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Final Report

EVALUATION OF DEPARTMENT OF REVENUE COMPUTER SUPPORT FOR TAX PROCESSING

PROGRAM EVALUATION DIVISION
Office of the Legislative Auditor
State of Minnesota

EVALUATION OF DEPARTMENT OF REVENUE COMPUTER SUPPORT FOR TAX PROCESSING

PROGRAM EVALUATION DIVISION

OFFICE OF THE LEGISLATIVE AUDITOR

STATE OF MINNESOTA

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PREFACE

This report presents our evaluation of the Department of Revenue's use and development of computerized tax processing systems. It is part of a broader Program Evaluation Division study of state income tax processing and auditing, authorized by the Legislative Audit Commission. On March 17 we released our first report from the study; it examined the department's performance in corporate income tax processing. We are preparing a report on individual income tax processing and auditing that will be released soon.

In this report we conclude that the Department of Revenue needs new computer systems, but we also conclude that the department has performed badly in past efforts to develop computer systems. In our view these past failures have resulted from management deficiencies that still exist within the department. Moreover, we believe that the department's problems are severe enough that they should be thoroughly addressed and a plan to resolve them should be prepared before the Legislature releases more money to the department for the development of computer systems.

We fully recognize that the development of computerized tax processing systems has been and will continue to be a shared responsibility between the Department of Revenue and the Information Services Bureau in the Department of Administration. We also recognize, and have in fact noted in an earlier report, that ISB has not performed adequately during the past several years. But ISB's problems cannot excuse the failings of the Department of Revenue. If the state is to have the computerized tax processing systems that are needed, the Department of Revenue must make significant progress in resolving the management deficiencies that are set forth in this report.

We wish to thank the Department of Revenue for its cooperation and we hope that it will give this report serious consideration. We also hope that the appropriate legislative committees will thoroughly review the report and find it useful.

The Program Evaluation Division's study was directed by Ed Burek. This report was prepared by Sandra Fritz, with assistance from Allan Baumgarten and Naomi Kahn-Ramliden.

Eldon Stoehr, Legislative Auditor

James Nobles, Deputy Legislative Auditor for Program Evaluation

March 24, 1981

PROGRAM EVALUATION DIVISION

The Program Evaluation Division was established in 1975 to conduct studies at the direction of the Legislative Audit Commission (LAC). The division's general responsibility, as set forth in statute, is to determine the degree to which activities and programs entered into or funded by the state are accomplishing their goals and objectives and utilizing resources efficiently. A list of the division's studies appears at the end of this report.

Since 1979, the findings, conclusions, and recommendations in Program Evaluation Division reports are solely the product of the division's staff and not necessarily the position of the LAC. Upon completion, reports are sent to the LAC for review and are distributed to other interested legislators and legislative staff.

Currently the Legislative Audit Commission is comprised of the following members:

Senate	House
Donald Moe, Chairman	Fred Norton, Vice-chairman
Robert Ashbach	Lon Heinitz, Secretary
John Bernhagen	Irv Anderson
Jack Davies	William Dean
Frank Knoll	Shirley Hokanson
George Pillsbury	Randy Kelly
Robert Tennessen	Tony Onnen
Gerald Willet	Ann Wynia

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

EXECUTIVE SUMMARY

The Program Evaluation Division has conducted a comprehensive evaluation of the computer support currently used by the Department of Revenue and the department's recent efforts to develop new computer systems for tax processing. Our study addressed three major issues:

- Is current computer support of tax processing functions adequate?
- How well has the Department of Revenue conducted its recent systems development projects?
- Are there management problems in the Department of Revenue which have affected systems development?

A. ADEQUACY OF CURRENT COMPUTER SUPPORT

We found serious inadequacies in the computer support currently available for processing of individual and corporate income taxes. In general, we found that individual income tax returns are processed with a 12-year old system which is inadequately documented and which has not kept up with advances in computer technology. Furthermore:

- The system is difficult and expensive to maintain and modify because of its age, the lack of documentation, and the manner in which the system has been modified in the past.
- The current teleprocessing software is outdated and has been without vendor service for more than ten years.
- There are deficiencies in the system's ability to efficiently process returns and prepare returns for auditing.

Corporate income tax returns are basically processed through a manual system and there is very little computer support of this activity. Serious inadequacies have been identified in this study and in a recent financial audit of the department:

- Controls over corporate tax processing are weakened because manual processing steps cannot be integrated with related computer processing to establish control totals.
- Computations and mathematical accuracy of the returns are only partially checked, and that check is not made until over a year after the returns are filed.

- Duplicate refunds are not detected until two years after the returns are filed.

- Data from the returns are not available to make a computerized audit selection.

- Using the current processing systems, the department cannot readily determine at any time whether a corporation is making its quarterly declaration payments in a timely and adequate manner.

We conclude that both the corporate and the individual tax processing activities are in need of additional computer support to ensure fair and efficient tax processing. The Department of Revenue has recognized the need for improved computer support and has attempted to develop or modify several computer systems.

B. NEW COMPUTER DEVELOPMENT

To evaluate the department's performance in systems development, we reviewed the five major development projects undertaken by the department in the last three years. The five projects are:

- a new Individual Income Tax processing system;

- a new Corporate Income Tax processing system;

- a new Declaration Match processing system which examines the timeliness and adequacy of quarterly declaration payments.

- a major modification to the Accounts Receivable system; and

- a major modification to the Master Business File system.

Development of new computer systems for tax processing is a joint effort involving department staff and the staff of the Information Services Bureau of the Department of Administration (ISB). Analysts in the Department of Revenue Systems Division work with other department staff to identify and document needs for computer support. When department management decides to initiate a new development project, the Systems Division, aided by ISB analysts, works with department users to define the scope and objectives of the system and evaluate the costs and benefits. The overall system and subsystem design is completed jointly by ISB and department analysts. ISB then programs the system and department staff assist ISB in testing and implementing the system.

We sought to learn whether systems development projects had been successfully developed and whether systems had been implemented on time and within budget. We found that the department has experienced serious problems in attempting to implement large scale computer systems in the past three years. Specifically:

- The Individual Income Tax system was cancelled in October 1980, already two years overdue in implementation. Though original estimates had placed the cost of the system at about $190,000, nearly $600,000 had been spent before cancellation, and the estimates of total cost had ballooned to $1.6 million.

- Similarly, the Corporate Income Tax system was cancelled in June 1979 after $79,000 had already been spent. The project was two years behind the original schedule, and estimates of total cost had more than doubled.

- The Declaration Match system was implemented in February 1981, but it has taken over five years to develop, (almost four years longer than originally scheduled) and it is expected to cost $226,000 more than originally planned.

- The modification of the Master Business File system was completed on schedule, but it cost $100,000 more than originally estimated.

- Only one project, a modification of the Accounts Receivable system, was developed on schedule and within budget.

Our review of the five development projects has shown that the department has serious problems in three areas:

1. CONTROL OF THE DEVELOPMENT PROCESS

The department has been unable to define precisely what it wants in a new system during the early phases of development and then freeze the design so that programming and implementation can be completed. Major changes have been requested at very late stages of development, resulting in delays and increased costs. For example:

- During development of the Individual Income Tax system, department users requested 30 major changes after both ISB and the Department of Revenue had approved a Phase III document. This resulted in the revision of 13 of the 14 subsystems, the addition of 8 new subsystems, and the expansion of the data base from 2 files to 6 files.

Since no one in the department is effectively monitoring expenses and progress of system development projects, changes in designs and plans occur without receiving the necessary scrutiny.

2. DEFINING SYSTEMS REQUIREMENTS

We found that the department does not effectively involve users in the early stages of systems design and relies on obsolete documentation of current systems. For example:

- Many department users did not attempt to influence the design of the new Individual and Corporate Income Tax systems until the Phase III review meetings.

Furthermore, the department usually does not consider alternative designs or review similar systems developed in other states. Finally, the Department of Revenue has in the past been committed to the development of huge computer systems when several smaller systems might have been equally effective and more feasible to implement.

3. ESTIMATING COSTS AND BENEFITS

The methods used by ISB and the Department of Revenue for estimating the costs of systems development and reviewing those estimates are often inadequate. This is one reason why costs were badly underestimated in four of the five projects we reviewed. For example:

- ISB arrived at the cost estimates for the new Individual Income Tax system by adding up the cost of each desired modifications to the old system, even though it knew this was to be a totally new development effort. ISB did not include supervision and orientation costs in its original estimates. The department did not effectively review and evaluate those estimates.

Furthermore, the benefits to be realized from new systems have been estimated using unreliable methods, or without necessary input from units in the department.

C. MANAGEMENT PROBLEMS AFFECTING SYSTEMS DEVELOPMENT

In the course of our study, it became clear that the department's difficulties in systems development are related to management problems in the department. We analyzed management problems which affect the department's efforts to develop computer systems and have grouped them into these categories: department planning, organization, funding, and use of specialized staff.

1. DEPARTMENT PLANNING

The Department of Revenue does not have an effective set of long-range plans or objectives and has not adequately defined and

communicated the overall goals of the department. Attempts to develop short-range plans through Management By Objective (MBO) statements have been sporadic and have provided little guidance. Furthermore, the assistant commissioners for the department's three program areas do not appear to be effectively communicating and coordinating their respective program goals.

Because of this lack of planning, it is difficult if not impossible for the department to make rational decisions about the necessity or priority of a particular computer system. We found:

- The decision to initiate the development of a new computer system is made haphazardly, with little thought given to the impact it will have on department objectives.

2. ORGANIZATION AND AUTHORITY

On paper, the organizational structure of the department appears to contain unity of control and effective assignment of responsibility and authority. However, we found that:

- The commissioner and the deputy commissioner are not closely involved with coordinating the work of the three program areas.

Instead, the assistant commissioners are forced to reach an accommodation among themselves in an effort to ensure an effective and efficient allocation of department resources.

We observed:

- An absence of effective cooperation and coordination among the three program areas.

Furthermore, we found:

- Problems in systems development resulted from the department's failure to clearly assign responsibility and authority for systems development.

This lack of coordination has resulted in situations where systems development was delayed because of an inability to resolve the conflicting requests of different program areas or where the definition of a system was determined by the extent to which one program area would cooperate with another in data input efforts.

3. FUNDING ENVIRONMENT

The department has experienced difficulties in securing direct appropriations for systems development projects. Though four of the five projects received initial allocations larger than the original

cost estimates, the Legislature often refused to provide additional funding when costs exceeded estimates. However, the department has been able to continue funding those projects from savings in other areas of its budget. The department has also returned large amounts of unspent funds to the general fund in recent years.

- In fiscal year 1979, $645,000 was returned to the general fund including $218,000 of Line 17 computer funds.

The department has repeatedly stated that the Individual and Corporate Income Tax systems were cancelled for lack of funds. However, we found that:

- The department could have funded these projects through internal budget savings, including unspent computer services funds.

Through interviews with legislators and legislative staff, we found that the Department of Revenue has a serious credibility problem with the Legislature in the area of computer funding, which is why legislators are reluctant to provide large direct appropriations in this area. Among the concerns cited:

- Several people were critical of the department's tendency to ask for funds when little if any planning had occurred and with inconsistent and barely understandable cost/benefit justification provided.

4. USE OF SPECIALIZED STAFF

The department has several units of specialized staff that could help it improve its performance in systems development. However, the department does not make effective use of these resources, which include the Income Tax Division attorneys, the Research Division, and the Operations Auditing Division.

For example, we found that attorneys are not routinely involved in the early stages of systems development. This has resulted in the testing or even implementation of new systems before it was discovered that statutory requirements were not being fulfilled. For example:

- In the Declaration Match system, the lack of systematic legal review resulted in the need for five modifications to the programming logic after the system was well into testing, because of errors or omissions in statutory requirements.

Research Division analysts could assist other units to develop effective cost/ benefit analysis procedures, which are currently lacking in the department. Finally, the role of the Operations Audit Division could be broadened to ensure that overall plans, policies, procedures, and standards are developed and enforced, and to assist the commissioner in coordinating the work of the three program areas.

SUMMARY OF RECOMMENDATIONS

We have made several recommendations throughout the body of this report which we believe will enable the department to improve its computer development performance. Although the recommendations are summarized below, we encourage the reader to review the entire report so that the findings and recommendations are seen in context and are kept in proper perspective.

CONTROLLING THE DEVELOPMENT PROCESS

- The department should take steps early in the development process to determine the content and scope of new computer development projects.

- After solidifying requirements, the department should ensure that an effective freeze of the design is established and enforced.

- The department should assign someone the responsibility and accountability for effectively monitoring cost versus progress during the development cycle so that corrective action can be taken prior to the expenditure of large amounts of money.

DEFINING REQUIREMENTS

- Department of Revenue users should play a more active and aggressive role in accurately defining systems requirements during the early stages of development.

- Systems documentation for currently operated computer systems should be reviewed to ensure it is up-to-date and accurately reflects the processing logic of the programs. Department workflows should also be defined and documented.

- Alternative computer designs should be considered so that an informed cost/benefit analysis can be made.

- Similar systems developed in other states should be reviewed so that the State of Minnesota can benefit from the experience of other states and avoid unproductive approaches.

- Future auditing needs should be considered in the initial design of a system and allowances should be made to accommodate these needs.

- The department should discard the outdated philosophy that large, complex systems are the only way to solve its information needs, and it should consider alternatives which allow for implementation of a system in manageable modules.

ESTIMATING COSTS AND BENEFITS

- The department should place a higher priority on establishing accurate cost estimates in the early stages of a development project.

- The department's Systems Division should receive extensive additional training in cost estimation techniques to improve its performance in this area and allow it to more adequately approve or disapprove ISB estimates.

- Systems requirements should be precisely determined earlier in the development process and thereafter frozen so that cost increases can be avoided.

- The Income Tax Division should be more actively involved in assisting systems personnel in conducting accurate benefits analysis for income tax systems.

PLANNING

- The department should clarify and document its overall operating policies and procedures, especially as they relate to the emphasis placed on timely refund processing versus tax auditing and compliance activities.

- The department should develop long-range plans which identify the direction it is moving in and determine the objectives necessary to purposefully move in that direction.

- The department should consistently develop coordinated short-range plans which clearly identify the intermediate objectives required to implement the long-range goals.

ORGANIZATION AND AUTHORITY

- The department should establish more effective reporting relationships so that unity of command and control is possible and clear lines of responsibility and authority are established.

- The department should take steps to reduce interprogram rivalry and improve interprogram cooperation and coordination.

- The department should ensure that responsibility for systems development is clearly defined and communicated to all department personnel.

FUNDING

- The department should take steps to improve both its computer development performance and its credibility with the Legislature so that it can obtain adequate and continuous funding for its computer development projects.

USE OF SPECIALIZED STAFF

- Attorneys assigned to the Income Tax Division should be more actively involved in the early stages of the development process to ensure that all statutory requirements have been defined and incorporated into a proposed system.

- The Research Division should be actively involved in assisting other divisions within the department to develop more accurate cost/benefit estimates and procedures.

- The Operations Auditing Division should be actively involved in ensuring that departmental policies, procedures, and standards are established and enforced. Additionally, this division should report directly to the commissioner.

- If the department plans to initiate major new development projects in the future, it should consider expanding its current systems staff.

RECOMMENDATION TO THE LEGISLATURE

- We recommend that the Legislature consider the following restriction in making any large appropriation to the Department of Revenue for the development of new computer systems. Prior to spending money on systems development, the Department of Revenue should be required to report to the House Appropriations and Senate Finance Committees on the actions that the department is taking to correct the performance and management problems identified in this report and to present a detailed plan and justification for expending money for the development of new computer systems.

INTRODUCTION

The Program Evaluation Division has conducted a comprehensive evaluation of the computer support currently used by the Department of Revenue and its recent efforts to develop new computer systems for tax processing. Our study addressed three major issues:

- Is current computer support of tax processing functions adequate?
- How well has the Department of Revenue conducted its recent systems development projects?
- Are there management problems in the Department of Revenue which have affected systems development?

Our research included an analysis of computer support available to the department and a detailed review of the five major systems development projects that the department has attempted in recent years. We conducted a series of 45 structured interviews with user personnel, systems personnel, management of the Department of Revenue, and personnel of the Information Services Bureau of the Department of Administration (ISB).[1] We also reviewed documents and reports from the Department of Revenue and ISB on recent systems development efforts.

This report presents the results of our study. Chapter I examines the computer support currently available to the department. Chapter II reviews the department's performance in five systems development projects. In Chapter III, we present our analysis of management problems in the department which affect systems development.

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[1] A copy of the interview guide is appended to this report.

I. ADEQUACY OF CURRENT COMPUTER SUPPORT

The Department of Revenue is responsible for the fair and efficient collection of individual and corporate income taxes in compliance with state law. We evaluated the adequacy of computer support available to assist the department in performing this function.

A. INDIVIDUAL INCOME TAX PROCESSING

We found that individual income tax processing is primarily conducted with a 12-year old computer system which is inadequately documented and which has not kept up with changes in computer technology. Additionally, we noted several tax processing deficiencies.

First we found that the system is difficult and expensive to maintain and modify because:

- Documentation of the system is minimal and obsolete.
- Many of the batch programs are written in Assembler language and it is increasingly difficult to find qualified programmers capable of understanding the coding.
- Changes have been made to the system each year as a result of legislative mandates, but the changes are not grouped together and are scattered throughout the 100 plus programs which comprise the system. This fragmented approach makes it extremely difficult to ensure that new logic is coordinated with current logic. Furthermore, 12 years of modifications and patches to the system have jeopardized the integrity of the system, leaving many sections extremely difficult to adapt further.
- The file structure used in this system is far behind the state of the art and is not used in any other system at ISB. Consequently, it is becoming increasingly difficult to find qualified programmers to work on these unfamiliar structures. Furthermore, the file design was completed when high disc storage costs were a significant factor, with a tradeoff of additional maintenance costs willingly incurred. The value of this tradeoff is now gone because disc storage costs have been reduced significantly.

Second, we found the current teleprocessing software outdated. For example:

- The income tax system uses the GRAPHICS teleprocessing monitor, an IBM software package which has been without

vendor service for over ten years. Newer teleprocessing software is available which would make more efficient use of hardware resources and which would have vendor service should a breakdown occur.

Third, we found several inefficiences in individual income tax procedures. Specifically:

- During the machine edit phase of tax processing, if an error is discovered in any tax return in a batch of 100, the entire batch cannot be processed until the error is resolved. If the error is especially serious, all returns are delayed, thereby delaying the processing of all 100 returns for two or three days instead of just the problematic return.

- The current logic of the machine edit cannot handle balance due extensions, no remits, and partial paid tax returns, making it necessary to have parallel manual review of these returns once machine processing is completed to validate arithmetic accuracy. Furthermore, for these types of returns, if a taxpayer overpays a tax obligation, the overpayment is not refunded nor is it credited to the following year return. The system has no way of recording the overpayment and the dollars are not credited to the taxpayer's account.

- Because the current system does not keep track of the detail of itemized deductions and only captures the total amount of all itemized deductions, its use for auditing is limited.

B. CORPORATE INCOME TAX PROCESSING

Corporate income tax returns are basically processed using a manual system, and thus, there is very little computer support of this activity. A return initially goes through a computerized cash entry system and if a refund is due, it is processed through a computerized refund system. Other than selected management reports available on request, no other computer support of this activity is currently provided.

Several deficiencies in this processing method were noted in the fiscal year 1980 audit of the department conducted by the Financial Audit Division of the Office of the Legislative Auditor.

- Controls over corporate tax processing are weakened because manual processing steps cannot be integrated with related electronic data processing to establish control totals.

- Computations and mathematical accuracy of the returns are only partially checked, and that check is not made until over a year after the returns are filed.

- Duplicate refunds are not detected until two years after the returns are filed.

- Data from the returns are not available to make a computerized audit selection.

- Estimated tax payments must be manually verified.

- The tax research division must have each return keypunched to accumulate statistical data, because there is no computer record of the data.[1]

We concur with the above findings. Additionally, we found that the nature of the Accounts Receivable and the Declaration Master File systems used in corporate tax processing is such that the Accounting Section cannot accurately determine at any given time what a corporation has paid, what it owes, and the dates of the last and next payment. Consequently, it is difficult to audit for over-estimating or under-estimating of quarterly payments, or to determine when a liability becomes delinquent. Because of this, interest on late quarterly payments is not assessed and additional revenue is lost.

Another problem arises when a corporation inadvertently overpays its annual tax obligation. Upon discovery by the department, this overpayment is credited to the year in progress. But if the corporation does not make use of the credit during the year in progress, the overpayment is not automatically returned nor is it automatically credited to the following tax year. Unless the corporation detects the overpayment and specifically requests otherwise, it remains as a credit for the current tax year and the corporation does not have the use of these funds.

We conclude that both the corporate and the individual tax processing activities are in need of additional computer support to ensure fair and efficient tax processing. The Department of Revenue has recognized the need for improved computer support and has attempted to develop or modify several computer systems. In the next chapter, we examine the results of the department's efforts.

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[1]Office of The Legislative Auditor, Financial Audits Division, Management Letter Report, Statewide Financial Audit, Year Ended June 30, 1980 (1981), p. 364.

II. NEW COMPUTER DEVELOPMENT

In recent years, the Department of Revenue has attempted to develop several new computer systems to assist it in tax processing. We reviewed the five major development projects undertaken by the department in the last three years to evaluate the department's performance in systems development. The five projects are:

- a new Individual Income Tax processing system;
- a new Corporate Income Tax processing system;
- a new Declaration Match system which examines the timeliness and adequacy of quarterly declaration payments;
- a major modification to the Accounts Receivable system; and
- a major modification to the Master Business File system.

Development of new computer systems for tax processing is a joint effort involving Department of Revenue staff and the staff of the Information Services Bureau of the Department of Administration (ISB). Analysts in the Department of Revenue Systems Division work with other department staff to identify and document requirements for computer support. When department management decides to initiate a new development project, the Systems Division, aided by ISB analysts, works with department users to define the scope and objectives of the system and evaluate the costs and benefits. The overall system and subsystem design is completed jointly by ISB and department analysts. ISB then programs the system and department staff assist ISB in testing and implementing the system.

We sought to learn whether systems development projects had been successfully developed and whether systems had been implemented on time and within budget. We found that the department has had limited success in implementing large-scale computer systems in the last three years. Only one of the five systems, the Accounts Receivable modification, was implemented on time and within budget. The Individual and Corporate Tax processing systems were cancelled after a total of over $660,000 had already been spent on the two projects. The Declarations Match system was implemented in February 1981, but it has taken over five years to develop, and it has cost $233,000 more than originally estimated. The Master Business File modification was implemented on time, but cost $100,000 more than originally estimated. Descriptions and reviews of the five projects appear in Appendix B of this report.

In analyzing the reasons for this record of limited success in computer development, we found major deficiencies in the department's ability to:

- effectively monitor and control the development process;

- decide on the definition and scope of a computerized system and stick with the decision once made; and

- ensure that cost estimates developed in consultation with ISB realistically reflect total costs.

The remainder of this chapter describes the department's performance in each of the above areas, along with our recommendations for improvement. We recognize that the department does not operate in a vacuum, and that the performance of ISB has, at times, clearly affected the Department of Revenue's ability to successfully implement computer systems. However, it is not the purpose of this report to focus on the performance of ISB, but rather to analyze problems and recommend solutions which are within the jurisdiction of the Department of Revenue to achieve.

A. CONTROLLING THE DEVELOPMENT PROCESS

An essential element of successful computer system implementation is the ability to monitor and control the development process. The development process consists of defining requirements, designing a computer system which will meet those requirements, programming, testing, and ultimately implementing the system. The process is controlled by developing and executing an implementation plan, which consists of milestones to be accomplished along with associated timeframes. Ideally, the successful execution of the plan results in a system being implemented on time and within budget.

The Department of Revenue and ISB use a systems development methodology called PRIDE (Profitable Information by Design) to assist them in monitoring and controlling the development process. The PRIDE methodology consists of seven phases of development and requires a review and signoff by both ISB and Department of Revenue personnel at the end of each phase. During Phase I of the PRIDE methodology, the overall objectives and scope of the system are defined and a cost/benefit analysis is prepared. During Phase II, major system design is accomplished which identifies specifically what is to be done, what input and output requirements will be, and what data will have to be captured on computerized files to support the project. At this point, the scope and content of the system should be well defined.

During Phase III, subsystem design is accomplished defining how the data will be manipulated to achieve the desired results. This phase produces detailed specifications for writing the programs required to support the system. At this point, system definitions and requirements should be frozen, and no further changes to the design should be allowed so that programming can commence in an orderly fashion. If the system design is not frozen, it is impossible to complete programming, as each change necessitates that new or changed

logic must be added to what is already coded. When this is done, great care must be taken to ensure the new coding does not conflict with and is coordinated with coding already completed.

During PRIDE Phases IV through VII, programming is completed, testing and conversion are accomplished, administrative procedures are specified, and the system is implemented. An eighth phase is used for modifications and consists of an abbreviated version of the first seven phases.

Our review of five systems development projects shows that:

- The department has experienced serious problems in its recent attempts to develop computer systems.

The Department of Revenue has a poor record of success in the past three years for implementing systems on time and within budget. The Corporate Income Tax system was cancelled after $79,000 was spent on the development process. This represented 62 percent of the money allocated for the project, and yet Phase III of the design had not even been completed. The Individual Income Tax system was cancelled after $582,000 was spent, with required additional funding estimated to be $1.02 million before the system could be implemented. When the Declarations Match system was completed in February 1981, it was three years overdue and cost $233,000 over the original budget. The Master Business File modification was implemented on time, but at a cost of $100,000 over its original budget. Of the five systems we studied, only the Accounts Receivable modification was implemented on time and within original budget.

We found that:

- The department has been unable to decide what it wants in a computer system and stick to that decision.

One reason for this lack of success is that the department frequently requested changes in the content and scope of systems, even though the PRIDE methodology emphasizes freezing systems design before proceeding to later phases of development. These changes can be partially attributed to the methods used by the Department of Revenue to define system requirements, as discussed in the next section. But most of the changes are the result of the Department of Revenue's inability to decide what it wants in a computer system and to stick to this decision. Because of this, what began as fairly simple and manageable designs were allowed to expand to the point where the system became so complex that it was impossible to adequately manage all of the requirements with the limited systems staff available. It also became virtually impossible to complete the programming stages and implement the system.

A typical example of this process is found in the development of the Individual Income Tax system. After the initial Phase III

document was generated and agreed upon by both ISB and the Department of Revenue, department users requested no less than 30 major changes to the design, resulting in the revision of 13 of the 14 subsystems, the addition of 8 new subsystems, and the expansion of the data base from 2 files to 6 files. The majority of these changes were requested by the Income, Sales and Use Tax Program, although six changes were originated by other Department of Revenue users. In addition to the aforementioned changes, ISB initiated one major change to accommodate use of a newly acquired teleprocessing monitor.

Each change significantly added to the content and scope of the system design, and therefore significantly increased the costs. Thus, what started as a $189,000 system is expected to eventually cost $1,605,000. As the requirements changed the timetable for implementation was also extended. Eventually the requirements had expanded to a point where the design process was impossible to manage, and the system was cancelled in October 1980, already two years overdue.

As Table 1 indicates, a similar pattern was found for all three new development projects we studied. Only the two modifications were completed on time, although one of these, the Master Business File was $100,000 over budget at the time of implementation. When asked why these two modifications were completed on schedule, Department of Revenue users and ISB personnel consistently stated that the main reason was because the Department of Revenue decided early what the system modification would entail and did not change this decision as development progressed.

In our interviews with the top management of the department, we found that the department often views the continual changing of requirements as a very positive occurrence; it believes that once the system is finally implemented, it will have the most modern, up-to-date version of the system available. What the department fails to realize is that the constant changing of requirements is counterproductive to ever getting the system implemented. In fact, many of those changed requirements should have been anticipated during the early phases of development.

We also found that:

- The department does not effectively monitor the progress of development projects.

Another reason the Department of Revenue has had a problem controlling the development process is because there does not appear to be effective monitoring of the development plan. Though the department meets periodically to review progress, it does not take action when significant time and cost overruns are brought to its attention. Thus, the development process is allowed to significantly deviate from the plan without assurance that the deviations are well thought out and absolutely necessary, or still within the capabilities of the department's budget and personnel resources to achieve.

TABLE 1

SYSTEMS DEVELOPMENT TIME AND COST DATA

DEVELOPMENT TIME

System Name	Date Started	Estimated Project Completion Date				System Implemented?
		Phase I Estimate	Phase II Estimate	Phase III Estimate	Last Available Estimate	
Corporate Income Tax	7-76	8-77	10-77	N/A[b]	1-79	no (cancelled 6-78)
Individual Income Tax	5-77	9-78	1-79	1-81	1-82	no (cancelled 10-80)
Declaration Match	3-77	2-78	12-80	1-81	2-81	yes (2-81)
Master Business File	3-80	10-80[a]	N/A	N/A	10-80	yes (10-80)
Accounts Receivable	2-80	6-80[a]	N/A	N/A	6-80	yes (6-80)

DEVELOPMENT COST

System Name	Estimated Project Cost[d]				Total Cost To Date
	Phase I Estimate	Phase II Estimate	Phase III Estimate	Last Available Estimate	
Corporate Income Tax	$ 55-85,000	$ 91,431	$ N/A	$ 200,000	$ 79,284
Individual Income Tax	189,547	191,875	500,000	1, 605,000	582,694
Declaration Match	14,300[c]	180,000	193,000	248,600	241,000
Master Business File	40,000[a]	N/A	N/A	150,000	140,971
Accounts Receivable	70-90,000[a]	N/A	N/A	70-90,000	88,146

[a]This was actually a phase VIII modification to an existing system, and the dates and costs identified were established at the beginning of the Phase VIII planning process.

[b]System was cancelled during Phase III development.

[c]During the development of this system, four Phase I documents were generated. The cost identified is the result of the first Phase I. By the end of the fourth Phase I, the cost has risen to $142,760.

[d]These figures only include ISB services, and not the cost of department staff working on the projects.

In summary, the Department of Revenue should take steps to determine what it wants in a computer system and solidify requirements at an early stage of the development process. It also needs to ensure that a freeze of the design is established and enforced. Additionally, someone should be assigned the responsibility and authority for effectively monitoring costs versus progress during the development cycle so that corrective action can be taken prior to the expenditure of large amounts of money.

B. DEFINING REQUIREMENTS

Defining systems requirements is the process by which a department determines the content and scope of a computer system, and determines what the proposed system will or will not do. This is a difficult task for the Department of Revenue because it operates in an intricate and complex statutory and regulatory environment. Consequently, computer systems developed for the department are also complex, and great care must be taken to ensure that computer systems are well-thought out, well-planned, and well-coordinated. The many statutory requirements which must be built into the department's computer systems also make the process of defining systems requirements more difficult.

Ideally, an effective job of defining systems requirements results in the general scope and content of a system being defined in Phase I of the development cycle, with any remaining requirements being solidified no later than the end of Phase II. However, as discussed in the previous section, the Department of Revenue experienced considerable difficulty controlling the development process, because requirements kept changing well into Phase III and beyond. Part of the reason for this is the manner in which the department defines systems requirements.

We found that:

- The department uses ineffective methods to define systems requirements.

The department's basic approach is to examine the documentation of the old system, duplicate the logic, and interview users to determine whether current reports should be changed or new reports added. Contrary to effective requirement planning, we found that little emphasis was placed in the initial stages on determining if the design philosophy or objectives of the old system were still appropriate, or if major new design features and capabilities should be included in the design. Furthermore, very little effort was expended in the initial stages in checking with other states to determine what they were doing in a particular area and what the results were, so that Minnesota did not have to "reinvent the wheel" and could avoid unproductive approaches.

We emphasize initial stages because the deficiencies identified were eventually corrected to some extent, but this occurred well after Phase III was initiated in two of the three new development projects we studied. In the third project, the Declaration Match system, it took over two years and four revisions to develop an acceptable Phase I document because of changing requirements. Major changes to the systems design and programming were necessary at a fairly late stage of the development process because needs and requirements were not identified earlier and kept changing. This inefficient requirements definition process caused major cost increases which ultimately contributed to the demise of both the Corporate and Individual Income Tax systems.

During our interviews, a number of department users complained that they were never initially asked by the systems staff about new features they would like to see in the proposed system, or if they were asked, their needs were supposedly ignored. Observers at both the Corporate and Individual systems Phase III review meetings noted that the meetings became brainstorming sessions and were conducted in an atmosphere of "well, as long as you are asking, here is what I want." The Phase III meetings were supposedly the first time many users felt they had an opportunity to adequately describe the enhancements and new features they would like to see in the proposed system.

Why this happened is not entirely clear, because interviews with the Department of Revenue systems personnel and review of the PRIDE Phase I and II documents indicate that most of the department's users were consulted during the early design phases of all three development projects, but for whatever reason were not serious about stating their needs until the Phase III review meetings. As previously stated, Phase III is a very poor time to be conducting brainstorming sessions regarding the system design. This activity should occur in Phase I and II of the development cycle.

- Important documentation is often obsolete or non-existent.

Besides ineffective user involvement, other deficiencies also affected the department's ability to efficiently determine the requirements of a system. For example, very little documentation exists which specifies the flow of work through the various operating units. Because of this, it is difficult for the Department of Revenue systems personnel to understand the processing of various documents and thus have the computer duplicate the many manual steps involved in processing. This lack of documented workflow makes it even more important that department user personnel are actively and aggressively involved in the early stages of systems design so that all requirements are defined.

Another problem is caused by the department's reliance on the documentation of the old system to help it define the requirements of the new system. In many cases, the systems documentation has become outdated because numerous changes have been made to the

coding of the programs over the years without a corresponding update of systems documentation. The systems documentation for the Individual Income Tax system, for example, had not been updated for two years and did not accurately reflect the logic that is currently being used to process individual tax returns. The systems documentation was also found to be outdated in both the Corporate Income Tax and the Declaration Match systems. This caused major changes in requirements at later stages of the development cycle when the discrepancies in documentation were discovered.

Additionally, few if any alternative designs are considered and no attempt is made to explore various scopes and definitions along with associated costs, so that a more informed and responsible cost/benefit analysis can be made.

We also found that requirements definition is many times the result of compromise and negotiation, rather than an actual determination of needs. For example, one division may insist an additional report is needed or additional checks are needed to improve the system's reliability. If these requirements involve additional work by another division, negotiations will occur since one division director does not have authority over another director. As a result of the negotiations, perhaps the report will be dropped, when in fact, it could be highly profitable. Or perhaps the second division will agree to the extra workload required if the first group will agree to add yet another report which benefits the second division. In any case, what occurs is not a very effective method of determining systems requirements. Either valuable components may not be included or the system begins to increase significantly in scope.

- Auditing needs are not considered during systems development.

Finally, we found that during the development phases, neither the Department of Revenue users nor systems staff tried to determine how the system might be used to support future auditing activities, and what these auditing needs might be. The designs of the systems we evaluated were specifically aimed at processing activities, and little thought was given to capturing data items which would aid in future auditing efforts. Because of this "processing only" design philosophy, major efforts may be needed after implementation to revise the systems to capture data and accommodate auditing requirements.

Auditing requirements should be analyzed and identified in the beginning, and systems should be designed with these needs in mind. Allowances for these future data needs should be incorporated into file design and data manipulation practices. The system could then be implemented in manageable modules, with the tax processing module implemented first and the auditing and compliance modules to follow. This method offers a coordinated approach to systems design and minimizes the amount of rework needed after a system is implemented.

Using a modular design approach would also help solve another problem we observed in the department. In the past, the department has favored the development of a single, large computer system to be implemented in one pass when several smaller systems could be equally effective. Consideration should be given to the use of several smaller systems implemented over a period of time. Smaller systems allow for a more manageable development process, and also allow more effective use of the limited systems staff available to the department.

In summary, we recommend the following steps be taken by the department to improve its performance in effectively defining system requirements:

- Department of Revenue users should play a more active and aggressive role in accurately defining systems requirements during the early stages of development.

- Systems documentation for currently-operated computer systems should be reviewed to ensure it is up-to-date and accurately reflects the actual processing logic of the programs. Workflows should also be defined and documented.

- Alternative designs should be considered so that a more informed cost/benefit analysis can be made.

- Similar systems developed in other states should be reviewed so that the State of Minnesota can benefit from the experiences of other states.

- Future auditing needs should be considered in the initial design of a system and allowances made to accommodate these needs.

- Finally, and perhaps most important, the Department of Revenue needs to discard the philosophy that a large, complex system implemented in the first pass is the only way to solve its information needs, and should consider alternatives which allow for implementation of a system in manageable modules.

C. ESTIMATING COSTS AND BENEFITS

The Department of Revenue experienced significant problems in realistically estimating both the costs and benefits of four of the five systems we studied. Specifically, the Corporate Tax system was originally estimated to cost $55,000 to $85,000; at the time of cancellation, the cost estimate had risen to $137,000. The Individual Income Tax system was originally estimated to cost $189,547; at the time of cancellation, the cost estimate had risen to $1,605,500. The Declaration Match system was originally estimated to cost $14,300, but the estimate ultimately grew to $248,000. The Master Business File

system was originally estimated to cost $40,000; at the time of implementation in October 1980, the total cost of the system had grown to $150,000. Only the Accounts Receivable modification was accomplished close to its original estimate of $100,000.

- Inadequate methods are used for estimating development costs.

As discussed above, two major causes of these cost increases are that the scope and the content of the proposed system are allowed to escalate and that the requirements are allowed to change significantly at a late stage in the development process. But another important reason for these discrepancies is the manner in which ISB and the Department of Revenue arrive at the cost estimates. Some of the methods used by ISB to determine the estimates are inadequate.

The development of cost estimates for the Individual Income Tax system is a good example. ISB arrived at its initial cost estimates for this system by adding up the cost of each desired modification to the old system, even though it knew this was to be a totally new development effort. Additionally, ISB only recently began including supervision and orientation time in its cost estimates, and this added at least 6 percent to the revised cost estimates. During the later stages of development, ISB decided to accommodate the use of a new teleprocessing system, and this added 15 percent to the cost of each subsystem. Similar estimating problems were found in four of the five systems we studied. Only the Accounts Receivable modification was completed within the original estimate.

Estimating project costs is a joint responsibility of ISB and the Department of Revenue Systems Division. ISB is responsible for providing initial estimates, and the department's systems staff is responsible for reviewing and approving or disapproving the cost estimates. However, the department's systems staff is inadequately trained in effective estimating techniques and is in a poor position to evaluate ISB's work in the area. Furthermore, our interviews indicate a general lack of concern by both the Department of Revenue systems personnel and management that development costs be accurately defined in the early stages of a project. They know ISB has a history of underestimating, and have developed an attitude of helplessness to the cost increases, because they feel they cannot control the increases.[1]

- The potential benefits of new computer systems are often underestimated.

The benefits to be realized from these development efforts were also badly underestimated. For example, a cost benefit analysis completed by the Department of Revenue's systems division in

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[1]In recent months, the department has expressed more concern over cost increases and has indicated that it plans to exercise more control over costs in the future.

May 1978 indicated the development of the Corporate Income Tax Processing system would result in $175,000 in increased revenue to the state. This estimate was made by the department systems staff with very little input from the Income Tax Division. Yet, only nine months later, estimates were revised by the Income Tax Division and the increased revenue to the state was estimated to be $850,000. It is difficult to determine, however, if the latter estimate is any more accurate than the first.

Benefits also appear to be significantly underestimated in the Declaration Match system. This system was projected to bring in an additional $35,000 as a result of personnel cost savings. Yet, research by PED staff indicates the potential additional revenue to the state could be as high as $1 million as the result of additional tax charges assessed by the system.

The department has also occasionally used questionable methods to estimate benefits. For example, $1 million each year was cited by the department as the estimated increased revenue to the state as a result of the implementation of the Individual Income Tax system. Of this amount, $850,000 was calculated as the result of projected increases in detection of arithmetic errors on page two of the tax return. When pressed for an explanation of how $850,000 was calculated, the department explained that it had completed a sample study and was able to determine that 1.87 percent of all returns had errors on page two, and the machine audit capability of the new system would be able to detect 50 percent of these errors. The department then concluded that at $57 per error, it could realize an additional $850,000 annually. However, the department was unable to explain how it arrived at the $57 figure, or why the machine audit routine would only detect 50 percent of the errors on page two.

These discrepancies indicate the department does not have a very precise method of determining what the benefits of a system will be. More time should be devoted to training and developing procedures in this area.

In summary, we recommend the following actions be taken by the Department of Revenue to improve the accuracy of its cost and benefit estimations:

- Department staff should place a higher priority on establishing accurate cost and benefit estimates in the early stages of a development project.

- The department Systems Division should receive extensive additional training in cost estimation techniques to improve its performance in this area and allow it to more adequately approve or disapprove ISB estimates.

- System requirements should be more precisely determined earlier in the development process and thereafter frozen so that increased costs can be avoided.

- The Income Tax Division should be more actively involved in assisting systems personnel in conducting accurate benefits analysis for income tax systems.

In conclusion, the problems described in this chapter are a shared responsibility of Department of Revenue management, users, and the Systems Division. While it is true that Systems Division personnel play a major role in the development of computer systems for the department, we do not mean to imply that the performance of this division alone is the cause of the problems identified in this report. In fact, we found the staff of the Systems Division to be competent, and their performance has been creditable considering their workload.

III. MANAGEMENT PROBLEMS AFFECTING SYSTEMS DEVELOPMENT PERFORMANCE

In Chapter II, we concluded that the Department of Revenue has had only limited success in its recent efforts to develop new computer systems. It has experienced serious problems in controlling the development process, in deciding on a systems definition and then sticking with that decision, and in realistically projecting the costs of development projects.

In the course of our study, it became clear that management problems within the department were directly related to the department's computer development difficulties. In this chapter, we present our analysis of management problems which affect the department's efforts to develop computer systems. We have grouped our discussion into four categories: department planning, organization, funding, and use of specialized staff.

A. DEPARTMENT PLANNING

An organization such as the Department of Revenue should have a planning methodology which includes the specification of long-range plans defining where the organization would like to be in five or ten years, as well as a set of short-range plans which support and implement the long-range goals. Short-range plans usually cover the next one to two years and consist of the intermediate objectives necessary to achieve the long-range goals. Such a methodology enables a department's computer staff to rationally determine what computer assistance will be needed to support the short-range and long-range goals, and provides a logical framework for them to establish priorities and purposefully develop systems which may take several years to complete. Any proposed new development project should be analyzed in relation to its contribution to the short-range and long-range department goals, thus eliminating haphazard and unmanageable computer growth.

We found that:

- The department's long-range plans and planning methodology are inadequate.

The Department of Revenue does not have an adequate set of long-range plans or objectives, and has not adequately defined and communicated its overall goals. One objective that requires clarification is whether the department plans to increase its auditing and compliance role in tax matters versus continuing its current emphasis on timely refund processing. Lack of guidance in this area has needlessly impeded the development of the computer systems we studied, because much time was spent on trying to determine whether

or not a particular system should include tax compliance and auditing features. The development of either long-range plans or an overall operating policy would clarify this situation.

It is difficult to develop coordinated, meaningful, and purposeful short-range plans without the overall direction provided by long-range plans. Nevertheless, the Department of Revenue plans for the short-range by developing Management By Objective (MBO) statements covering a one-year period. In theory, the commissioner develops a set of MBO statements first, and each assistant commissioner then develops MBO statements which expand on and implement the commissioner's objectives. Each division director then develops MBO statements which further detail and implement the assistant commissioner's directives for the division, and so forth.

If used as intended, the MBO methodology would provide an adequate framework to ensure top management guidance and short-range direction for the department. However, these short-range plans have been developed only sporadically since fiscal year 1977, and have therefore provided little guidance. For example, in fiscal year 1978 only the commissioner and one of the three assistant commissioners developed MBO statements, and in fiscal year 1979, none of these four people developed MBO statements. The MBO statements for fiscal year 1981 have only recently been completed in draft form, even though nine months of the fiscal year have elapsed.

Additionally, with the exception of fiscal year 1980 statements, we find the statements developed by the commissioner's office to be too limited in scope to provide adequate guidance to subordinates for development of specific programs in the tax processing area. Even in the 1980 statements, only three of the eleven objectives listed by the commissioner pertain to tax processing or auditing. The rest pertain to "implementing the principles of Interaction Management," "promoting interdivisional problem solving," "expanding the women and minority program," and other non-tax related objectives. While these latter objectives are important, not enough guidance is being given to subordinates concerning the tax-related objectives of the department.

- The objectives and goals of the three program areas are not effectively coordinated or communicated.

We also found that the three assistant commissioners do not appear to be effectively communicating and coordinating their respective program goals. For example, in reviewing the 1980 MBO statements for all three program areas, we found 10 objectives stated in the Income, Sales, and Use Tax Program and the Property and Special Tax Program which required significant computer support from the Revenue Management Program. (The Systems Division is part of the Revenue Management Program.) Providing this computer support, however, is not even mentioned in the fiscal year 1980 objectives of the Revenue Management Program. Furthermore, the Revenue Management Program identified two additional computer projects which it intended to complete in fiscal year 1980. The completion of all 12

of these new projects, plus routine maintenance and enhancements to over 300 currently existing programs is, in our judgment, an impossible task for the Systems Division staff of five to accomplish. Had the goals of the three program areas been coordinated, more realistic and attainable objectives could have been established.

Considering the lack of long-range plans and the sporadic and uncoordinated development of short-range plans, it is difficult if not impossible for Department of Revenue management to make rational decisions about the necessity or priority of a particular computer system. Not surprisingly, our study indicates the decision to initiate the development of a new computer system is made in a haphazard manner with little thought given to the impact a new system will have on department objectives. This method does not lend itself to purposeful and logical computer development activities; instead it permits uncontrolled and unmanageable computer growth.

We recommend the department take immediate steps to:

- Clarify and document its overall operating policies and procedures, especially as they relate to the emphasis placed on speedy refund processing versus tax auditing and compliance activities.

- Develop five-to-ten year long-range plans which identify the direction the department is moving in and determine the objectives which are needed to purposefully move in that direction. These long-range plans would not only provide overall guidance to the department, but would also provide continuity during changes in administration.

- Consistently develop short-range plans which are coordinated and clearly identify the intermediate objectives required to implement the long-range goals.

These short-range plans should be broad in scope, but specific enough to provide adequate direction to subordinate units. The plans should be developed with available resources in mind and should contain enough specific checkpoints so that progess in the execution of the short-range plan can be monitored and modifications made as required, consistent with long-range goals.

B. ORGANIZATION AND AUTHORITY

1. DEPARTMENT ORGANIZATION AND STAFFING

A department should be organized in a manner which lends itself to unity of control and the establishment of clear lines of responsibility and corresponding authority. We examined the Department of Revenue's organizational structure in light of this standard,

and found significant weaknesses in the areas of control, responsibility, and authority. These weaknesses were not a result of the organizational structure, as such, but rather in the staffing pattern within the structure. Furthermore, we found this staffing pattern to have a negative impact on efficient and effective computer systems development.

The organizational structure of the department is identified in Figure 1. The department currently operates with a staff of 952 employees, the majority of whom work in operating entities called divisions. These divisions are grouped together by similar function, and each grouping comprises a program area. As Figure 1 indicates, there are three program areas in the department, each headed by an assistant commissioner. According to the organizational chart, each assistant commissioner reports to the deputy commissioner who in turn reports to the commissioner.

At first glance, it appears that this organizational structure does lend itself to unity of control and effective assignment of responsibility and authority. Indeed, we found no major problems with this structure per se, but rather in the manner in which people operate within the structure.

- The top management of the department does not effectively coordinate and monitor the three program areas.

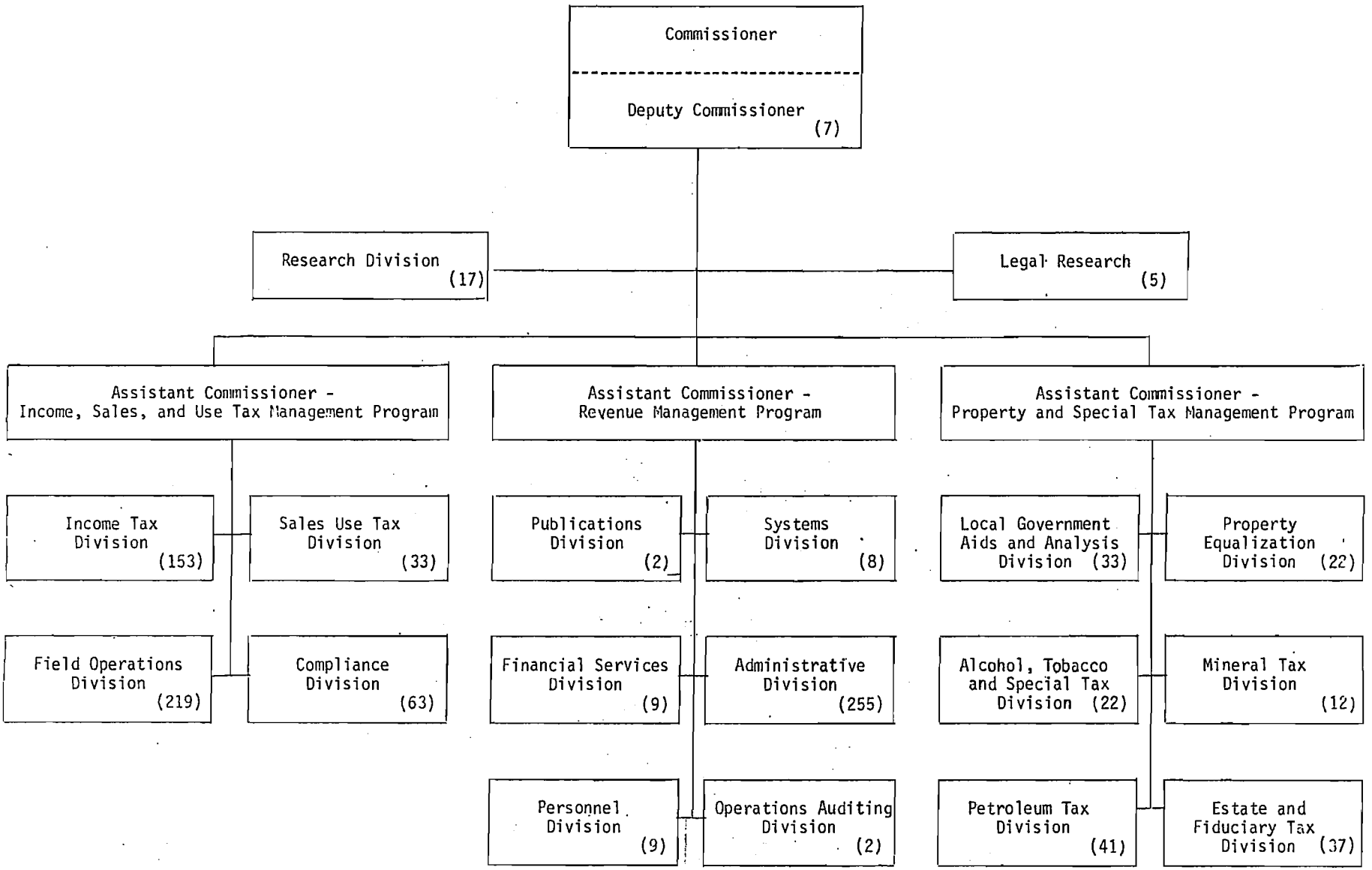
For example, although a deputy commissioner is identified in the organizational chart, the incumbent is not involved in the day-to-day activities of the department. Instead, he spends the majority of his time in legislative coordinating functions and tax law research, areas in which he is an acknowledged expert. For all practical purposes, this means that the three assistant commissioners report directly to the commissioner. But the commissioner is too involved with other functions to adequately coordinate and monitor the three programs, and thus, the three assistant commissioners are forced to reach an accommodation among themselves in an effort to ensure an efficient and effective allocation of department resources.

In some organizations, this staffing pattern would not necessarily be dysfunctional if adequate emphasis were placed on long and short-range planning, and if the assistant commissioners had a high sense of teamwork and commitment to the achievement of departmental objectives. However, we observed an absence of effective cooperation and coordination among the three program areas.

This lack of coordinated leadership has a negative impact on the development of computer systems. It takes much longer to define the scope and content of a particular system when effective coordination and cooperation are absent. Indeed, we found several cases where the definition of a system was needlessly delayed because of conflicting program desires. We also found several cases where the definition of a system was determined by the extent to which one program would cooperate with another program in data input efforts.

FIGURE 1

MINNESOTA DEPARTMENT OF REVENUE ORGANIZATIONAL CHART



Source: Department of Revenue Personnel Division, 1/21/81.

Note: The number of employees in each organizational unit is shown on the chart.

In short, the current staffing patttern of the department results in ineffective reporting relationships which impair the department's ability to determine the content and scope of a computer system in consonance with overall departmental objectives. We recommend the department take immediate steps to improve interprogram coordination and cooperation. We see several options available to accomplish this task:

- The deputy commissioner position could be charged with day-to-day responsibility for operating the department and ensuring that the three programs are effectively coordinated and that personnel are cooperating with one another.

- The commissioner could ensure that definitive long- and short-range plans are developed and charge the assistant commissioners with implementing these plans. Either the commissioner or deputy commissioner would have to play a more active role, however, in monitoring the accomplishment of department objectives.

- The three program areas could, on their own initiative, take steps to improve interprogram coordination and work toward achievement of overall department goals.

- Any combination of the above could occur.

We favor the establishment of a strong deputy commissioner in conjunction with the development of definitive long- and short-range plans. However, it is really up to the department to determine how it can best develop teamwork and reduce interprogram rivalry, thereby providing unity of control and effective assignment of responsibility and authority.

2. RESPONSIBILITY AND AUTHORITY

Ideally, responsibility and accountability for systems development should be clearly assigned to an individual or group so that communications regarding this function can be centrally coordinated and monitored. In addition, top management should identify the responsible person(s) to all members of the organization so that it is clear that authority and decision-making for this function have been delegated to the identified individual(s).

- The department has not assigned responsibility for and authority over computer systems development.

During the course of our study, we asked each person interviewed: who is responsible and accountable for the development of computer systems for the department. The answers we received ranged from Department of Revenue systems analysts to specific division heads to the assistant commissioner for the Income, Sales, and Use Program to the assistant commissioner for Revenue Management. Yet, in talking with the people identified above, each indicated someone else is responsible, or that responsibility is shared by

Department of Revenue users and systems personnel. It appears that the department has not adequately defined who is responsible for effective systems development. Thus decision-making and authority are diffused, making it impossible to assign accountability for systems development performance.

Furthermore, our research indicated that not assigning this responsibility along with corresponding authority delayed the timely resolution of problems, especially those arising from counterproductive or competing interprogram priorities. No single assistant commissioner had the authority to override the desires of the other two assistant commissioners, which sometimes resulted in a stalemate and delayed progress on a project. For example, interprogram friction arose during development of the Individual Income Tax system when the requirements of a division in one program required the input of additional data by a division of another program. A stalemate occurred which delayed progress on the system until an acceptable compromise could be reached. Resolution of this problem may have come at the expense of good systems design, since the level of cooperation given by personnel of one division determined what data would be put into the system and thus, what output would be provided.

We recommend that:

- Responsibility for systems development should be clearly defined and communicated to all Department of Revenue personnel.

The Revenue Systems Division appears to be in the best position to perform the systems development function, and it should be given the responsibility and corresponding authority to accomplish this task. Furthermore, since the Systems Division reports to the assistant commissioner for Revenue Management, this individual should be held accountable and responsible for effective systems development activities.

If this recommendation is implemented, however, the Assistant Commissioner for Revenue Management should keep in mind that even though he has been delegated the final decision-making authority for systems development, he is still responsible for ensuring that the computer needs of the entire department are adequately met, including those of the other two programs.

C. FUNDING ENVIRONMENT

Like other state departments, the Department of Revenue requests funding for its computer development plans through submission of its biennial budget. Computer funds, known as Line 17 funds, are divided into two categories: production and maintenance funds; and development and improvement funds. Requests for funding are based on the department's spending plan which is determined

by information received from department management, the Systems Division, and ISB. Any money that is not spent at the end of the fiscal year is returned to the state's general fund. If funds are inadequate for a particular project, the department may either request a supplemental appropriation, approach the Legislative Advisory Commission for interim funding, or attempt to finance the project through savings achieved elsewhere in the department's budget.

- The department was unable to secure adequate direct appropriations to fund four of the five projects we studied.

For example, $125,000 was allocated for the Corporate Tax system in fiscal year 1977, but because of a shortage of ISB personnel, work on the project did not begin until November 1976, and only $25,000 was spent on the project in fiscal year 1977. The department requested a carryover of the remaining $100,000 in fiscal year 1978, but this request was denied. The remaining $54,000 spent on the project before it was cancelled in June 1978 was financed from salary and cost savings.

Similar problems were experienced with the Individual Income Tax, the Declaration Match, and the Master Business File systems. As Table 2 indicates, $97,000 was allocated for the Individual Income Tax system in fiscal year 1977, with no additional funding provided in fiscal years 1978 through 1981, even though additional funding was requested. The remaining $485,000 spent on the project before it was cancelled in October 1980 was financed through salary and cost savings. The Declaration Match system was allocated $15,000 in fiscal year 1977 and received no further funding. The remaining $226,000 spent on the project was also financed through salary and cost savings. Finally, $40,000 was allocated for the Master Business File modification in fiscal year 1980, and the remaining $100,000 needed to implement the system was financed from salary and cost savings. The additional funding required to complete all four systems from fiscal year 1977 through fiscal year 1980 totals $865,000.

Only the Accounts Receivable modification has not experienced a direct funding problem. It received $100,000 in fiscal year 1980, and the system was implemented in June 1980 at a cost of $88,146.

As Table 2 also indicates, however, only the Individual Income Tax system was directly allocated an amount less than the original cost estimates. Upon closer examination, we discovered the discrepancy between funds ultimately needed and funds allocated was partly a result of poor initial cost estimates. But another major reason for this discrepancy is that system requirements changed drastically during three of the four other projects. These changing requirements added significantly to the content and scope of each system, and thereby increased costs significantly.

TABLE 2

APPROPRIATION/COST ESTIMATE COMPARISON[a]

	SYSTEM				
	Corporate Income Tax	Individual Income Tax	Declaration Match	Master Business File	Accounts Receivable
Phase I Estimated Cost	$ 55,000-85,000	$ 189,547	$ 14,300	$ 40,000	$ 70,000-90,000
Initial Allocation	$125,000	$ 97,000	$ 15,000	$ 40,000	$100,000
Date of Initial Allocation	FY77	FY77	FY77	FY80	FY80
Dollars Spent to Date	$ 79,284	$ 582,694	$241,000	$140,971	$ 88,146
Last Available Estimate of Total Project Cost	$200,000	$1,605,500	$248,600	$150,000	$ 70,000-90,000
Status of Project	Cancelled June '78	Cancelled Oct.'80	Implemented Feb.'81	Implemented Oct.'80	Implemented June'80

[a]ISB costs only.

- A lack of funding was not the primary reason for cancelling the Individual and Corporate Income Tax systems.

Furthermore, the department has repeatedly stated to the Legislature and to us that the Corporate and Individual Income Tax systems were cancelled because of lack of funding. Yet, as stated above, the department was able to internally finance the $865,000 needed to continue work on the four projects through the use of salary and cost savings. Additionally, as Table 3 indicates, during fiscal years 1977-1980 the department returned $2,898,833 to the general fund, of which $879,579 were Line 17 funds. Since the department was able to avoid spending nearly $3 million in the last four years, any or all of these non-dedicated funds could have been transferred to Line 17 to complete the Corporate and Individual Income Tax systems. So funding in and of itself was clearly not the primary reason for cancellation.

TABLE 3

DEPARTMENT OF REVENUE
EXCESS FUNDS RETURNED TO THE GENERAL FUND

	Total Non-Dedicated Funds Returned[a]	Total Line 17 Funds Returned[b]
FY 1977	$1,106,188	$400,418
FY 1978	513,735	79,028
FY 1979	645,010	218,796
FY 1980	633,900	181,337[c]
TOTAL	$2,898,833	$879,579

[a]The amounts cited do not include returns of excess dedicated funds. Dedicated funds are those received for a specific purpose which cannot be used for any other purpose.

[b]The amounts cited are a part of the total funds returned.

[c]The initial Line 17 appropriation for FY 1980 was consumed by the department. The amount listed here was returned from additional funds moved into the Line 17 account.

Source: Department of Revenue Financial Services Division.

- The department's problems in securing direct appropriations are partly the result of its poor credibility with the Legislature.

We interviewed several legislators and legislative staff members to determine the rationale for denying computer funds requested by the Department of Revenue. Interviews were conducted with members of the House Appropriations Subcommittee on Computers, the Senate Finance Subcommittee on Computers, the House Appropriations Committee, and with staff of the House Appropriations Committee and the Department of Finance. The answers we received were virtually identical: the Department of Revenue has a serious credibility problem with the Legislature in the area of computer funding and thus, legislators are reluctant to provide significant amounts of direct appropriations in this area. Rather, they prefer that the department request a supplemental appropriation for major development projects, thus forcing the department to provide adequate, consistent, and understandable justification of both the costs and the benefits of each project. It is this perceived lack of adequate and consistent justification that has led to the credibility problem.

In these interviews, several concerns were cited which contributed to this legislative questionning of the Department of Revenue's budget requests. Whether or not the concerns expressed below are accurate is not the point of this discussion. Rather, the point is that the department is perceived to have acted in the manner described.

- On one occasion, the department requested authority to use computer funds for the installation of accoustical improvements.

- The department cited the savings of $30,000 annually as the major benefit of the Accounts Receivable modification because the new system would require three fewer clerical positions for the itemized billing area. However, when the suggestion was made to cut these three clerical positions from the department's complement, the department strongly objected since "it is uncertain exactly how many positions can be cut in this area" and it would rather take a "wait and see" approach and transfer the positions to other revenue-generating areas if indeed they were not needed.

- Although specific examples were not cited, several people stated that they believe the department has a tendency to overbudget in the area of systems development, and this was the primary reason substantial cuts were made in the computer funds appropriated for both fiscal year 1979 and fiscal year 1981. According to our sources, cuts were made on an indiscriminate basis in order to force the department to request a supplemental appropriation if the systems were really needed. It was felt that the supplemental appropriation method would allow for closer scrutiny of each request.

- Several people were very critical of the department's tendency to ask for funds when little if any planning for the system had occurred, and with inconsistent and barely understandable cost/benefit justification provided. Furthermore, they were critical of the fact that the department rarely if ever, provides follow-up information regarding the amount of revenue generated and cost savings realized as a result of the new system.

- Most people we talked with believe that the department, when asked to trim its budget, deliberately chooses to cut its budget in sensitive areas such as taxpayer services and field auditing because it knows it can generate legislative support for these programs. This was viewed as the department's method of circumventing a "no-increase" budget. Furthermore, they believe the department has a tendency to provide a limited set of alternatives to the Legislature, all of which tend to have a highly negative impact if accepted.

- Several people felt the department's traditional response to budget cut requests is "if we don't get the money or complement we need, then the state will lose significant

amounts of revenue." On one occasion, when asked for backup material to support this argument, the department's response was that the data used to arrive at the budget figures were based on materials which were available at the time of the budget preparation, but which were no longer accessible.

- Most people we interviewed indicated they were not against the department's receiving computer funds per se, but would like to see a more rational plan of action and more consistent and understandable cost/benefit justifications before recommending any major disbursements of computer funds to the department. They also want to ensure the department understands that even though it is the prime revenue collector for the state, it is still subject to the same types of accountability as other service departments.

The department needs to take steps to improve both its performance and its credibility with the Legislature if it is to again obtain adequate and continuous funding of its system development projects.

D. USE OF SPECIALIZED STAFF

The department currently has several specialized units available to assist it in improving its performance in developing computer systems, and yet they are rarely used during the development process. This specialized staff includes three attorneys assigned to the Income Tax Division, seven analysts in the Research Division, and two Operations Auditing personnel who comprise the Operations Auditing Division.

1. LEGAL STAFF

We found no current procedures which ensure that legal personnel systematically review a development project for statutory compliance in the early stages of development. In fact, relatively little use is made of the legal staff at any stage of the development process. According to personnel in the Income Tax Division, the department relies on the documentation of the old system and the expertise of the systems personnel to define statutory requirements, and supplements this method with a review of the system after it is implemented to determine if all statutes are met. If the system is found to be deficient upon implementation, the system is modified to bring it into full statutory compliance.

In at least one of the development projects we studied, the Declaration Match system, the lack of systematic legal review lengthened the initial planning stage and resulted in the need for at least five modifications to the programming logic after the system was

well into the testing stage because of errors or omissions of statutory requirements. These modifications could easily have been avoided if a legal review had been conducted in the early design stages.

Since two of the five projects we studied were cancelled and the other three have only recently been implemented, it is difficult to determine how many, if any, modifications will be necessary to bring the systems into full statutory compliance. But, because no procedures have been established for the attorneys to systematically review the designs in the early stages, the department exposes itself to the unnecessary risk of not having statutory requirements fully met at the time of implementation, thus requiring additional changes to the system. This is not an efficient method of developing computer systems. These problems could be avoided if attorneys were more actively involved in the development process.

2. RESEARCH ANALYSTS

As previously discussed, the department has experienced considerable difficulty in accurately determining both the costs and the benefits of proposed systems, primarily because a systematic method for developing this information has not been established. This makes it extremely difficult for top management to make an informed decision regarding the relative merits of a project.

The Research Division has developed considerable expertise in accurate statistical analysis and sampling procedures, and it has earned a reputation for its thorough and well-documented analysis in any area of legislative inquiry. This group could assist other Department of Revenue divisions in developing effective cost/ benefit analysis procedures. Since it is not routinely involved in income tax processing activities, it would also be in a better position to more objectively and therefore more realistically determine the proposed benefits of a new system. We recommend that this division be more actively utilized in this role, even if one or two more people will be needed in the Research Division to perform this function.

3. OPERATIONS AUDITING PERSONNEL

The operations auditing unit in an organization is usually assigned the task of ensuring that departmental plans, policies and procedures exist and are in fact complied with. This group is also responsible for ensuring that standards are developed which dictate methods of operation, thereby providing guidelines for uniform and predictable performance. It is through the development and enforcement of these plans, policies, procedures, and standards that management control is maintained. The role of the operations auditing group is not to decide whether the department is making the right decision, but rather to ensure that the department has available and is using the relevant information it needs to react rationally to situations as they arise.

The two individuals who currently comprise the Operations Auditing Division have not been assigned the responsibilities described above. Rather, their primary function is to perform selected projects for the commissioner relating to various management issues that he is concerned with, such as developing new time reporting and project control systems.

We find that use of the Operations Auditing staff could be more effective. As we discussed in earlier sections of this report, the department is behind in the development of overall plans, policies, procedures, and standards. The Operations Auditing Division could and should play a key role in the development of these management control tools, rather than the role it currently performs. However, this group should not also be engaged in activities that it could be expected to review and appraise, as is currently the case.

We strongly recommend that the role of the Operations Auditing Division be strengthened and that it be given the following responsibilities:

- Ensuring that plans, policies, procedures, and standards are developed and enforced.

- Ensuring coordination among the activities of the various divisions, and anticipating the effects of decisions made in one division on the activities of the others.

- Periodically ensuring that schedules are maintained, records are kept, and human and physical resources are efficiently utilized.

- When major deficiencies and problems are brought to the attention of top management, the operations auditor should ensure that the steps taken to resolve these problems are consistent with overall departmental operating policy.

- This group is also in the best position to periodically evaluate the effectiveness of computer systems once implemented, to determine whether users are satisfied, whether the system has met its intended objectives, and whether the system is consistent with statute so that objective recommendations could be made to improve performance in this area.

In short, the Operations Auditing group should become the monitoring unit of the commissioner to ensure that department policy is documented and followed. The current staff appears to be particularly knowledgeable about effective organizational behavior, and therefore should have no problem in this new role. To effectively play this role, however, the current staff of two should be expanded and the current reporting relationship would have to change from reporting to the assistant commissioner for Revenue Management to reporting directly to the commissioner's office.

In summary, we recommend:

- Attorneys assigned to the Income Tax Division should play a more active role in the early stages of the development process to ensure that all statutory requirements have been defined and incorporated into the proposed system.

- The Research Division should be actively involved in assisting other Revenue divisions to develop more accurate cost and benefit estimates and procedures.

- Operations Auditing personnel should be actively involved in ensuring that departmental policies, procedures, and standards are established and enforced. We also recommend that this division report directly to the commissioner's office.

E. CONCLUSION

In conclusion, we acknowledge that the department needs new computer systems for tax processing. However, our report has documented serious deficiencies in the department's ability to plan for and develop new computer systems and to manage its resources and staff.

In light of these problems, we therefore recommend that the Legislature consider the following restriction in making any large appropriation to the Department of Revenue for systems development:

- Prior to spending money on systems development, the Department of Revenue should be required to report to the House Appropriations and Senate Finance Committees on the actions that the department is taking to correct the performance and management problems identified in this report and to present a detailed plan and justification for expending money for the development of new computer systems.

APPENDIX A

PROGRAM EVALUATION DIVISION

Department of Revenue Interview Guide

PLANNING PROCESS

1. When did the planning for this system begin?

2. Why was this system developed?

3. How did you determine what the requirements for this system would be?

4. How many alternate designs were considered before you decided on this particular design?

   None
   Some--Number:_____.

   (a) What did these alternate designs consist of?

   (b) How was it decided to pick this particular alternate?

5. Who was involved in the planning process for development of this system?

   (a) What was the role of each person identified above in the planning process?

6. What other Revenue divisions were contacted or involved in the planning for this system?

   None
   Some--Identify: ___.

   (a) What was the nature of these contacts?

7. (Other than those identified in Item 6 above) Are there other divisions within Revenue that could use information similar to that provided by this system?

   Yes
   No

   (a) Why weren't these divisions contacted?

   Didn't think about it
   Coordination problem
   Assignment of responsibility/authority problem

Cost allocation problem
Legal or statutory problem
"Not our responsibility"
Other--Explain: _____.

8. What other state agencies were contacted or involved in the planning process?

None
Some--Identify.

(a) What was the nature of these contacts?

9. (Other than those agencies identified in item 8 above) Are there other agencies in the state that could use information similar to that provided by this system?

Yes
No

(a) Why weren't these agencies contacted?

Didn't think about it
Coordination problem
Assignment of responsibility/authority problem
Cost allocation problem
Legal or statutory problem
"Not our responsibility"
Other--Explain: _____.

10. Could other Revenue divisions provide information to you that would make this application easier or more effective to use?

Yes
No

(a) Describe.

(b) Have they ever been requested to provide this information?

Yes
No

(c) What were the results?

(d) Why not?

11. Could other state agencies provide information to you that would make this application easier or more effective to use?

Yes
No

(a) Describe.

(b) Have they ever been requested to provide this information?
Yes
No

(c) What were the results?

(d) Why not?

12. How are you kept informed of what systems development efforts are occurring in other Revenue divisions?

Not kept informed
Staff meetings
Interdivisional bulletins, newsletters, etc.
Other--Describe: _____.

RESPONSIBILITY FOR SYSTEMS DEVELOPMENT

13. Who is responsible for the overall development of this system?

Division Head (Name)
Revenue Systems Department
Other--Explain: _____.

14. What was the involvement of the division heads in determining the need for this system?

Some--Describe.
None--Why not?
None--Who did determine this system was needed?

15. What was the involvement of division heads in determining the requirements of this system?

Some--Describe.
None--Why not?

17. What was the involvement of the Revenue Systems Department in determining the requirements of this system?

Some--Explain.
None--Why not?

18. If conflicting requirements were identified in the planning stage, how was it determined which requirements would be a part of this system?

REVENUE SYSTEMS DEPARTMENT

19. On this project, did the systems people understand your needs?

Yes
No

(a) Did they meet your needs?

Yes
No--Explain.

20. How would you rate the systems staff's performance on this project to date?

Excellent
Good
Fair
Poor

(a) If not "excellent," why not?

21. Overall, are you satisfied with what this system will do for you?

Yes
No--Explain.

22. Will this system do all of the things you want it to do?

Yes
No--Explain.

(a) Did you explain the above needs to the Systems Department?

Yes
No--Why not?

(b) What was their response?

23. In general (i.e., on this and other projects), do the systems people design systems that you can use and need?

Yes
No--Explain.

STATUTE AWARENESS/ENFORCEMENT

24. What steps were taken to ensure that applicable statutes were met in development of this system?

Some--Describe.
None--Why not?

25. How did (do) you determine which statutes apply?

26. What features of this system will assist you in enforcing applicable statutes?

27. What features of this system will assist you in performing your auditing responsibilities?

PROBLEMS DURING DEVELOPMENT

28. Is this system expected to cost more than anticipated to develop?

Yes
No
Cannot tell yet.

(a) Yes--How much more?

(b) Yes--Why? (check all that apply and explain fully)

System requirements changed
ISB rates changed
Poor estimates by ISB
Poor estimates by Revenue
Poor project management by ISB
Poor project management by Revenue
ISB staff turnover
Revenue staff turnover
Other--Explain above fully:_____.

(c) What changes have been implemented to prevent the above problems in the future?

29. Is this system expected to take longer to develop and implement than anticipated?

Yes
No
Cannot tell yet.

(a) Yes--How much longer?

(b) Yes--Why? (check all that apply and explain fully)

System requirements changed
ISB rates changed
Poor estimates by ISB
Poor estimates by Revenue
Poor project management by ISB
Poor project management by Revenue
ISB staff turnover
Revenue staff turnover
Other--Explain above fully:_____.

(c) What changes have been implemented to prevent the above problem in the future?

WORKFLOW/INTERFACES

30. Was a document ever prepared which identified the workflow involved in this application?

    Yes
    No

    (a) Yes--Attach copy of document.

    (b) No--Did anyone ever determine what the workflow was for this application?

        Yes
        No

    (c) How was the workflow determined?

31. Does this system interface with other Revenue systems which are not a part of this application?

    Yes
    No

    (a) Yes--Which ones?

    (b) No--Was this ever considered?

        Yes
        No

    (c) Yes--What was the result?

    (d) No--Why not?

32. What do you expect to receive as output from this system and what is the timing of each?

    Output
    Timing

33. How will data entry be accomplished for this system and what is the timing deadline of each input type?

    Input_____.
    Input Deadline_____.

FUNDING

34. How was this system development effort funded?

Legislative appropriation received for this specific project
Movement of other funds into Line 17
Combination of above
Other--Explain: _____.

35. What additional costs beyond what was budgeted for (i.e., additional equipment needed, additional clerical or professional support needed, etc.) will have to be incurred to make this system fully operational?

36. In your opinion, was enough money allocated (appropriated) to this project in the beginning to adequately implement and begin operation of this system?

Yes
No--Explain deficiencies.

37. Who is monitoring this project to keep track of progress vs. cost?

No one
Someone--Name: _____.
Do not know.

APPENDIX B

PROJECT DESCRIPTIONS

A. INDIVIDUAL INCOME TAX SYSTEM

1. DEVELOPMENT

The Individual Income Tax system was initiated in May 1977 and was originally planned to be a modification and update of the existing nine-year-old system. Before Phase I was completed, however, the Department of Revenue and ISB decided that modifying the old system was not cost-effective and that a new system was required.

The objectives of the new system were to provide for more efficient use of cathode ray tubes for data entry, provide for more on-line activities, process itemized deductions, improve system maintenance, and satisfy numerous output and processing needs of department users. The estimated development cost of the new system was $191,000 and it was scheduled for implementation in January 1979.

Specific requirements were identified by personnel of the Department of Revenue and a Phase II document was approved on June 1, 1977 by ISB and the department. Work progressed with relatively few problems, and a Phase III document was generated and approved in March and April of 1978.

Shortly after the Phase III signoff, however, the department and ISB realized that the initial cost estimates were very poor. Development costs were underestimated by $100,000, and the annual operating costs of the system were underestimated by $250,000. As a result of the revised cost estimates and because of a lack of funds, the department suspended further development work on the system from December 1978 to July 1979.

A new Phase III review meeting was held in July 1979. At this meeting, the Income Tax Division still expressed dissatisfaction with the system design and identified 12 major problem areas which, according to Department of Revenue systems personnel, had never been discussed before. These problems included:

- The new system provided for on-line alphabetical look-up capability for first-time filers only.
- The new system did not automatically transfer a business liability to the Accounts Receivable system.
- The new system would not decrease the processing time of income tax returns.

- The new system did not allow the filing status of property tax refund filers to be changed once input.

- The new system did not interface with the Declaration Match system.

- The new system allowed for status information on returns in process to be retrieved by taxpayer social security number only, and did not allow for spouse social security number inquiry.

- The new system captured only the 6 itemized deduction subtotals rather than all 30 itemized deduction detail lines.

- The on-line history file would carry only one year of history information and users desired four years of on-line history information.

- The new system would be able to accommodate auditing only the current and previous year tax return at the time of implementation, with the capability of auditing two more years added to the design after the system was implemented. Users wanted the capability of auditing four years of returns at the time of implementation.

As is evident, the identified deficiencies were not minor report format corrections, but were major changes to the design, philosophy, and scope of the new system.

The Department of Revenue and ISB considered re-doing the Phase II design at this point, but by August 1979, ISB was able to propose modifications to the current design to handle the deficiencies. However, those changes would add $40,300 to the development costs and increase annual operating costs by $45,000 to $62,000.

Shortly after this, other Department of Revenue users identified system design changes needed to handle special income tax assessments and revised interest and penalty rules. These changes were incorporated into the system design and a new Phase III review meeting was held on September 23, 1979. At this meeting, Revenue systems personnel urged department users to stop changing requirements so that ISB could finalize the design and commence programming.

On September 28, 1979, however, the Income Tax Division again requested changes to the processing logic of the new system. These changes included revisions to the format of a daily report, the addition of one new monthly report, and the addition of one new annual report. They also requested that logic be entered into the system to detect false social security numbers.

On October 17, 1979, the Department of Revenue reluctantly agreed to the Phase III design and signed off on the document. ISB

notified Revenue that a freeze on design changes would be established at this point, and that if the department wanted any more changes, additional costs would result.

In November 1979, Commissioner Allen decided to continue development of the system, but to delay implementation until January 1982, so that the above changes could be incorporated and a six-month test time could be allowed. (Prior to this, only three months of testing was planned.) The Phase III design changes were re-reviewed in December 1979, and agreed upon again by the Department of Revenue and ISB personnel.

In February 1980, the Income Tax Division again requested changes to the system to allow overpayment refunds to be automatically generated from the new system.

ISB continued working on the programming of the new system until September 1980, when it realized that estimated costs for developing the new system were significantly understated. The revised cost figures generated at this point ultimately led to the cancellation of this system in October 1980.

As the requirements changed, the estimated cost for this system increased significantly, although the estimated benefits remained fairly constant.

2. DEVELOPMENT COSTS

As previously stated, the development cost was originally estimated to be $191,000 (as of Phase I in May 1977). ISB revised its estimated on-line cost in March 1978 and the total cost estimate for development grew to $256,753. In October 1978, the development estimate was increased by $100,000 and it was determined that operating costs for the new system would be $250,000 more than current operating costs. Because of the cost increases and a lack of funds, development was suspended in December 1978. According to ISB, $190,000 had been spent by that time.

In February 1979, Assistant Commissioner Winter testified before the House Appropriations Committee regarding the department's fiscal year 1980 budget requests, and requested additional funding for the Individual Income Tax system. The governor recommended $821,000 be appropriated in fiscal year 1980 to re-write the Individual Income Tax system, but the Legislature refused this recommendation.

According to several legislative staff members, the Legislature feels the Department of Revenue has a tendency to overbudget in the areas of systems development, and this feeling led to substantial and indiscriminate cuts in the department's computer funding in both fiscal years 1978-1979 and 1980-1981. If the funds were truly needed, the Department of Revenue was advised to request a supplemental appropriation. It was hoped that using such a method would

force the department to provide adequate justification for new computer development activities. The Department of Revenue decided to use salary savings to finance the new system.

In July 1979, the estimated development costs increased by $150,000, establishing a new total of approximately $400,000. As stated previously, the Department of Revenue decided to continue financing the project, but over a 24-month period instead of the projected 12-month period. Shortly after this, however, major design changes were requested, resulting in significant redesign efforts and associated costs. In September 1980, ISB issued new cost estimates for the development of this system. The system was now estimated to cost $572,000 in fiscal year 1981, $396,000 in fiscal year 1982, and $207,500 in fiscal year 1983. The entire development cost was now estimated to be $1,605,500. Approximately $582,000 had already been spent. ISB also indicated that an additional $280,000 would still be needed for annual operating charges, which included $30,000 for an ISB contingency fund.

The revised cost estimates were due to a number of reasons. Poor initial estimating, ISB price increases, and the continual change in system requirements all played a major part in this final cost increase. Unforeseeable technology changes at ISB with the introduction of the CICS teleprocessing system accounted for approximately $85,000 of the cost increases.

Because of the final cost estimate of $1.6 million and the lack of legislative funding, the Department of Revenue decided to cancel the project in October 1980.

3. PROPOSED BENEFITS

With one exception, the proposed benefits of the new system remained fairly constant throughout the development process, primarily because no one bothered to go back and re-evaluate the benefits after the requirements changed. The benefits cited included (in 1977 dollars):

- $ 40,000 - Maintenance cost savings per year because of ease of maintenance.
- $ 850,000 - Additional revenue per year from entering itemized deductions.
- $ 104,800 - Additional revenue per year from on-line machine audit.
- $ 22,000 - Additional revenue per year from on-line activity file inquiry.

$1,016,000 - Total additional revenue per year (1977 dollars).

At the December 1979 Phase III review meeting , Assistant Commissioner Miller discussed the federal IRS's use of non-filer information. Based on IRS figures, he projected that Minnesota is currently losing between $250 and $300 million per year because of non-filers, and he urged that the new system be implemented to assist in capturing at least some of these dollars.

The department began to have serious doubts about the accuracy of both of these projections, and for this and other reasons, cancelled the project in October 1980. At the time of cancellation, the project was still in Phase III of development.

B. CORPORATE INCOME TAX SYSTEM

The Corporate Income Tax system was initiated in July 1976 and was scheduled for completion in August 1977, at a cost of $55-85,000. The original objectives of the system were to process corporation, partnership, and small business tax returns and to provide a tracking mechanism for these returns during processing. During fiscal year 1977, $125,000 was allocated by the Legislature for completion of this system. No funds were allocated during fiscal years 1978 and 1979.

Work on the project progressed slowly until November 1976, because of a shortage of ISB staff. A Phase I document was generated on January 7, 1977, and a Phase II (system design) document was completed on June 30, 1977. The Phase II document, however, limited the scope of the new system to corporations only, removing the processing of partnership and small business returns from the design. The Department of Revenue and ISB planned to include these two tax types in the processing logic after implementation of the system if a need still existed.

Because of the changes in scope and requirements for this system between Phases I and II, the implementation date was moved to October 1978, and the system was now estimated to cost $91,431.

A Phase III (subsystem design) meeting was held on September 14, 1977. At this meeting at least 24 new requirements were identified which required major rework to the scope and philosophy of the design. It was obvious during this meeting that many Department of Revenue users had not adequately reviewed the design and output of this system prior to this time. Some of the objections to the design were:

- The design included processing of regular corporate returns only, and did not include delinquent or amended returns. (It should be noted that regular returns constitute 90 percent of the processing volume.)

- A recently appointed Accounting Supervisor expressed major dissatisfaction with the accounting controls utilized in the design.

- The audit selection criteria used in the design were considered totally inadequate. Also, at least seven new selection criteria were identified which were previously unstated.

- Additional "on-request" information was desired requiring the development of another subsystem.

Because of the above deficiencies, the Department of Revenue and ISB decided to go back to Phase II and re-design the system. The ISB project leader resigned at this time, and a new one was appointed.

As Phase II was being re-done, additional requests for changes were made to revise the editing requirements, change the formats of daily and weekly reports, and revise three of the four quarterly reports. Furthermore, changes to the audit selection criteria were repeatedly made, partially due to a change in the format of the corporate tax return form.

Because of the continual change in requirements, ISB attempted to freeze the system design in January 1978, so that programming and testing could be completed by September 1978, and implementation could occur in October 1978.

On April 13, 1978, the Department of Revenue decided to delay implementation of this system until January 1979 because another $60,000 was needed in fiscal year 1979 to implement the system, bringing the total estimated cost to approximately $137,000. Furthermore, Department of Revenue users were very concerned at this time about the number of personnel that would be needed to support this system. Estimates indicated that 11 new people would be needed during regular processing and as many as twice that amount needed during peak processing periods.

Because of the revised cost estimates and the concern over staffing needs, a new cost/benefit analysis was prepared by Revenue systems personnel in May 1978. The cost of this system was now estimated to be $180,000, but the additional revenue expected increased from $110,000 to $175,000. The additional $65,000 in revenue was attributed to an increase in computation errors detected. The net effect of these changes was to increase the system payback time from 1.47 years to 1.87 years.

On June 30, 1978, the Department of Revenue decided to terminate development of the system "due to funding and administrative problems." Approximately $79,000 had been spent on the system. The on-line portions of the design were approximately 75 percent completed, including programming and testing. The batch portion of this system was still in Phase II design.

Recent estimates prepared by Revenue systems personnel on May 20, 1980 indicate $200,000 would now be the total cost of the system if it was completed in fiscal year 1983. Since $79,000 has already been spent, an additional $121,000 is needed to complete the system. This estimate does not include the cost of additional people, space, and equipment needed to support operation of the system.

In analyzing the development of this system, we note that:

- $125,000 was requested and received from the Legislature in fiscal year 1977 to develop this system, even though the Phase I cost estimate was only $55-$85,000.

- When cancelled in June 1978, the system was estimated to cost $180,000. About $79,000 had been spent, with $103,000 required to complete the project in fiscal year 1979. The system was supposedly cancelled because of lack of funds, yet the department returned $513,000 in non-dedicated funds to the general fund in fiscal year 1978 including $79,000 of Line 17 computer funds. In fiscal year 1979, $645,000 was returned to the general fund including $218,000 of Line 17 computer funds.

- As of May 1978, an acceptable Phase II document had still not been generated, but implementation of this system was still planned for January 1, 1979. It is doubtful that both requirements and a system design could have been solidified, programming completed, and adequate testing and conversion activities accomplished in the seven months remaining.

- Because of turnover at ISB, five different analysts were assigned to this project during Phase II.

- The revised cost/benefit analysis generated on May 28, 1978 indicated approximately $175,000 in increased revenue to the state could be realized as a result of this system. These estimates were revised on March 1, 1979 by the Income Tax Division and the benefits now included an additional $850,000 in increased revenue to the state. Using these latest estimates, the dollars invested to develop this system could be recovered in a few months time. We question however, how the dollar benefits increased so dramatically in eight months time.

- The original Phase I document generated in January 1977, indicated 11 new people would be needed to support the new system. The final estimate of staffing needs at the time of cancelling the project was still 11 people. Even though this staffing need was identified one and one-half years earlier, inability to fund the additional personnel needed was cited as a major reason for cancelling the project.

C. DECLARATION MATCH SYSTEM

The new Declaration Match system was designed to identify those taxpayers who fail to file declarations of estimated tax as required by law. There are about 80,000 estimated tax filers in the state of Minnesota. This system will identify those taxpayers who have either not filed, overclaimed, or underpaid an estimated tax. The old system addressed overclaimers only.

Development of this system began in March of 1977 and was projected to be completed in February of 1978 at a cost of $14,300. But the Phase I document had to be revised four times (in 6/77, 7/78, 8/78, and 3/79) and as a result, the estimated cost rose to $142,000 and the date of completion was extended to late 1980 or early 1981.

The revisions and increased cost were due to several factors. The system was originally conceived by income tax personnel to be a computerization of existing manual procedures, using a "balance due" approach. However, testing revealed serious deficiencies in the processing logic. A balance due approach only examines the adequacy of the total tax remittal for the year. It fails to detect late or inadequate individual quarterly payments. Consequently, systems and income tax staff redesigned the system to allow some detection of timing problems, instead of using a "balance due" approach as first proposed. Cost estimates remained relatively stable ($14,300 to $16,145) throughout the first three Phase I revisions. During the fourth revision, however, the estimated cost rose to $91,000 in December 1978 and to $142,760 in March 1979.

These siginficant increases were due to several factors:

- The original $14,000 to $16,000 estimate was unrealistically low.
- ISB adopted a new structured design development approach, and the Declaration Match system was its first attempt to use this approach. As a result, estimating costs was very difficult.
- The original estimate excluded the cost of computer equipment for testing.
- ISB raised its rates by about 20 percent during this period.

Phase II began in May 1979 and was completed in February 1980, three months after its estimated completion date. Project cost was now estimated to be $180,000 over the Phase I and II costs already incurred.

Phase III was completed in May 1980. During this phase, various changes came to light which caused an increase in cost estimates to $193,000. In early July 1980, the estimate rose to $210,000

due to increased ISB rates (about 10 percent), use of outside consultants by ISB at higher rates than planned, and higher testing costs than expected. During August 1980, the estimated cost rose to $231,000 due to modifications required in related systems and higher computer and personnel costs than originally anticipated.

Testing in October 1980 revealed that the formula for calculating penalty charges which was approved by the Income Tax Division, was erroneous. The cost of correcting this deficiency was $10,000. Since that time, there have been at least four other revisions to the Declaration Match programs because of errors or omissions in logic.

As of February 20, 1981, the first subsystem was run with live data. The Department of Revenue has been billed $241,000 for the project as of that date. The additional funds needed for this system beyond the original $15,000 appropriation came from salary and cost savings plus credits from ISB.

The majority of the problems experienced during the development of this system arose from inadequate planning. First, there was no legal review of the design of this system in the early stages of development. Had legal staff been involved from the start, changes to the system could have been avoided, saving time and money.

Second, users continuously added "newly discovered" requirements to the system which they believed were necessary to ensure the accuracy of the system. These changes occurred until very late in the development process.

Finally, ISB certainly contributed to the project's problems because it began use of the structured design development method without informing the Department of Revenue systems office. The department analyst assigned to this project had no opportunity to prepare himself for the new methodology and his work was hampered by his need to learn the new techniques while doing the job.

In spite of these problems, the system was implemented in February 1981.

D. ACCOUNTS RECEIVABLE SYSTEM MODIFICATION

Planning for the modification to the Accounts Receivable (A/R) system began in June 1979 when $100,000 was allocated by the Legislature. Programming began in February 1980, and the system was implemented in late June 1980, as scheduled. The project was estimated to cost between $70,880 to $90,000. The actual cost was $88,146.

The primary objective of the modification was to enable the Department of Revenue to automatically provide the taxpayer with detailed information on the reason for issuing the Accounts Receivable billing statement. Prior to the modification, the taxpayer received only a summary statement which failed to separate tax obligations from interest and penalty. Many taxpayers called or wrote the department for clarification. Taxpayer and department complaints were the primary reason for seeking the legislative appropriation.

The project required modifications to the current A/R system and to interfacing feeder systems (the Income Tax system, the Sales system, and the Withholding system), so that explicit information regarding the original tax balance, late filing penalty, and interest could be retained and displayed on the billing statement.

The modification was completed by ISB and Revenue systems staff. Other Department of Revenue units involved were Accounting, Tax Compliance, and Administrative Services.

The modification was completed without significant problems. It appears that much of the success is due to the fact that the department had a clear idea of what it wanted the system to do, and did not change its decision as the modification progressed. Another major reason for success is the high quality of ISB and Revenue systems staff assigned to the project and the excellent working relationship they were able to establish.

According to Revenue systems staff, the modification has been running well and no significant problems have been encountered since implementation.

E. MASTER BUSINESS FILE SYSTEM MODIFICATION

The modification to the Mater Business File system began in early March 1980 and was completed in mid-October 1980, as scheduled. The objectives of this modification were:

- to correct operating deficiencies such as lost files and inadvertent file deletion;
- to increase the processing efficiency of the Master Business File system by decreasing processing time and eliminating duplications; and
- to provide flexibility for future changes in systems requirements.

The Master Business File modification is expected to save $27,000 annually because of increased processing efficiency. Another $22,000 per year in savings is expected when and if the Corporate Income Tax processing system is implemented, because of increased

processing efficiency. The combined $49,000 in savings was cited as the benefit of the system; recovery of the development cost was to occur in three years. However, without the new Corporate system, it will take about 5.3 years to recover the development costs.

Project cost was originally estimated to be $40,000, and this amount was allocated in the 1980-1981 budget. However, this estimate was developed "out of the air," according to both ISB and Revenue systems staff that we interviewed. No systematic requirements determination had been conducted before the estimate was made. Consequently, as detailed planning for the system commenced, this cost estimate was raised first to $60,000 and then to $150,000 as all the requirements were identified.

This sharp increase in cost is attributed to three factors:

- The original estimates were made before any detailed planning for the system had begun. Most of the cost increase was a result of this.

- ISB subsequently installed TOTAL, a computerized data base management and control package, and the original estimate did not take into account the use of this new package.

- ISB changed from a general pool of personnel to a dedicated staff organization and reorientation time was necessary for new staff assigned to the project.

The Department of Revenue Systems Division and the Master Business Unit of the Administrative Services Division completed the majority of work required to develop the information requirements. Contact with other departmental divisions was minimal and apparently unnecessary for development.

ISB hired Technalysis, a consulting firm, to assist it in designing and programming the system under a fixed-price contract for $90,876. The system was implemented in October 1980, at a total cost of $140,971. This includes ISB and Technalysis costs. Costs beyond the original $40,000 appropriation were financed through salary and cost savings.

Once the requirements were accurately determined, the development went as planned and the modification is working well. Users consistently expressed satisfaction with the competence and professionalism of personnel assigned to the project. Weekly progress meetings were held involving Department of Revenue users, ISB, and Technalysis personnel so that problems could be resolved in a timely manner.

STUDIES OF THE PROGRAM EVALUATION DIVISION

Final reports and staff papers from the following studies can be obtained from the Program Evaluation Division, 122 Veterans Service Building, Saint Paul, Minnesota 55155, 612/296-8315.

1977

1. Regulation and Control of Human Service Facilities
2. Minnesota Housing Finance Agency
3. Federal Aids Coordination

1978

4. Unemployment Compensation
5. State Board of Investment: Investment Performance
6. Department of Revenue: Assessment/Sales Ratio Studies
7. Department of Personnel

1979

8. State Sponsored Chemical Dependency Programs
9. Minnesota's Agricultural Commodities Promotion Councils
10. Liquor Control
11. Department of Public Service
12. Department of Economic Security, Preliminary Report
13. Nursing Home Rates
14. Department of Personnel, Follow-up Study

1980

15. Board of Electricity
16. Twin Cities Metropolitan Transit Commission
17. Information Services Bureau
18. Department of Economic Security
19. Statewide Bicycle Registration Program
20. State Arts Board: Individual Artists Grants Program

1981

21. Department of Human Rights
22. Hospital Regulation
23. Department of Public Welfare's Regulation of Residential Facilities for the Mentally Ill
24. State Designer Selection Board
25. Corporate Income Tax Processing
26. Computer Support for Tax Processing

In Progress

27. Construction Cost Overruns at the Minnesota Correctional Facility Oak Park Heights
28. Individual Income Tax Processing
29. State Building Construction Division
30. State Sponsored Chemical Dependency Programs, Follow-up Study
31. Real Estate Management Division