budget and Finance (p. 146)

The current Unemployment Insurance benefits warrants application is already documented and has been in operation since 1979.

28. Recommendation: Disaster Recovery Planning (pp. 147-148)

As a first step in disaster recovery planning, we recommend that EDPD determine the economic and programmatic impacts of different types of computer disasters. EDPD should then develop a disaster recovery plan that addresses the risks and considers items such as the following:

- Processing alternatives for major system hardware and software components.
- Backup procedures to be used by the operations staff within EDPD.
- Processing priorities within each location.

We recommend that a committee be established to assist EDPD in drafting the plan. Committee members should include user department data processing coordinators, operations, systems, programming, and technical support staff from EDPD.

Comment by Department of Budget and Finance (pp. 147-148)

DB&F concurs with this recommendation and recognizes that the proper planning for contingencies is important to all computer centers and will continue its efforts to establish a viable and workable disaster recovery plan. Over the years, DB&F has taken several steps to minimize the impact of a disaster. One of these was to establish reciprocal sharing arrangements with another data center to support each other or allow some time on each other's computer should a prolonged outage occur. This arrangement may have worked out fine in the past, but it is not practical under today's high-speed on-line based systems with sophisticated software and a multitude of hardware components.

Another step taken was to establish an offsite storage arrangement which provided for the storage of critical backup files on a daily basis at another location. This arrangement provides for the capability of being able to start up a system on replacement equipment should the operating center be lost. In order to lessen the financial burden and provide for the replacement of the expensive central site equipment, EDPD has been acquiring insurance coverage over the years for all the equipment owned by the State at the central site.

EDPD considers the issue of disaster recovery as a priority item and has also investigated the subscription of membership in several of the disaster recovery services available commercially. The "hot sites" offered do not have the kind of equipment that the State needs to provide adequate services. The

"cold sites" examined are limited in space and cannot accommodate the size of operation that the State requires.

As mentioned in our response to your Recommendation 17, the second site would serve two major purposes in that it provides needed additional space for equipment to meet data processing needs, and it will also provide an alternate site that contingency plans would require. Being under the same management, a second site minimizes recovery costs since operating systems, support programs, and hardware are easily coordinated to provide redundant reciprocal support.

29. Recommendation: Electric Power Supply Backup (p. 148)

Alternative power supplies including an uninterruptible power supply, backup generator, and dual electrical feeders available from the electric company should be evaluated by EDPD. The alternative solutions and the corresponding costs associated with implementation should be evaluated so that the most appropriate and cost-effective alternative can be selected for implementation.

Comment by Department of Budget and Finance (p. 148)

DB&F concurs with the recommendation. An uninterruptable power supply is ideal for any computer center, and together with a backup generator, the combination will provide for continuous operation in the event of an electrical outage. However, the cost of such backup needs to be carefully examined.

EDPD has investigated the acquisition of an uninterruptable power supply together with upgrading the existing backup diesel generator to provide the needed power for the central computer operation. However, the estimated $1.5 million dollar cost and the lack of space in our present location have prevented serious acquisition activities. The computer center is serviced by dual electrical feeder lines from the electric company at the present time. EDPD will continue to pursue alternate solutions and costs associated with implementation of an uninterruptable power supply system for the computer operations.

30. Recommendation: Job Scheduling System (p. 149)

EDPD management should evaluate the costs and benefits of an automated job scheduling system. In any event, jobs run should be compared to jobs scheduled on a daily basis.

Comment by Department of Budget and Finance (p. 149)

DB&F concurs with the recommendation. EDPD, in bringing this problem to the attention of the auditors, noted that progress is being made in this area. Procurement of an automated job scheduling system has been requested through the budget process in the past. Although this item has not made it through the budget process, the division is currently seeking the acquisition of a job scheduling system through fiscal savings.

Technical presentations by vendors on their software products have been completed and DB&F is currently evaluating the functionality, benefit/cost, and cost-effectiveness of the alternative technical solutions. EDPD is also examining how such software has been operating at other installations in Hawaii. Detailed comparisons of jobs run against jobs scheduled on a daily basis are difficult without the proper tools to retrieve job information. An automated job scheduling system should provide data showing these comparisons.

31. Recommendation: Automated Tape Library Management System (p. 149)

EDPD should assign high priority to acquiring and implementing one of several commercially available automated tape library management systems.

Comment by Department of Budget and Finance (p. 149)

DB&F concurs with the recommendation. EDPD, in bringing this problem to the attention of the auditors, noted that progress is being made in this area. Procurement of an automated tape management system may be possible in this fiscal year through savings. Otherwise, funds will be requested for this system in the next biennium budget.

32. Recommendation: Data Security Plan (pp. 150-151)

To assure successful implementation of data security, EDPD should prepare a written plan that details the steps required to complete the Resource Access Control Activity (RACF) implementation. The plan should address:

- EDPD security policy and directives regarding data, program, and password security, describing the user and EDPD responsibilities for protecting data and maintaining password confidentiality;
- Ownership responsibility for establishing files in the system;
- Guidelines, policies, and procedures for adding new users, deleting access for terminated or transferred employees, and deactivating unused user access codes;
- Involvement and communication required by the user divisions to assure that security is promptly implemented;
- Guidelines for password expiration intervals and rules for new password creation;
- Guidelines for protecting system started tasks and TSO and CICS transactions;
- Tape volume protection including bypass label processing and interfaces to the tape library management system;

- Disk storage (DASD) volume protection to provide an increased level of security and control by restricting user access to specified DASD volumes;

- Protection of authorized program libraries, authorized programs, and sensitive utility functions;

- Implementation of computer operations procedures governing control over RACF and emergency bypass controls required in the event an operational emergency occurs;

- Documentation of the required data security organizational structure and responsibilities by level for all system administrators;

- Development of standard data security administration procedures. With RACF implementation, procedures should be centralized and controlled by the security administrator to assure that appropriate authorization and management approval have occurred before access is permitted; and

- Target dates and tasks required to meet implementation deadlines.

Comments by Department of Budget and Finance (pp. 150-151)

DB&F concurs with this recommendation. A data security ad hoc advisory committee, comprised of management-level personnel from EDPD and other State agencies, has been in existence since September, 1985. The issues identified in the recommendation above are being addressed or will be addressed by the committee.

The initial task undertaken by the committee has been the development of data security policies to be administered by EDPD and adhered to by all users within the State's data processing environment. In a previous attempt to pilot the implementation of security on a user agency's data, a large part of the difficulties encountered were the procedural changes required of the user agency. This issue would best be addressed by a committee, such as the aforementioned ad hoc committee, with joint participation between the central agency and user agencies.

Procedures for some of the daily tasks listed above in the recommendation, such as management of the user ID and passwords, and the protection of their confidentiality exist and are in use but have not been formally documented. TSO resources, including the DASD allocated to it, are protected through RACF and another software product. CICS has its own built-in password security facilities for the transactions.

Other data security procedures will be developed and formalized along with the existing ones. A project is being planned to do a global analysis of

the various data security subsystems that exist with the present inventory of software products and develop strategies and procedures to coordinate them. Significant progress in the implementation of data security is anticipated over the next year.

33. Recommendation: Data Security System Implementation (p. 152)

EDPD should include improvements in the implementation of Resource Access Control Facility in the data security plan. In the interim, the Resource Access Control Facility access authorizations for terminated employees should be revoked immediately. In addition, protection of critical data sets should be given top, immediate priority.

Comment by Department of Budget and Finance (p. 152)

DB&F is in general concurrence with this recommendation. Steps are being taken to ensure that the access authorizations of terminated employees are revoked upon their departure from EDPD.

System data sets have been under RACF protection for several years, but the implementation of security on the user agencies' data introduces factors that are external to EDPD. As mentioned in the response to the Data Security Plan Recommendation on pages 150 - 151, a pilot was attempted with one user agency with unsuccessful results. This result, along with RACF's reputation for being unwieldy, discouraged the participants from proceeding any further.

Current reports are that RACF has been improved significantly; however, an in-depth analysis of its merits and demerits today have not been done. This would be an appropriate task for the ad hoc committee to undertake since the user agencies would have the opportunity to participate in developing an acceptable set of rules. We are in total agreement with the need to implement data security on critical unprotected data as soon as possible and will strive to influence the ad hoc committee to that effect.

Data that resides in the data base management system are adequately protected by its own data security features.

34. Recommendation: Production Jobs (p. 152)

EDPD procedures should be enforced to prohibit running production jobs with test versions of programs.

Comment by Department of Budget and Finance (p. 152)

Production jobs are not run from test version of programs. Program changes are verified and tested and the validity of the program modifications ascertained through normal acceptance procedures prior to a program being used in a production job. However, in some exception cases, after the program has been tested and deemed acceptable for production, the load module residing in the test library has been used in a production job. Although we do not like

to do this, it has been necessary because (1) the user agency often requests that last-minute changes be incorporated into their production jobs and (2) they do not want to delay their production job schedules. In these cases, the project staff has no alternative but to run the production jobs using programs in the test library.

It is important to point out that in these cases it is only the movement of the production program from the test library to the production library that is not performed. The reason that the program is not moved to the production library first is because to do so requires a special request form and the execution of a special computer program by the Computer Operations Services Branch. However, it is not the movement procedure that is the problem.

The real problem is that there is no assurance that the program will be moved into the production library because there are a number of error conditions which has prevent the correct movement of the program. In order to assure the user that the correct program will be executed in the production job, it is safer to use the program in the test library that night and to move the program into the production library the next day when there is an opportunity to verify the accuracy of the move.

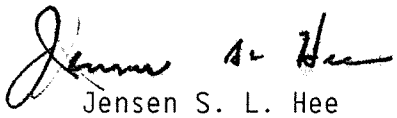
## C. SUMMARY OF REVIEW

In summary, we wish to state that DB&F welcomes the audit because we firmly believe that evaluation is important to improve programs. We believe that improvements to the EDP Program are needed but that rapid progress is being made to improve the Program and that there is reason to be optimistic about the Program's future. DB&F is firmly committed toward improving edp services to the State and will implement many of the recommendations contained in the report, especially as it pertains to improving services to users, productivity in governmental automation, and internal edp operations. DB&F also appreciates many of the ideas that are conveyed in the report and will conduct further examinations in those areas.

However, we believe some of the key recommendations are not justified given the Department of Budget and Finance's commitment to improving services to agencies and its record of implementing new programs and proactive initiatives. We wish to state for the record that implementing some of the recommendations in the report to decentralize and eliminate centralized management and control over data processing related activities would result in additional, unnecessary costs to taxpayers, an inefficient edp system in Hawaii State Government, and a long-term failure to properly manage the State's information resources. Finally, to implement some of the recommendations made by the audit will entail additional resources. After a more detailed analysis of such recommendations, DB&F will consider requesting such resources to the Governor in the Biennium Budget for FY 1987-1989.

Again, thank you for the opportunity to comment on the auditors' report. Should you have any questions or wish to discuss our comments, please do not hesitate in contacting me.

Sincerely,



Jensen S. L. Hee
Director of Finance

cc: Governor George R. Ariyoshi

# APPENDIX

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# A BILL FOR AN ACT

RELATING TO THE ELECTRONICS DATA PROCESSING SYSTEM OF THE STATE OF HAWAII.

**BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:**

SECTION 1. **Findings and Purpose.** This Act incorporates the findings and changes recommended by the Legislative Auditor's Management Audit of the Electronics Data Processing System of the State of Hawaii.

The Legislature finds that there should be a policy which encourages, rather than controls, the electronic data processing technology as a means of improving the quality, efficiency and effectiveness of the state's programs and services. The Legislature hereby adopts the restructuring of the State's electronic data processing ("EDP") system as follows:

(a) The departments are given the authority and responsibility for their efficient and effective use of data processing. The departments may contract for services from the electronic data processing division ("EDPD") and may operate and control their own computer facilities through funds appropriated to the departments.

(b) EDPD shall operate, staff and control the central computer facility. It shall provide computer processing, systems development and maintenance, training and other centralized EDP services to the departments. It shall operate on a self-sustaining basis and bill for the services it provides.

(c) EDPD shall be responsible for the statewide EDP plan.

(d) EDPD shall provide proactive advisory and consultative services to the departments and assist them in applying current and emerging EDP technology.

(e) EDPD shall operate on a self-sustaining basis through the establishment of a revolving fund into which would be deposited the charges collected from the departments.

(f) EDPD shall be transferred to the Department of Accounting and General Services.

(g) The departments shall have the option to use commercial service bureaus or consultants.

(h) The governor shall appoint an EDP Advisory Committee to set priorities for and monitor the progress of EDP projects aimed at developing common systems and shared data bases used by multiple departments.

SECTION 2. **Transfer of Program.** The electronic data processing division is transfered from the department of budget and finance to the department of accounting and general services.

SECTION 3. **Rights and Obligations of Succeeding Department.** The department of accounting and general services ("succeeding department") shall assume all of the rights and powers exercised, and all of the duties and obligations incurred by the department of budget and finance ("former department") in the administration of the programs and organization segments transferred, whether such powers, duties and obligations are mentioned in or granted by any law, contract, or other document. All references in any such law, contract, or document to the former department in connection with the programs and organizational segments transferred shall apply to the succeeding department as if the latter were named in such law, contract, or document in place of the former department.

SECTION 4. **Transfer of Personnel.** The transfer shall include all personnel, the major portion of whose functions and duties is in the transferred programs and organization segments.

No employee of the State having tenure shall suffer any loss of salary, seniority, prior service credit, vacation, sick leave, or other employee benefit or privilege as a

consequence of this Act; provided that subsequent changes in status may be made pursuant to Chapters 76 and 77, Hawaii Revised Statutes.

Any employee who, prior to this Act, was exempted from civil service and who may be transferred as a consequence of this Act, shall continue to retain the employee's exempt status and shall not be appointed to a civil service position because of this Act. Employees who may be transferred by this Act and who are receiving entitlements, benefits, or privileges in accordance with Chapter 77, but not Chapter 76 of the Hawaii Revised Statutes, shall continue to receive only those entitlements, benefits, or privileges received under Chapter 77, Hawaii Revised Statutes, after such transfer.

SECTION 5. **Transfer of Records, Equipment, Appropriation, Authorization, and Other Property.** All records, equipment, files, supplies, contracts, books, papers, documents, maps, appropriations, authorizations, and other property heretofore made, used, acquired, or held by the former department in the exercise of the programs transferred or by the organizational segment transferred by this Act shall be transferred under the direction of the governor to the succeeding department.

SECTION 6. **Civil Actions.** No suit pending at the time this Act takes effect shall be affected by this Act. The right of any administrative officer to institute proceedings for prosecution for an offense or an action to recover a penalty or forfeiture shall henceforth be vested in the head of the succeeding department or some person designated by the head of the succeeding department or as may be directed by law.

SECTION 7. **Appeals.** The right of appeal from administrative actions or determinations as provided by law shall not be impaired by this Act.

Except as otherwise provided by this Act, wherever a right of appeal from administrative actions or determinations is provided by law to or from the former department, such right of appeal shall lie to or from the succeeding department. Such right of appeal shall exist to the same extent and in accordance with the procedures as immediately prior to the effective date of this Act.

SECTION 8. **Continuity of Administration.** Notwithstanding anything in this Act to the contrary, the transfer of an organizational segment of a department provided by this Act shall be accomplished within the time specified in Section 9 by executive order or orders issued by the governor.

Until so transferred, each program or organizational segment shall continue to discharge its duties and functions with the same personnel and to the same extent as immediately prior to the effective date of this Act.

SECTION 9. **Schedule for Transfer of Programs and Organizational Segments.** The transfer shall be accomplished in the following manner:

(1) No later than ten days following the effective date of this Act the governor shall commence:

(A) The reassignment, by executive order, of the various programs and organizational segments as provided for by this Act; and

(B) By executive order, the transfer of personnel, records, authorizations, equipment, etc.; the revision of any job description, and any other detailed matter related to the internal operation of the department.

(C) By executive order, the transfer of EDPD's appropriation into the EDPD revolving fund. Until the departments receive direct appropriations to pay for EDP services, the comptroller may waive the charges for EDP services.

(D) Issue a new administrative directive replacing AD 1977-2 and incorporating the changes recommended by the Management Audit.

The governor shall submit to the legislature no later than twenty days before the Regular Session of 1988 a progress report relating to the implementation of this transfer. This transfer shall be completed by December 31, 1987.

SECTION 10. The revisor of statutes may incorporate into the Hawaii Revised Statutes any of the provisions contained in this Act. The revisor of statutes shall substitute the appropriate departmental reference in all existing statutes where a program or organizational segment is transferred from one department to another department if such existing statutory language has not been amended by this Act.

SECTION 11. **Amendment of Conflicting Laws.** All laws and parts of laws heretofore enacted which are in conflict with the provisions of this Act are hereby amended to conform herewith. All Acts passed during this Regular Session 1987, whether enacted before or after the passage of this Act, shall be amended to conform to this Act, unless such Acts specifically provide that the Act relating to the "Electronics Data Processing System of the State of Hawaii" is being amended.

SECTION 12. The Hawaii Revised Statutes are amended by adding a new section to be appropriately numbered and to read as follows:

"SECTION . EDPD Revolving Fund. There is hereby created an EDPD Revolving Fund from which is paid the cost of goods and services rendered or furnished by the electronic data processing division and which is replenished through charges made for the goods and services. The comptroller shall establish charges for the division's services which reflect the actual costs of operating the division. The charges shall be reviewed annually and adjusted, if appropriate.

The comptroller may negotiate service agreements with state departments which require the services of the division. Nothing in this section shall require a state department to utilize the services of the division.

All expenses of the division shall be paid from the fund."

SECTION 13. Section 26-6, Hawaii Revised Statutes, is amended to read as follows:

"§26-6 Department of accounting and general services. The department of accounting and general services shall be headed by a single executive to be known as the comptroller.

The department shall preaudit and conduct after-the-fact audits of the financial accounts of all state departments to determine the legality of expenditures and the accuracy of accounts; report to the governor and to each regular session of the legislature as to the finances of each department of the State; manage the inventory, equipment, surplus property, insurance, and centralized purchasing programs of the State; establish and manage motor pools; manage the preservation and disposal of all records of the State; undertake the program of centralized engineering services, including operation and maintenance of public buildings, for departments of the State; undertake the functions of the territorial or state surveyor; [and] establish, analyze, and enforce accounting and internal control systems[.]; and provide electronic data processing services to all state departments.

The King Kamehameha celebration commission is placed within the department of accounting and general services for administrative purposes. The functions, duties, and powers, subject to the administrative control of the comptroller, and the composition of the commission shall be as heretofore provided by law.

The functions and authority heretofore exercised by the comptroller, board of commissioners of public archives, the archivist, the disposal committee, and the insurance management, surplus property management, and central purchasing functions of the bureau of the budget and the nonhighway functions of the department of public works as heretofore constituted are transferred to the department of accounting and general services established by this chapter."

SECTION 14. Statutory material to be repealed is bracketed. New statutory material is underscored.

SECTION 15. This Act shall take effect upon approval.

INTRODUCED BY:

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