Audit of the Department of Transportation's Procurement of Information Systems

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

Report No. 97-2
January 1997

THE AUDITOR
STATE OF HAWAII

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Submitted by

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Foreword

This is a report of our audit of the Department of Transportation's procurement of information systems. The audit was conducted pursuant to Section 23-4, Hawaii Revised Statutes, which requires the Auditor to conduct postaudits of the transactions, accounts, programs, and performance of all departments, offices and agencies of the State and its political subdivisions, and Chapter 103D, HRS, the Hawaii Public Procurement Code, which requires the Auditor to periodically audit procurement practices within government.

We wish to express our appreciation for the cooperation and assistance extended to us by the officials and staff of the Department of Transportation.

Marion M. Higa
State Auditor

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Chapter 1

Introduction

The State Auditor initiated this audit of the Department of Transportation's procurement of information systems pursuant to Section 23-4, Hawaii Revised Statutes, which requires the Auditor to conduct postaudits of the transactions, accounts, programs, and performance of all departments, offices, and agencies of the State and its political subdivisions. Additionally, the Hawaii Public Procurement Code, Chapter 103D, HRS, requires the Office of the Auditor to periodically audit procurement practices within government for compliance with the law and all applicable rules. With computer purchases of several million dollars, the Department of Transportation was chosen to be audited for compliance with the law. Further impetus for the audit came from reviews of other agencies that indicated a need to study the adequacy and effectiveness of a department's planning for its major computer systems.

Background on the Department of Transportation

The transportation program, one of the eleven major programs in the State, is carried out by one organizational entity, the Department of Transportation. Formed shortly after Hawaii became a state in 1959, the department's responsibilities include the planning, design, construction, operation, and maintenance of state facilities in all modes of transportation. The department consists of three divisions, Airports, Harbors, and Highways, that are supported by ten departmental offices.

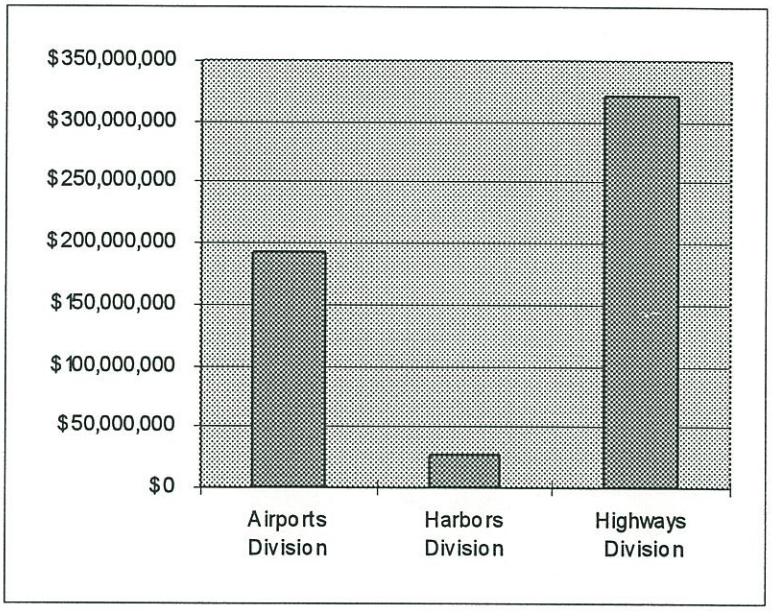
The Airports Division manages Hawaii's airports system of 16 airfields distributed throughout six islands. In FY1994-95, over 36 million passengers passed through Hawaii's airports with Honolulu International, classified as the 18th busiest airport in the nation, handling almost 23 million passengers. The division is involved in various construction projects to renovate or expand airport terminals, buildings, and other facilities such as waiting areas, parking lots, restrooms, and cargo areas.

The state's commercial harbor system, managed by the Harbors Division, includes seven deep-draft harbors and two medium-draft harbors. In FY1994-95, the harbor facilities handled almost 16 million tons of cargo. The Harbors Division is involved in projects to construct, extend or expand piers, container yards, sheds, harbor basins, passenger terminals, and access roads.

Responsible for over 2,600 lane miles of highways statewide, the Highways Division manages projects for highway expansion, resurfacing, maintenance, construction, and safety improvements.

For FY1994-95, operating expenses for the Airports, Harbors, and Highways Divisions were $193 million, $27 million, and $321 million respectively (see Exhibit 1.1).

Exhibit 1.1
Operating Expenditures FY1994-95



The Department of Transportation operates under special funds, which means it must generate its own funds for its programs and projects. The Legislature established independent special funds to finance the operations and maintenance costs for each of the three divisions. Hawaii Revised Statutes (HRS) sections 248-8, 261-5, and 266-19 established the State Highway Fund, the Airport Revenue Fund, and the Harbor Special Fund, respectively. The department also relies on revenue bonds, general obligation bonds, and federal aid to help fund programs and projects.

In recent years, the department requested from the Legislature appropriations of several million dollars to fund the development of several computer related projects, including acquisitions of computer equipment and related consultant services. For example, in 1993, the Legislature appropriated special funds of $2.3 million to the airports administration for computer related projects, $676,000 to the highways administration for the Highways Maintenance Management System, and over $900,000 to departmental administration to develop a coordinated data plan and a storage and distribution system. In addition, the Legislature, for the 1995-97 biennium, appropriated more than $80,000 in

special funds to harbor facilities and harbors administration for computer equipment and $300,000 to the highways administration to continue its Highways Maintenance Management System.

Objectives of the Audit

The objectives of the audit were to:

1. Assess the adequacy of the Department of Transportation's planning for the purchase of computer hardware, software and related services.

2. Determine whether the department's purchases of computer hardware, software, and related services comply with the provisions of the Hawaii Public Procurement Code.

3. Make recommendations as appropriate.

Scope and Methodology

We reviewed purchases made by the Department of Transportation for information systems that included costs for acquisition, installation, and implementation of computer hardware and software. In addition, we examined user training costs and assessed the adequacy and effectiveness of the department's planning in developing and managing its major computer systems. The audit focused on the period between July 1, 1993 to June 30, 1996, although the on-going development of some of the computer systems we reviewed predated that period.

Fieldwork included interviews with management and representative officials of the department's divisions and offices. We studied Chapter 103D, HRS, in establishing our audit criteria and designed and conducted tests to determine whether the Department of Transportation's information systems purchases were in compliance with it. We also used as criteria the System Development Methodology, adopted by the Information and Communication Services Division of the Department of Budget and Finance, as the standard to be followed in the development of computer application systems within the State. We performed detailed case studies to determine whether the purchase or development of major computer systems ensured that the systems satisfied intended objectives and followed System Development Methodology. Additionally, we reviewed administrative directives and the Department of Transportation's Departmental Staff Manual and assessed the adequacy of the department's management controls over the purchase of computer hardware, software, and related services.

Our work was performed from June 1996 to October 1996 in accordance with generally accepted government auditing standards.

Chapter 2

Lack of Compliance With State Guidelines and Laws

This chapter assesses the adequacy and effectiveness of the Department of Transportation's planning in developing and managing its major computer systems. It also examines the department's management controls and compliance with the Hawaii Public Procurement Code, Chapter 103D, HRS, in relation to the purchase of computer hardware, software and related services.

Summary of Findings

1. The department failed to follow state guidelines for development of its information systems, resulting in incomplete, underused, late, or significantly more expensive systems.

2. The department failed to fully comply with the Hawaii Public Procurement Code.

The Department Failed to Follow State Guidelines For Developing Its Information Systems

In developing and procuring several information systems, the department failed to follow state standards as well as those commonly followed by the data processing industry.

Industry standards in information systems development generally consist of separate phases for analysis, design, implementation, and evaluation. In the analysis phase, the project team examines the existing system, defines system objectives, and identifies user needs. In the design phase the project team analyzes how the information or data will flow through the organization and how the data is input, stored, and manipulated. This phase may also include programming and testing of computer software. The next phase is implementation, which involves preparing for transfer of operations over to the new system. The department should then evaluate the new system to measure its effectiveness.

State standards, which will be discussed later in the report, follow a generally consistent structure for information systems development and acquisition. Failure to follow these general standards for system development frequently results in a system that does not meet user requirements and expectations, fails to meet the needs of the organization, and wastes valuable resources.

For our audit, we reviewed the following major information systems: 1) the department's budgeting system, 2) the department-wide network, 3) the airport division's air office automation system, and 4) the highways

division's maintenance management system. Exhibit 2.1 summarizes the information systems reviewed. We found inadequate efforts to follow state standards for needs assessments, user participation, and project documentation. In addition to not following state or industry standards, the department also neglected to provide appropriate guidance to the divisions in developing or acquiring information systems. As a result, systems were costly, delayed, and underutilized.

Exhibit 2.1
Summary of Information Systems Reviewed

Information System	Users	Developer	Function and Purpose
Budget System	Department and division budget analysts	Department Program, Projects, and Budgeting branch	To prepare and consolidate divisions' budgets into a departmental budget for submittal to the Legislature.
Department Network	Entire department	Vendor and department Computer Systems and Services Office	To allow electronic transmission of documents and on-line communications among users.
Airports Office Automation (AIROA)	Airports Division	Airports Division	To allow electronic transmission of documents and on-line communications among users.
Highways Maintenance Management System (MMS)	Highways Division	Vendor	To record and track highway maintenance project information.

State System Development Methodology provides detailed procedures

The Department of Budget and Finance's Information and Communications Services Division requires that executive departments use System Development Methodology to develop information systems. System Development Methodology divides a Basic System Life Cycle for information systems development into five major functions and nine phases. Within each phase, System Development Methodology guides the development effort with step-by-step descriptions of tasks to be performed and how they are to be documented. It also provides guidelines on estimating costs and schedules of completion. When properly followed, System Development Methodology ensures that the system is built in the best way possible, satisfies user needs, and meets objectives. It also helps management to control the system's development, enabling the department to keep within its time and budget constraints.

The nine phases for information systems development consist of: (1) Service Request and Project Valuation Assessment; (2) Systems Requirements Definition; (3) System Design Alternatives; (4) System External Specifications; (5) System Internal Specifications; (6) Program Development; (7) Testing; (8) Conversion; and (9) Implementation. System Development Methodology also requires that the agency perform a post-implementation review, which is considered to be an important quality assurance function that sets the stage for future enhancements. Exhibit 2.2 illustrates these phases. Because each phase forms baselines for related phases, initial phases are very important to the overall development effort.

Analysis of the problem

Analysis of the problem which gave rise to the project takes place in the first three phases of systems development. In phase one, Service Request and Project Valuation Assessment, users initiate work for a project to satisfy a particular need or as a part of management's overall automation plan. By issuing service requests, users may assess project viability, relative priority, and benefits, and estimate costs and time schedules. If the service request references a previously approved automation plan, the project may forgo the valuation assessment and immediately commence with phase two, the Systems Requirements Definition.

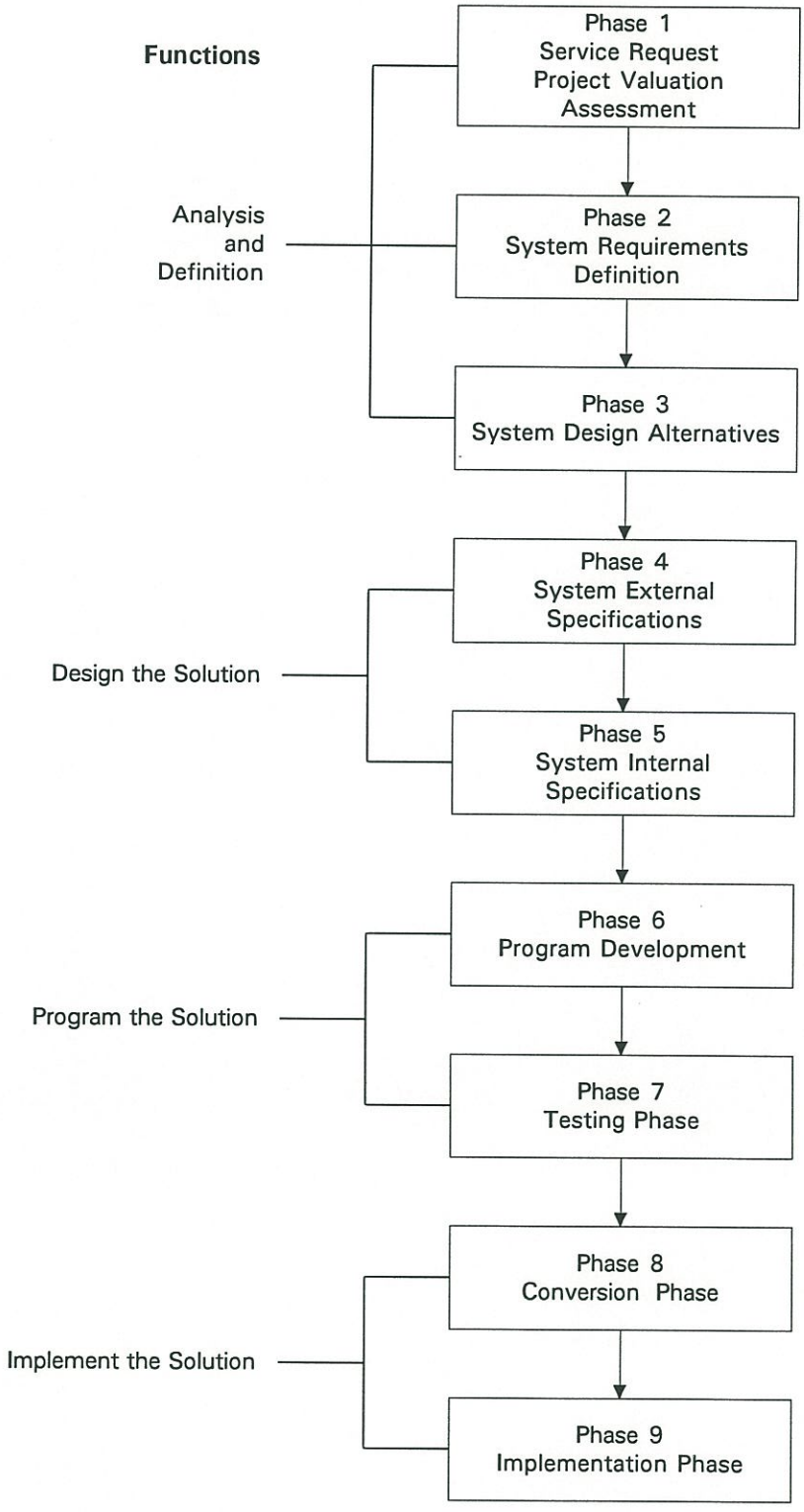
The Systems Requirement Definition phase involves a thorough analysis of present operations and provides a detailed description of user needs and problems. Optimally, a senior level data processing analyst and an equally qualified person from the user group who are skilled in interviewing and structured analysis techniques should be a part of the Systems Requirement Definition project team. In phase three, the Systems Design Alternatives phase, the project team reviews and assesses the viability of alternative solutions to satisfy the user's needs and problems and system objectives defined in the Systems Requirement Definition phase.

Designing the solution

After choosing alternatives, a project team mainly composed of data processing personnel develops the design of the system in the System External Specifications phase, phase four, and the System Internal Specifications phase, phase five. The System External Specifications phase consists of the general design specifications for the operating environment, inputs and outputs. The System External Specifications phase also provide preliminary plans for testing, conversion, and implementation.

Based on the general framework provided by the System External Specifications phase, the System Internal Specifications phase consists of technical tasks that require the exclusive involvement of data processing

Exhibit 2.2
System Development Methodology
System Life-Cycle Functions and Phases



personnel and only minimal user participation. Systems analysts with thorough knowledge of information systems develop the detailed design. From the data processing point of view, the System Internal Specifications phase is the most critical phase because a well designed system contains fewer undetected bugs and operational errors and allows for easier maintenance and enhancements. System Internal Specifications documentation identifies required programs, report layouts, internal record and file structures, and other information necessary for programmers to begin coding. In addition, the System Internal Specifications phase finalizes preliminary plans for testing developed during the System External Specifications phase.

Program and implement the solution

Program development in System Development Methodology, phase six, primarily involves translating the design into efficient code and testing the code generated. The Testing phase, phase seven, often occurs in conjunction with coding, but basically includes preparing the test plan, identifying acceptance criteria, specifying test cases, and ensuring that system objectives and requirements are satisfied. Users participate extensively in preparing test data and in actual acceptance tests. Test phase documentation should contain test case specifications, test data, and test results that will benefit the future testing of systems maintenance and enhancements.

Within System Development Methodology, the Conversion and Implementation phases, phases eight and nine, define the efforts required to convert information from existing formats to those required for the new system and to prepare the user for the new system. The Implementation phase is the "catch-all" phase where the project team performs all the tasks necessary to transfer the system to the user for final certification.

System Development Methodology requirements were not followed

The department did not follow System Development Methodology, as we describe below. It performed no system requirements definition and did not adequately assess user needs in its budgeting system, department wide network, and highways maintenance management system. Because it did not take these steps, the department's information system analysis is inaccurate and will jeopardize subsequent system development phases. Information systems have been delayed and have exceeded estimated costs. The systems may not satisfy user needs and may require more work.

The department does not guide divisions in the planning of information systems

At the forefront of the department's difficulties lies the department's failure to establish policies to help the divisions plan for the development and acquisition of information systems. The department's policies and procedures manual contains insufficient guidance describing necessary steps to follow in developing information systems. The staff manual section reserved for the department's Computer Systems and Services Office, which is responsible for providing automated data processing services, has never been developed. Out of more than 500 double-sided pages comprising the staff manual, only one page addresses information systems development. Furthermore, this page focuses only on financial information systems. With no requirements on how to plan or develop information systems, the department allowed its divisions to develop information systems on their own, resulting in inefficient and uncoordinated efforts.

The department devotes little effort to ensuring the correct planning and development of information systems. Under current procedures, divisions route computer equipment purchase requests to the department's Computer Systems and Services Office for review and approval and subsequently to the director's office for approval. Department policies require that requests include a staff study describing the problem, factors bearing on the problem, a discussion of how the department will benefit, and a recommendation. We reviewed requests approved for the period FY1992-93 to FY1995-96 and found that staff studies for computer purchase requests contained only general statements such as "to run today's software" or "to work more efficiently." Most studies contained insufficient detail such as measurable or time-specific objectives. As a result, goals for system development are subject to broad interpretations, making it difficult to hold an individual or a division accountable. Other than the staff study, there are no requirements for divisions to justify the initiation or continuation of system development.

The System Development Methodology requires much more work than a mere staff study before initiating a project. The department's staff studies are similar to service requests under System Development Methodology. Service requests initiate new systems development work and provide generalized statements about a problem or need, benefits to be realized, and a gross estimate of costs. But even before performing a system requirements definition, System Development Methodology requires more—a project valuation assessment, identifying project magnitude and phases, determining required reviews and approvals, determining available resources, selecting project teams, and completing final work plans. These functions are a part of planning, but were not done in the transportation systems that we reviewed. Without them, the department cannot ensure that a system will be built correctly and will satisfy user needs.

Without plans there can be no control

To achieve the objective of developing an information system, management plans the necessary course of action, organizes the tasks to be performed, directs and guides resources, and controls the process by taking corrective actions. Management exercises control by measuring project status against project plans and adjusts either plans or resources to meet objectives. Management is unable to monitor and control a project if work plans are unavailable. A lack of work plans impeded the department's ability to exercise control over the projects that we reviewed.

Work plans are intended to help the department manage the implementation of systems by clearly describing and justifying tasks, as well as establishing methods and time schedules for accomplishing them. Work plans also form the basis of credible cost estimates. We found no comprehensive, formal planning documents that met the criteria of sound work plans.

We also found no evidence that the department effectively monitored these projects. We found no clear, concise documents summarizing the progress of the projects. In addition, we encountered difficulties in tracking the department's progress in installing various systems and software. Information about the systems had to be pieced together from meeting minutes, undated memos, various files, and consultant reports. However, these documents still did not provide sufficient details on project status, time frames, budget expenditures, and problems encountered. Without adequate documentation of problems and how they were addressed, the department may encounter the same problems and repeat unnecessary steps in its attempt to resolve common problems.

To ensure that management is adequately informed of project status on a day-to-day basis, project documentation should be maintained in an orderly fashion. Documentation should identify tasks to be performed, the linkage between tasks, and a timeline for their completion. Task documentation provides management with information on work in progress, the collection of pertinent data, and the completion of tasks and baselines for the next task. Orderly documentation makes it possible for new staff to continue a project at any given phase. System Development Methodology's structured techniques are self-documenting and therefore the system is appropriately documented at the completion of all phases.

Airports office automation project poorly controlled

One example of a project over which management has not exercised appropriate control is the Airports Office Automation Project. The Airports Division initiated the project for the purpose of linking personal computers together to allow users to share information and to implement a correspondence management database system. A consultant performed a

needs assessment, which effectively detailed the need for a correspondence management system. However, there are no work or implementation plans documenting project objectives and there are no status reports detailing the progress of the project.

While the Airports Division says that the project is in the design stage, we found that some users already have been linked to the network, while many have not. The division claims the local area network will be the infrastructure for future information sharing, but says that it lacks resources to build the system. Without the appropriate work or implementation plans and status reports, management cannot compare the current status to intended objectives and thus cannot effectively control and manage the project.

Department failed to track the cost of systems

Another consequence of poor management controls was the inability to obtain accurate cost data on the systems we reviewed. Based on an examination of contracts and purchase requests, we estimate that the department expended close to $9 million for computer equipment and related services during the period FY1992-93 to FY1995-96. Over $1 million was spent for the Maintenance Management System Project, over $3 million was spent on purchasing or upgrading equipment to access the Department-wide Network and over $300,000 was spent for the Airports Office Automation Project. These systems have not been completed and additional costs will likely be incurred. For the Budget System, software and hardware borrowed from other projects cost in total over $700,000 in federal and state funds. The magnitude of these expenditures makes failure to exercise proper controls a serious concern.

Needs assessments were not done

Within System Development Methodology, planning also involves performing a system requirements definition to assess and document user requirements and needs. The department's failure to follow System Development Methodology led to inadequate analysis and needs assessment, resulting in numerous delays and increased costs. The Highways Maintenance Management System began as a project estimated to cost only $100,000 and scheduled for completion by 1991. The project encountered numerous delays and exceeded the department's initial estimates. The department's budgeting system remains unused and the department-wide network is underutilized.

Highways Maintenance Management System delayed and costly

In 1990, the Highways Division initiated the Maintenance Management System to automate the Oahu district's tracking of personnel, maintenance, and litigation information. The department contracted with

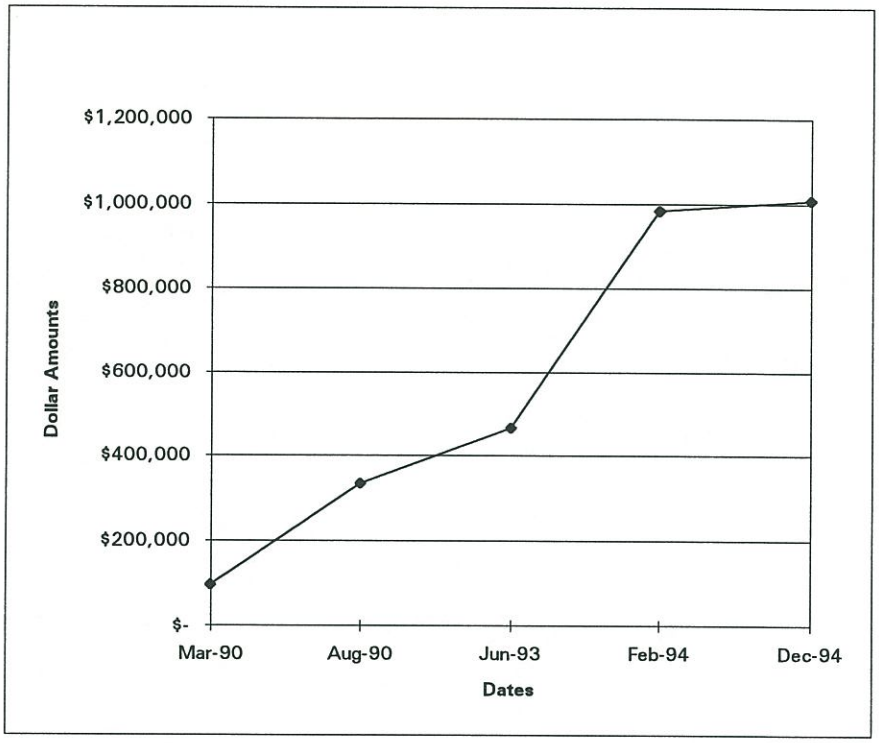
a consultant to complete the system by September 1991, at a cost of more than $330,000. The cost estimate used in seeking initial approval for the project had been only $100,000. The project was extended to October 1991 because necessary paperwork was missing. The department gave the consultant another extension, to December 1991, because the project manager was on leave. Later, due to a staff shortage, the department granted another extension to January 1992. In its December 1991 report to the Legislature, the department described the project as having three phases. Phase I, consisting of equipment purchases and software design, was to be completed in January 1992. Phase II, consisting of testing, training and implementation, was to be completed in June 1992. Phase III had an indeterminate date of completion with no details of what the phase contained.

The department further delayed the project by amending the contract in June 1993 to purchase additional software modules for inventory tracking, fiscal accounting, and field operations reporting. This amendment also increased the costs of the project by an additional $130,000. Claiming that the scope of the entire system was too varied and involved to develop specifications at the time, the department performed no needs assessment. In the amended contract, the consultant was given until March 29, 1994 to complete phase II. This was almost two years past the date stated in the 1991 report to the Legislature.

In the department's October 1993 report to the Legislature, phase II became phase IIA, consisting of the task of completing software modules, and phase IIB, consisting of installing mini-computers for the various neighbor island districts. Again, no analysis or needs assessment was done to support the purchase of minicomputers for the neighbor island districts. The department paid $515,000 for the three minicomputers. In December 1994, the department told the Legislature that phase II now consisted of an additional phase IIC, to complete fleet maintenance and budgeting modules at an additional cost of $22,500. In addition, the Oahu district purchased personal computers and printers costing over $70,000. Phase II is still on-going because the inventory module has yet to be developed.

In summary, the department has spent over $1,000,000 for a system that was initially expected to cost only $100,000. The system was originally scheduled to be completed in 1991. Five years after that date, it remains incomplete. A thorough initial analysis of the problem would have created more accurate cost estimates and eliminated the need to acquire additional modules as the project developed. Exhibit 2.3 illustrates the ever increasing costs of the Highways Maintenance Management System project.

Exhibit 2.3
Development Costs for Highways Maintenance Management System



Budgeting system unused

The department's development of its budgeting system provides another example of poor analysis and planning. The department's Program, Projects and Budgeting Branch began the system in May 1995 to replace its previous budgeting system. The old system had errors that could not be corrected because the developer of the system had retired. The department intended that the Program, Projects and Budgeting Branch and Highways Division budget analysts use the new system to develop and compile the department's budget requests for submittal to the Legislature. Using specialized software together with hardware borrowed from other projects, the Program, Projects and Budgeting Branch manager and the department's auditor completed the system in August 1996. Interviews with departmental staff indicate that the system went unused for over a month because personnel were not trained and were too busy completing the departmental budget. Originally planned to be used by budget analysts in August 1995, the system was delayed for one year and may not be ready for the 1997 budget submittal because users have yet to be trained.

Although simple and relatively inexpensive, the system could play an important function for the department. However, because it was not developed under System Development Methodology, the system's design failed to incorporate important features. For example, the ability to interface with the division's accounting systems to obtain actual expenditure data could have been incorporated into the system's design. In addition, training could have been systematically planned to help prepare departmental staff to use the system.

System Development Methodology's system requirements definition would have helped

System Development Methodology's phase and task guidelines would have helped the department improve its development efforts and would have enabled it to build better systems. Before a project begins, System Development Methodology tasks include determining project magnitude, project phases, and available resources. Under System Development Methodology's approach to determine available resources for the budget system, both the department and users would realize the commitment needed for the project and allow for training during development. By completing System Development Methodology's system requirements definition phase, which details user needs and problems and analyzes present operations and business processes through interviews with all users, the department would have discovered the need to access expenditure data from division accounting systems. The ability to incorporate expenditure data into the Budget System would make the system much more useful and complete.

Also, with a system requirements definition, the department would have realized the need for the additional modules when planning the Highways Maintenance Management System. Instead of doing piecemeal systems development, the department might have been able to purchase a complete package. Finally, using System Development Methodology's detailed guidelines on how to estimate costs, management could have been provided with a more accurate estimate of the cost of the Highways Maintenance Management System. It is reasonable to assume that management's decisions concerning the system might have been different had management known that the system was going to cost more than ten times its original estimate of $100,000.

Department-wide network underutilized

Without a thorough analysis of user needs, the department may develop a system that it will not use. This has been the case with the Department of Transportation's department-wide network. A 1994 consultant report indicated that at that time the network was underutilized. Additionally, the Computer Systems and Services Office currently reports that the network is still underutilized. The department-wide network, initiated in

1991, links personal computers together to allow users to transfer documents and communicate with each other. The project was scheduled to be completed in 1992, and although the network is currently operational, not all computers have been linked to the system. From FY1992-93 to FY1995-96, the department and the divisions requested approximately $3 million to purchase or upgrade equipment for the purpose of accessing the network, but the department has no record of a needs assessment for the network. Only recently did the Computer Systems and Services Office request that the divisions perform a study to assess which personal computers actually need network access.

User groups needed to be established as part of the system development effort

Users play an important part in the development process and are often the primary reason for the development of a system. Users contribute in all phases of System Development Methodology. During the initial analysis phase, users describe current operations and help identify needs and problems. Users help clarify gaps and key outputs during the design and program phases. User participation becomes more extensive during the testing and conversion phases, as users identify acceptance test criteria, prepare test data, help prepare test plans, and perform actual testing. User management committees help to establish the degree of user participation and allocate time for training. Ultimately, the users determine the success or failure of a particular system.

The department failed to realize the importance of user involvement. There are currently no user groups for the various projects we reviewed. At one time, a user group consisting of office managers from all Highways Division district offices, was involved in the Highways Maintenance Management System project. They collectively helped the Oahu district input necessary data to help expedite the implementation phase. The user group has since been disbanded and, as a result, the inventory module has not been completed. The module requires input from all districts regarding a common data format.

Greater user involvement in the Highways Maintenance Management System project would have provided better analysis and more accurate estimates. In the Highways Maintenance Management System, the consultant worked closely with only one user to design the system. It is impossible for one person to describe the needs of all the people who will be using the system. As a result, the department purchased additional program modules as the project progressed.

User involvement in the Budget System and Network projects would keep users informed of the status of the projects and help them prepare for system implementation. In developing the budget system, the budget analysts from the Highways and Harbors Divisions were not interviewed.

The department-wide network has no user group. Consequently, the network is underutilized. Budget analysts do not have the time to learn the budget system while they work on preparing the current departmental budget.

The department can still bring projects in line with state guidelines

System Development Methodology provides directions on how to adopt System Development Methodology for projects in progress. The decision to incorporate System Development Methodology depends on the size and scope of the system, the status of the project, and the experience and skill of project team members in systems development and use of System Development Methodology. The department's first step would be to determine the usefulness of its systems.

Post installation review is essential

Post-installation evaluation of a computer information system is a critical step in ensuring that the system is operating effectively. After the system has been installed and operational for several months, a re-examination is needed to determine how well the system meets its original objectives of satisfying user needs. The re-examination would also identify whether changes or enhancements are required to improve or prolong the useful life of the system. The department should ensure that this important phase in the System Development Methodology be followed upon completion of the implementation of any system.

Back documenting of current information systems is required

The System Development Methodology guidelines state that systems previously developed without adequate documentation should be "back-documented" to facilitate ongoing development/enhancement or maintenance activities. Back-documentation is the process of retroactively documenting a project using the phases of the System Development Methodology. The department should budget for and carefully control "back-documenting" because of added staff resources required to complete the tasks. For systems that are nearing completion and whose probable useful life spans three years or more, the department should complete the design of the system retroactively and consider preparing new user and operations guides. The Highways Maintenance Management System, the Budgeting System, and the Department-wide Network should receive this treatment. For projects that are past user requirements definition, such as the Airports Office Automation Project, System Development Methodology recommends that the department complete design documents and then continue with all subsequent phases and reviews as prescribed by the System Development Methodology guidelines.

Commitment to System Development Methodology is needed from the director

System Development Methodology further states that effective development of information systems requires a genuine commitment from management to using information systems resources in a "planned" manner and providing for the growth of the information systems environment. The director should: 1) establish specific objectives and direction for information systems needed to support strategic business interests; 2) set priorities; 3) insist that computer-use planning be done as thoroughly as operational planning; and 4) follow through to ensure planned objectives are realized. These responsibilities should not be delegated to either the information systems staff or to middle management. The director should be committed to the development of information systems as a strategic "resource" for the organization and not simply as a "service" to the users.

The Department Failed To Fully Comply With The Hawaii Public Procurement Code

In addition to assessing the adequacy of the department's planning in the purchase of computer hardware, software, and related services, our objectives included determining whether the department complied with the provisions of the Hawaii Public Procurement Code.

Choosing a sample that included purchases made by all three departmental divisions as well as nine administrative staff offices, we tested for compliance with various aspects of the code. The code and, by its authority, the administrative rules adopted by the Procurement Policy Office, establish different compliance requirements depending on whether the purchases are under $10,000 or $10,000 or more. Purchases under $10,000 are termed "small purchases" by the code. For purchases of $10,000 or more, further distinctions in compliance requirements are made depending on whether the purchase is made through sealed bids, sealed proposals, or sole source.

Another avenue for purchasing is provided by the code as well. If the department purchases from a state price list, most compliance aspects are automatically met. A price list is actually an indefinite quantity contract awarded for goods and services that provides for fixed prices for a specified period of time. Our tests of compliance were designed to take all these differences into account.

Non-compliance with sole source purchases requirement

Seventy percent of our sample of purchases costing $10,000 or more were acquired through use of price lists. However, our sample did include three sole source purchases made by the Highways Division which totaled more than $622,000.

Among other requirements concerning sole source purchasing, the procurement code directs that, when it is determined that sole source purchasing is necessary, the determination must be in writing and must be posted in the manner described in rules adopted by the procurement policy board. The policy board has adopted Administrative Rule 3-122-82, which states that, "The chief procurement officer and the purchasing agency shall post a copy of the 'Notice of Sole Source' in an area accessible to the public, at least seven days prior to any approval action." The posting requirement allows individuals to object to the request for sole source and possibly reveal alternative vendors. Thus, the posting helps guard against inappropriately restricting competition. Competition is recognized as an effective method of protecting resources against waste, fraud, and inefficient use.

The Highways Division confirmed that the department had not posted its intent to purchase through the sole source process in any of the three sole source purchases we examined.

Failure to comply with requirements for small purchases

One of the main requirements for small purchases is that, insofar as it is practical, no less than three quotes shall be solicited. The procurement rules and departmental policies require price quotations for small purchases to ensure fair prices through broad-based competition. Our tests revealed a number of instances in which the department failed to solicit price quotes for the purchase of computer software.

Another requirement for small purchases is that, when quotes are solicited, the file shall include written justification when an award is made to other than the vendor submitting the lowest quotation. The rules do not assume that the lowest quote is always the most advantageous. We found that the Harbors Division bought two computer drives, each costing more than the lowest quote, yet the files did not contain written justification as required by procurement rules for choosing the more expensive drives.

To help ensure that the overall requirement of obtaining at least three quotations for small purchases is followed, the administrative rules require that all quotations received be recorded and placed in a procurement file. Additionally, when quotations are required but are not obtained because of conditions such as insufficient vendors, sole source, or emergencies, the reason must be recorded and placed in the procurement file. While examining a computer equipment purchase of the Highways Division costing $9,977, we found that price quotes were not solicited. On one copy of a requisition form, the words "Sole Source Vendor" had been written as justification for not obtaining quotes. The file also contained a form designed to be used in documenting information concerning small purchases, including "Justification for inability to obtain minimum three quotations." However this form was blank. Upon

questioning, the employee who had requisitioned the equipment stated that other vendors may have been able to supply the equipment, but he decided to use the sole source justification to select the vendor. Since other vendors could have supplied this equipment, use of sole source justification was inappropriate.

Lack of documentation

In keeping with statutory requirements concerning record keeping for small purchases, the department's staff manual requires that records must contain at a minimum:

- Names of vendors contacted;
- Price quotations (including "no bids");
- Special terms and conditions, if any;
- Justification for not obtaining quotations; and
- Justification for not selecting lowest quotations.

While departmental personnel were required to document the process of small purchase price quotations, the department was unable to provide us with documentation justifying the vendor selection process in over 54 percent of the small purchases we examined.

Director is responsible for compliance

Within government, management is responsible for ensuring that an agency complies with laws and regulations. This expectation is expressed by such authoritative bodies as the American Institute of Certified Public Accountants and the United States General Accounting Office. The Hawaii Public Procurement Code also holds the director responsible for the department's compliance with the law. But while the Departmental Staff Manual and other documents demonstrate efforts to inform staff of procurement code requirements, the examples of noncompliance cited previously show that there is no system for monitoring and following up on compliance.

The Hawaii Procurement Policy Board, which administers the procurement code, states in Administrative Rule 3-131-3 that the head of the purchasing agency is responsible for the agency's compliance with the law. But the policy board also recognizes that violations of the procurement law are normally inadvertent and the result of administrative error, lack of knowledge, or simple carelessness. The board maintains that violations may be avoided through the implementation of better procedures, employee training, and progressive discipline. We concur.

Conclusion

The department failed to follow state guidelines for developing or acquiring its information systems. As a result, information systems were delayed and exceeded estimated costs. Furthermore, the systems may not satisfy user needs and will need further work to be completed. However, the department can still bring projects in line with state guidelines. Finally, the department has also failed to fully comply with the provisions of the Hawaii Public Procurement Code in the procurement of information systems.

Recommendations

1. We recommend the department ensure that its divisions follow the State's standard, System Development Methodology, for acquiring and developing information systems.

2. We recommend the director ensure compliance with the provisions of the Hawaii Public Procurement Code.

Response of the Affected Agency

Comments on Agency Response

We transmitted a draft of this report to the Department of Transportation on December 19, 1996. A copy of the transmittal letter to the department is included as Attachment 1. The department's response is included as Attachment 2.

The department generally concurred with our findings and indicated that it is working to correct the deficiencies noted. It agrees that the state guidelines for system development were not followed for the information systems reviewed. It also stated that compliance with the procurement law is a top priority of the department. Finally, the department provided additional information to clarify points made in the preliminary draft, some of which have been incorporated in our final report.

ATTACHMENT 1

STATE OF HAWAII
OFFICE OF THE AUDITOR
465 S. King Street, Room 500
Honolulu, Hawaii 96813-2917

MARION M. HIGA
State Auditor

(808) 587-0800
FAX: (808) 587-0830

December 19, 1996

COPY

The Honorable Kazu Hayashida
Director
Department of Transportation
Aliiaimoku Hale
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Hayashida:

Enclosed for your information are three copies, numbered 6 to 8 of our draft report, *Audit of the Department of Transportation's Procurement of Information Systems*. We ask that you telephone us by Monday, December 23, 1996, on whether or not you intend to comment on our recommendations. If you wish your comments to be included in the report, please submit them no later than Monday, December 30, 1996.

The Governor, and presiding officers of the two houses of the Legislature have also been provided copies of this draft report.

Since this report is not in final form and changes may be made to it, access to the report should be restricted to those assisting you in preparing your response. Public release of the report will be made solely by our office and only after the report is published in its final form.

Sincerely,

Marion M. Higa
State Auditor

Enclosures

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
JERRY M. MATSUDA
GLENN M. OKIMOTO

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:

DIR

December 30, 1996

RECEIVED
DEC 30 9 59 AM '96
OFC. OF THE AUDITOR
STATE OF HAWAII

TO: MARION HIGA, STATE AUDITOR
OFFICE OF THE AUDITOR

FROM: KAZU HAYASHIDA, DIRECTOR KH
DEPARTMENT OF TRANSPORTATION

SUBJECT: AUDIT OF THE DEPARTMENT OF TRANSPORTATION'S PROCUREMENT OF INFORMATION SYSTEMS

We would like to extend our appreciation to your office for your constructive criticism in order to improve the development of the computer systems for the Department of Transportation. In general, we concur with the audit, however, for clarification purposes would like to offer the following remarks regarding the findings.

While we agree that the state guidelines for system development were not followed for certain systems we did utilize new 4th generation system development technology. The State currently requires the Executive Departments use System Development Methodology (SDM) which is a proprietary product. It is a long, sometimes arduous process which could take several years. Newer 4th generation methodologies which incorporate some of the SDM process in the development and implementation of the system, save time and money. In addition, it is unfortunate that during the development of the systems mentioned in the report, we faced turnover of key personnel which delayed the development. We feel that we would have encountered these delays regardless of which process was used.

We would like to comment on the statement that the budget system cost $700,000. As the Auditor states the budget system is a small system which could have much usefulness. The system was developed using Oracle software. The Oracle software was purchased for $700,000 using federal funds to develop the federally mandated management systems under the Intermodal Surface Transportation and Efficiency Act (ISTEA). We merely borrowed a small module to develop the budget system. The prorated cost probably did not exceed 1% of the $700,000. The delay occurred when the vendor switched personnel mid way in the

project which meant almost starting over. At that point we decided to complete the system in-house. This meant training our employees and we incurred a bit more delay in the project. This was a forward looking conscious decision. Today, we do have a system that is being utilized and a cadre of employees who have new skills and abilities. We are able to make changes and fixes to the system without hiring expensive consultants.

Regarding the finding that the departmentwide network being underutilized, it is true that the system was underutilized but at that time all computers that were justified to be connected to the system were connected. Today, we have connected on many more units including the statewide network. As new units are justified they will also be connected. The Airports Office Automation System has been made part of the Department of Transportation and statewide network.

Regarding the Maintenance Management system, we agree that a more thorough system requirements definition could have been done. When the benefits of the system were realized, the system went from a personal computer based system for only Oahu district to a mini computer based system for all of the other neighbor island districts. The cost increased as the scope increased. A thorough system requirements definition could have identified the total costs more accurately from the start. We have found the system to be a reliable source of information for the users.

On the second finding regarding failing to fully comply with the Hawaii Public Procurement Code. It is a top priority with the department to fully comply with the law. We do post all notices of sole source in our contracts office which is the procurement office for the department of transportation. This office is located of the ground floor of the 869 Punchbowl Street building and is where contractors and other service providers pick up bid documents. It is also where bid openings occur. It is readily accessible to the public. We could not verify or confirm the notices that the auditor claimed were not posted. As far as small purchases are concerned it is state policy not the law that requires three quotes. But, for expeditiousness, i.e. to quickly repair an important piece of equipment or for emergencies, and if past experience shows that the quotes are the same, we do allow small purchases to be rotated among the various vendors.

Again, we would like to thank the Auditor for the review. We are working to correct the deficiencies noted as we have more stability in personnel now and will be able to address the concerns. We both share the same objective, to make government more efficient and customer service oriented. We look forward to working with you in the future.