EVALUATION OF ADMINISTRATIVE MANAGEMENT INFORMATION SYSTEMS FOR ELEMENTARY AND SECONDARY SCHOOL DISTRICTS AND STATE DEPARTMENT OF EDUCATION

JANUARY 31, 1980

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EVALUATION OF ADMINISTRATIVE MANAGEMENT INFORMATION SYSTEMS FOR ELEMENTARY AND SECONDARY SCHOOL DISTRICTS AND STATE DEPARTMENT OF EDUCATION

January 31, 1980

Peat, Marwick, Mitchell & Co.

Certified Public Accountants

1700 IDS Center
Minneapolis, Minnesota 55402

January 31, 1980

Mr. Robert G. Renner
Governor's Office
130 State Capital
St. Paul, Minnesota 55101

Dear Mr. Renner:

Peat, Marwick, Mitchell & Co. (PMM&Co.) is pleased to present this final report in connection with our evaluation of the administrative management information system (ESV-IS) developed by MECC for elementary, secondary, and vocational (ESV) schools in Minnesota. Although not required by terms of our contract, we believe this second report, based on the same analyses as the January 14, 1980 report of responses to the RFP questions, provides a comprehensive topical summary of our findings, observations, and recommendations for the ESV administrative data processing system. The contents of this report have been organized into six chapters:

1. Organization and Staffing;
2. Data Center Reviews;
3. Data Base Systems;
4. Analysis of Cost;
5. User Survey Results; and
6. Background and Requirements Analysis.

Because of the legislative concern for controlling the proliferation of computers in education, MECC was created in 1973. In response to the legislature's mandate for timely and accurate financial information, UFARS was enacted and ESV-FIN was developed to provide an automated system compatible with UFARS. These events have provided the impetus and foundation for the development of the ESV-IS and SDE-IS systems.

PMM&Co. believes that these systems are necessary to provide the information desired by SDE and the Legislature. While many successes have been realized during the last six years, we believe many critical issues exist which should be addressed in the near-term future. This report, as well as the January 14, 1980 report, identifies these issues and opportunities for improvement along with recommendations for solving the critical issues and making the necessary modifications and adjustments for improvements.

* * * * *

Peat, Marwick, Mitchell & Co.

We enjoyed the opportunity to assist the State of Minnesota in this project. We appreciate the assistance and cooperation of everyone involved in the project, especially the Project Review Committee.

Very truly yours,

Peat, Marwick, Mitchell & Co.

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INTRODUCTION

Purpose of MECC

The primary purpose of MECC was to assist members in the coordination and utilization of computer resources by a cooperative planning and decision-making structure. Two major goals related to this primary purpose are:

- maintenance of a long-range master plan for educational computing and an ongoing review of proposals for specific facilities and services; and
- meet member needs in management and operation of computer facilities, system design and development, "brokering" of computer service to the user, and consultation and training.

MECC is organized under a joint powers agreement. MECC-MIS has developed, under contract to the State Department of Education (SDE), ESV-IS systems which are run at regional processing centers throughout the State. Regional centers deliver service to local school districts for the ESV-IS.

ADMINISTRATIVE DATA PROCESSING

Systems

There are two principal systems which interact. One system, ESV-IS, was designed to provide administrative data processing services to elementary, secondary, and vocational schools in Minnesota. SDE has the second information system, designed to provide school district information to the Legislature and SDE.

District reporting using ESV-IS systems provides an input to SDE-IS. The financial reporting used in the SDE-IS consists of annual financial reports (AFR) prepared by districts. These AFR's may be produced using the ESV-IS at a regional center or may be manually created and submitted to the regional center for transmission to SDE.

The ESV-IS system consists of the following subsystems:

- Finance (ESV-FIN);
- Payroll/personnel (ESV-PPS);
- Student system (ESV-SSS); and
- Instructional Management (ESV-IMS).

In the next section we present our findings on the operation of these systems and the functioning of the ESV administrative data processing concept.

PMM&CO.'S APPROACH TO THE STUDY

The State of Minnesota contracted with Peat, Marwick, Mitchell & Co. (PMM&Co.) to complete an evaluation of the administrative management information system developed by Minnesota Educational Computing Consortium (MECC), based on the following criteria:

- efficiency of operation; that is, involving a calculation or a statement of cost incurred compared to the outputs of the mission or purpose; and

- effectiveness of operations; that is, an effort to ascertain if results obtained from an effort achieved the originally defined purpose.

We prepared our workplan by first clustering the State's 57 questions in the Request for Proposal (RFP) around these two criteria, efficiency and effectiveness. Next, we grouped the 57 questions into the following logical functions, which served as a basis for developing our data collection and task program.

- organizational relations/needs analysis;
- staffing;
- operations, policies, and procedures;
- cost analysis; and
- future conditions.

After assembling all the questions into these functional groups, we identified the possible sources of data for each of the RFP questions:

- State and Department of Education;
- MECC;
- Regional centers; and
- School district.

Using the source and work task information, PMM&Co. was able to estimate the magnitude of the collection effort required to address the two original criteria of efficiency and effectiveness. We selected the following methods of collecting data:

- documentation review;
- survey questionnaire;
- personal interviews; and
- on-site inspection.

A matrix prepared as Table II-4 in our proposal, and included as Appendix A to this section, shows the data sources needed for the review and the breadth of information gathering needed to fully consider each of the RFP questions.

PMM&CO.'S STUDY

During the first weeks of the study, the PMM&Co. engagement team completed examinations of five data center operations (Regions III and V, METRO II, TIES, AND MECC-MIS). At the same time, we prepared and distributed a survey questionnaire to a representative sample of school districts to obtain their expectation for the ESV system. We interviewed persons in SDE having responsibility for ESV administrative data processing. Key persons employed by MECC-MIS were interviewed, and documentation on ESV systems was examined by PMM&Co. We believe we obtained a comprehensive picture of the present status of ESV systems and of the knowledge, needs, and understanding of local districts, SDE, MECC-MIS, and regional centers.

While the RFP required answers to a specified series of questions, we do not believe that our responses to those questions provides a comprehensive report of the study. For that reason, we have prepared this second report which, based on the same analysis as the January 14, 1980 report, provides a comprehensive topical summary of the results of the study. The following topics are addressed in this report:

- Organization and Staffing;
- Data Center Reviews;
- Data Base Systems;
- Analysis of Cost;
- User Survey Results; and
- Background and Requirements Analysis.

The following sections identify our principal findings, observations, and recommendations.

TABLE II-4

DATA COLLECTION METHOD BY DATA SOURCE

RFP EVALUATION QUESTION	MAJOR MEANS OF DATA COLLECTION															
	DOCUMENTS REVIEW				SURVEY/ QUESTIONNAIRE				PERSONAL INTERVIEWS				ON-SITE INSPECTION			
	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL
A.1. COMPARISON OF CENTRALIZED VS. DECENTRALIZED SYSTEMS																
1. Is the concept of development and maintenance of common software cost effective for school district, the state, and other intergovernmental consortia?	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2. Is the concept of data processing and data storage at a regional host computer cost-effective for districts, the State and other intergovernmental consortia?	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3. Should district-unique software be developed by districts and regions, or developed at the state level?	x	x	x	x	x	x	x	x	x	x	x	x				
4. Have the regional centers given adequate consideration in their plans and in development to date to methods for distributed processing?																
(a) If not, what specific changes should be made in those plans and development?			x	x			x				x					
(b) What should be the place of satellite computers, micro-computers and Burroughs Network Architecture?	x	x	x	x					x	x	x	x				
5. Is the scope of the system as presently developed and planned likely to be (optimal) for the next five years in view of changes in computer technology?																
(a) What are the preferable alternatives?	x	x	x	x	x	x	x	x	x	x	x	x				
6. What costs, benefits, and trade-offs would be attached to further decentralization of governance, operation, or development?	x	x	x						x	x	x	x				

TABLE II-4 (Continued)

RFP EVALUATION QUESTION	MAJOR MEANS OF DATA COLLECTION															
	DOCUMENTS REVIEW				SURVEY/ QUESTIONNAIRE				PERSONAL INTERVIEWS				ON-SITE INSPECTION			
	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL
A.2. STATE LEVEL FUNDING AND ORGANIZATION																
1. Is the format and content of the data element dictionary defining all the data elements in the finance, personnel, payroll, and student information systems of SDE appropriate for present and foreseeable future needs?	x	x	x						x	x	x	x	x			
2. Is the format and content of the data acquisition calendar which is to be provided by SDE appropriate?	x								x	x	x	x				
3. What changes in procedures, if any, should SDE adopt which prescribe the criteria for approval of regional plans and budgets?	x	x	x		x	x	x	x	x	x	x	x				
4. What procedures should SDE adopt for providing support grants to regional centers and what formula(s) should be used to determine the amount of these grants?	x	x	x		x	x	x	x	x	x	x	x				
5. Is the State Department of Education Information System being developed according to appropriate system standards and project controls?	x								x				x			
6. Are the information needs of other divisions of SDE, and other state and federal agencies being addressed in the development of the software?	x	x							x	x						
7. Does SDE have the appropriate staffing level, organization, experience, and qualifications to develop and operate the SDE-IS?	x				x				x							

TABLE II-4 (Continued)

RFP EVALUATION QUESTION	MAJOR MEANS OF DATA COLLECTION															
	DOCUMENTS REVIEW				SURVEY/ QUESTIONNAIRE				PERSONAL INTERVIEWS				ON-SITE INSPECTION			
	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL
8. Are the plans to interface ESV-IS and SDE-IS cost-effective?	x	x	x	x					x	x	x	x	x	x	x	x
9. What is the most cost-effective hardware arrangement for providing computer services to SDE?	x	x	x	x					x	x						
B.1. FORMATION, FUNCTION AND STRUCTURE OF REGIONAL CENTERS																
1. Is the concept of independent regions with their own governing boards still valid?	x	x	x		x	x	x	x	x	x	x	x				
2. Does each region have adequate policies and procedures for governing their organization?	x	x	x	x					x	x	x	x				
3. Does each region have sufficient technical staff to support the operational responsibilities of the center?	x	x	x	x	x	x	x	x	x	x	x	x				
4. Does each region have sufficient user training staff to support the user services of their center?	x	x	x	x	x	x	x	x	x	x	x	x				
5. Are the authorities and responsibilities clearly defined, appropriately assigned, and adequately achieved?	x	x	x	x	x	x	x	x	x	x	x	x				
6. Is the structure of joint powers agreements adequate to govern the organization?	x	x	x	x	x	x	x	x	x	x	x	x				
7. Is the organizational structure of each region appropriate to perform the responsibilities of the region?	x	x	x	x	x	x	x	x	x	x	x	x				
8. What is the most desirable size and composition of regional boards? Should the Boards of all seven regions be of the same size and composition?			x		x	x	x	x	x	x	x	x				

TABLE II-4 (Continued)

RFP EVALUATION QUESTION	MAJOR MEANS OF DATA COLLECTION															
	DOCUMENTS REVIEW				SURVEY/ QUESTIONNAIRE				PERSONAL INTERVIEWS				ON-SITE INSPECTION			
	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL
9. Does each region have an equitable school district fee structure?	x	x	x	x					x	x	x	x				
10. Should there be a common fee structure across the entire state?					x	x	x	x	x	x	x	x				
11. Should fee structures be based on actual amount of resources used, or on some other formula, such as the number of students per application area?					x	x	x	x	x	x	x	x				
12. Are the regions making optimal use of MECC assistance?	x	x	x	x	x	x	x	x	x	x	x	x				
B.2. ASSIGNMENT OF DISTRICTS TO REGIONS																
1. Are the size and number of regions logical in light of geographic conditions, school populations, number of districts, and computer hardware considerations?	x	x	x	x	x	x	x	x	x	x	x	x				
2. Are the procedures for assignment of districts to regions and the transfer of districts from one region to another clearly defined and followed?	x	x	x	x	x	x	x	x	x	x	x	x				
3. Should changes be made in the procedures for assignment of districts to a region? If so, how should the changes be determined?	x	x	x	x	x	x	x	x	x	x	x	x				
4. Is the concept of total district participation in the system essential to the maximum effectiveness and operation of the system? If not, what is the threshold of participation necessary to achieve the original objectives of the system?	x	x	x	x					x	x	x	x				

TABLE II-4 (Continued)

RFP EVALUATION QUESTION	MAJOR MEANS OF DATA COLLECTION															
	DOCUMENTS REVIEW				SURVEY/ QUESTIONNAIRE				PERSONAL INTERVIEWS				ON-SITE INSPECTION			
	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL
C. PROCUREMENT OF HARDWARE																
1. Are the policies and practices relative to procurement of hardware practical and cost-effective from the point of view of users at the school district, regional, and state levels?	x	x	x	x	x	x	x	x	x	x	x	x				
2. Do the policies and practices for reviewing hardware procurement provide adequate information to the decision-makers?	x	x	x	x	x	x	x	x	x	x	x	x				
3. Has the MECC Facilities and Services Review Committee served a rigorous and objective review function?		x			x	x	x	x	x	x	x	x				
4. Are existing state procurement procedures appropriate for acquisition of large-scale computer systems?	x				x	x	x	x	x	x	x	x				
5. Are the prices for computer hardware acquired through state master contracts competitive by today's standards?	x															
6. Has the State benefited from the acquisition of computer equipment through state master contracts? Does the master contract system serve the needs of all users?	x				x	x	x	x	x	x	x	x				
7. Is the seven-year installment purchase plan the most cost-effective approach in view of the decrease and rate of decrease in the overall cost of hardware?	x															

TABLE II-4 (Continued)

RFP EVALUATION QUESTION	MAJOR MEANS OF DATA COLLECTION															
	DOCUMENTS REVIEW				SURVEY/ QUESTIONNAIRE				PERSONAL INTERVIEWS				ON-SITE INSPECTION			
	STATE	MECC	F•G	LOCAL	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL	STATE	MECC	REG	LOCAL
D.1. DEVELOPMENT AND MAINTENANCE OF SOFTWARE																
1. Has the ESV software been developed according to the guidelines and policies provided	x	x	x		x	x	x	x	x	x	x	x				
2. Has the cost of developing the software been within budget? Has the budget for software development been adequate to meet the anticipated needs?	x	x	x	x	x	x	x	x	x	x	x	x				
3. Are the timelines for development of software realistic and attainable, in view of existing staff and budget resources?	x	x	x	x	x	x	x	x	x	x	x	x				
4. Have the needs of the various users been addressed in the development of software?	x	x	x	x	x	x	x	x	x	x	x	x				
5. Does the software meet State Department of Education's reporting requirements?	x								x							
6. Have appropriate procedures and documentation been established for maintenance of the software?	x				x				x							
7. Does MECC have the appropriate staffing level, organization, qualifications, and experience to enhance and maintain the software?		x			x	x	x	x	x	x	x	x				
8. Doe the systems (ESV-FIN, PPS, SSS) operate in an efficient and effective manner utilizing state-of-the-art data base concepts, data communication, and hardware capabilities?	x	x	x	x	x	x	x	x	x	x	x	x				

I. ORGANIZATION AND STAFFING

FINDINGS

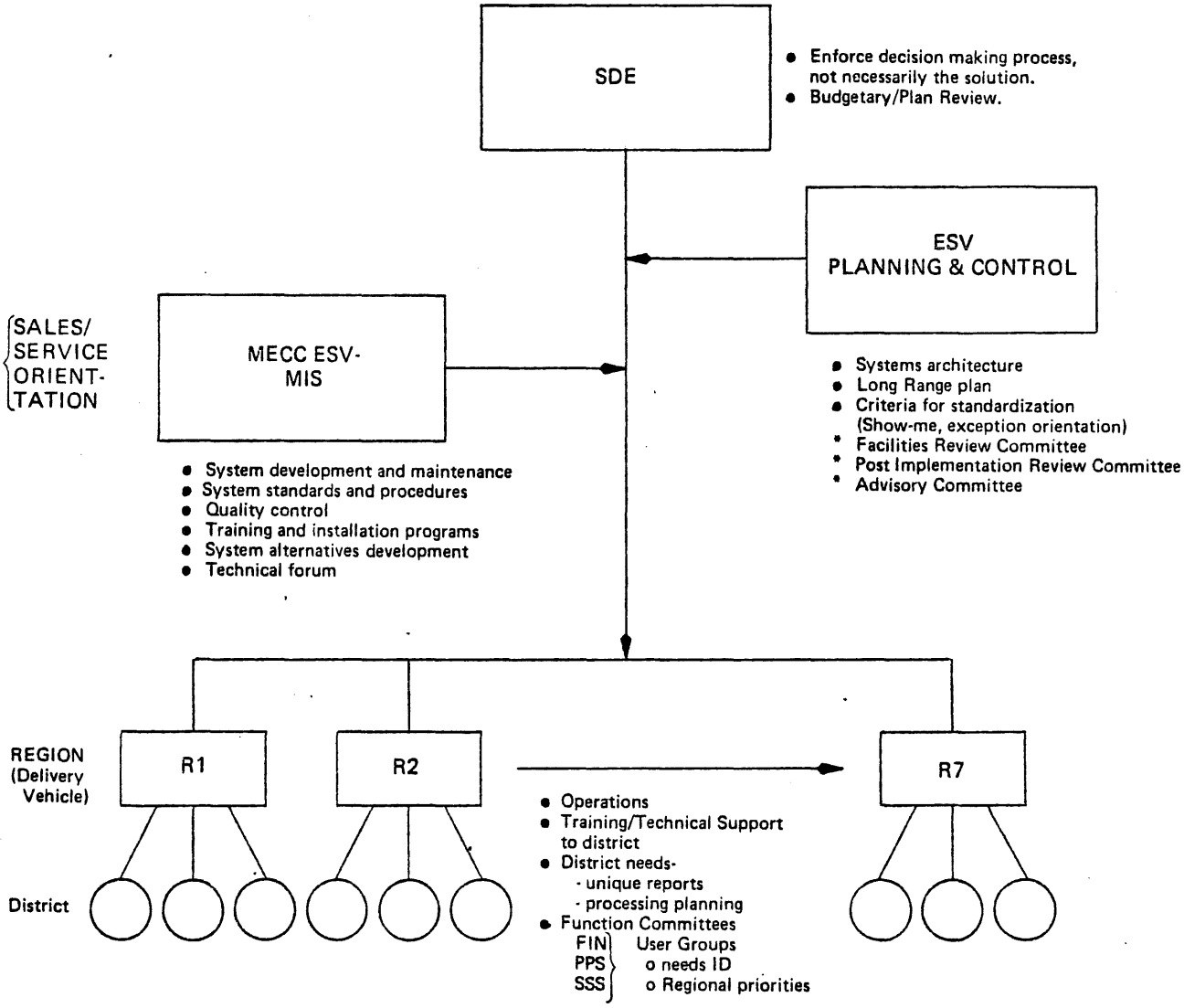
According to the survey responses, only 36% of the school districts believe that the authority and responsibility for staffing the ESV-IS system at MECC and the ESV Regions have been clearly defined, appropriately assigned, and adequately achieved. Local school districts expressed concern about the poor or nonexistent communication channels may explain this lack of agreement. The lack of any clear responsibility and authority, combined with a limited or nonexistent means of communication, may be contributing to this situation.

Based on responses to staffing questions in the user survey, PMM&Co. believes a charter should be developed for ESV-IS data processing. Survey responses also indicate that regional service staff responsibilities vary among the regions.

Considering the comments of survey respondents, and our analysis of data center operations and applications systems, PMM&Co. believes that the present organization structure, as shown on the facing page, of the entire "system" needs improvement. The lack of specific, defined objectives for all aspects of the "system" combined with a need for comprehensive coordination have been major factors contributing to organization and system difficulties which we believe exist. PMM&Co. believes that these difficulties can be categorized into three major weaknesses:

- no set of comprehensive "system" plans with specific objectives;
- no strong commitment by present participants in the system; and
- limited understanding by the users of existing organizational goals and objectives.

PROPOSED ORGANIZATION



MECC ESV-MIS

Technical Expertise Group - Recommend to larger managerial concil.

- Frame issues
- Provide technical forum for Regional and MECC-MIS personnel.

ESV PLANNING & CONTROL

Working Committee - acts on technical recommendations of MIS.

* Chaired by SDE

We believe that modifications and enhancements to the present organization are necessary to overcome these weaknesses. The proposed organization structure, shown on the facing page, has the following attributes to counteract the identified weaknesses:

- Systems architecture and long-range plans developed by a single operating body, the proposed ESV Planning and Control group.
- Enhancement and modification of ESV systems through MECC ESV-MIS; and
- Regional operations conducted in direct support of district needs;
- District support delivered through the regional processing center;

The following sections, ESV Planning and Control, MECC ESV-MIS, and Regional Centers, present our recommendations.

ESV PLANNING AND CONTROL

We recommend the formation of an ESV Planning and Control group to establish policy for the delivery of data processing services to elementary, secondary, and vocational education. While we understand the State Board of Education (SBE), by law, sets policy for elementary and secondary education, we believe SBE should assign to ESV Planning and Control the responsibility for ESV-IS data processing services. The authority would remain with SBE, as required by law.

The objective of this group would be to establish and monitor plans for ESV administrative computing. We believe a single operating body with the planning and control responsibility would help to reduce current conflicts as to the direction of ESV data processing.

This group or operating body, which can ratify, define, or develop system plans for ESV, should help to focus participants' efforts toward a set of common goals. Specified goals should help to reduce user confusion as to the direction, scope, and purpose of the ESV data processing system.

As a higher level body with functions analagous to an Operating Committee in a commercial enterprise, the proposed ESV Planning and Control group would approve:

- A systems architecture plan for ESV data processing which would include consideration of user needs, design applications, communications and hardware technology; and
- a long-range plan for ESV data processing which would identify changes to major systems, new support approaches for districts, and new system development efforts.

The membership composition of the proposed ESV Planning and Control group should include ten persons with specific skills representing public and private functional organizations. We believe this "top management" group should include or have representatives of the following:

- four local school districts represented by two different metropolitan schools and two different rural schools, with one Superintendent and one school board member in each case;
- two persons from ESV regional governing boards, with one metropolitan region and one rural region represented;
- two persons employed in management positions in the private sector, with one person being a data processing division manager or equivalent; and
- two persons employed in management positions in the public sector, with one person being a data processing division manager, or equivalent.

The proposed ESV Planning and Control group should be structured to include working committees. That is, the members of this group would be drawn together for decisions on the system architecture plan and the long-range plan. The proposed ESV Planning and Control group members should possess sufficient responsibility within their organizations to speak knowledgeably about how their organization would respond to the formulated proposals and should possess sufficient technical expertise to understand the technical details of data processing. We believe the composition of the Project Review Committee which worked with PMM&Co. on this project was representative and should be considered an example for this proposed group.

We suggest the proposed ESV Planning and Control group should be supported by three subordinate working committees:

- Facilities Review Committee to examine proposals for additional computer hardware within the consortium;
- Advisory Committee to prioritize ESV system enhancements and modifications; and
- Post-implementation Review Committee to examine ESV systems after pilot testing, after state-wide installation, and prior to major enhancements of these systems.

These Committees should be composed of a predetermined representative membership, which should meet on an as-needed basis or at the direction of the proposed ESV Planning and Control group. Each of these Committees would be chaired by a representative of the State Department of Education. We believe this commitment on the part of SDE is important to ensure understanding of policies and actions being taken by the ESV Planning and Control group. Representation of SDE in the process will help ensure the commitment of the State in this decision-making process. Subcommittees of these working committees could be established, as needed, to undertake a very specific, limited assignment.

The Facilities Review Committee, composed of computer industry and business officials, should examine hardware acquisition proposals from the perspective of cost-effectiveness and compliance.

The Advisory Committee, composed of one representative from each region, would (a) be aware of the recommendations of functional committees within the region; (b) be technically capable of evaluating the implications of proposed ESV system enhancements; and (c) be aware of the need for maintaining integrity, user understandability, and efficiency on the ESV systems.

The Post-implementation Review Committee, composed of user school district representatives having direct knowledge of the ESV-IS system being evaluated, should review the original objectives of the system compared to the actual results after the system has been installed. We recommend this "pulse" to be taken after district pilots, and before statewide installation, to prevent the installation of unacceptable ESV systems in districts. We further recommend review after state-wide installation and after each enhancement which has altered (a) approaches to transaction processing; (b) computation of data elements; or (c) updating methods to ensure implementation consistent with system objectives.

The rationale for the recommendation of the ESV Planning and Control group is to capitalize on two successful organizational approaches:

- the TIES functional committee and advisory committee's structure used to define user requirements in specific functional areas and to provide overall prioritization for system changes; and

- the UFARS Council consisting of accounting professionals representing SDE, regional accounting coordinators, school districts, and the Minnesota Society of Certified Public Accountants. This organization works with SDE to implement the UFARS law.

The functional committee concept should be employed in each region to provide users a method to communicate their needs and to share technical information about ESV-FIN, ESV-PPS, and ESV-SSS. An advisory committee subordinate to the ESV Planning and Control group would have a similar logical place and purpose, with a user district composition.

The UFARS Council experience suggests the value of having a body of school district accountants/business managers, regional accounting coordinators, and SDE UFARS staff, assisted by a private sector CPA, has been worthwhile. Similarly, we believe the same concept applied systemwide to payroll/personnel and student systems should be a valuable addition to the overall organization.

In addition to these two approaches, another organization existed in Minnesota State government in the early 1970s called the State Information System Advisory Committee (SISAC). This committee, composed of persons representing private sector business, advised the Commissioner of the State Department of Administration on data processing and related subjects. Although the recent administrations have not utilized SISAC, other advisory

committees in state government provide state agencies with a group of outside, private sector advisors who receive a small per diem. The opportunity for these advisors to share their knowledge and experience with State government is the essence of our recommendation for the use of private sector employees on the ESV Planning and Control group.

MECC ESV-MIS

We recommend the proposed MECC ESV-MIS be used as the operating service organization, as a division of SDE, for ESV administrative data processing systems. MECC ESV-MIS is the same as the current MECC-MIS Division organizationally, but with modified responsibilities.

This organization should have a "sales and service orientation" and should provide technical support to the ESV Planning and Control group. We believe the following functions should be among the major responsibilities of MECC ESV-MIS:

- System acquisition and system alternatives development;
- System standards and procedures;
- Quality control;
- Training and installation programs; and
- Technical forum.

MECC ESV-MIS should be composed of professional technicians who are intimately familiar with development, installation and maintenance of large-scale information systems. MECC ESV-MIS should employ staff with these qualifications, or these skills will have to be obtained from independent outside organizations. If MECC does issue contracts, the contracts should include (a) specific deliverables; (b) specific reference to MECC ESV-MIS development methodologies; and (c) specific dollar and time commitments.

When undertaking systems development and/or major enhancements to existing systems, the ESV Planning and Control group should consider several approaches to meet the needs. For numerous reasons, including several presented previously, the ESV Planning and Control group could:

- direct MECC ESV-MIS to develop a detailed proposal for the development or modification of ESV-IS systems;

- obtain proposals from ESV regions capable and interested in the development or modification; and/or

- request proposals from outside organizations, especially private vendors, interested in providing these services.

The proposals obtained should include a complete cost analysis and have a definition of alternatives.

For system acquisition and system development, SDE or ESV Planning and Control should, because of staffing limitations at MECC ESV-MIS or the ESV regions, always consider acquisition of systems which are commercially available or can be obtained from other governmental organizations, including the ESV regions. Evaluation of these alternatives should precede any internal development by MECC ESV-MIS.

For system standards and procedures, MECC ESV-MIS must document the methodology which it intends to apply. If the full PRIDE set of development milestones is only going to be used on major systems development, this should be stated in SDE policy. If there is to be a staged approach to system standards where more controls are applied as costs and system complexity rise, this should be stated.

For quality control we believe that each ESV-IS system should receive an EDP audit to ensure adequate system controls and auditability. These EDP audits could be performed by the State Auditor or an independent third party.

For training and installation programs we recommend MECC SV-MIS select a number of districts to pilot new systems development or for major systems enhancement. Both large and small districts should pilot these systems. MECC ESV-MIS should work directly with the pilot district's regional center to jointly develop (a) operations procedure guides; (b) installation guides; and (c) user documentation. Such a partnership with the regional center should help to ensure that documentation is more closely allied with district needs and wants. Further, such an approach to pilots should ensure smoother installation at other regional centers as the ESV system goes statewide.

For the technical forum, we recommend that the Director or managers of MECC ESV-MIS chair technical meetings to address the following subjects:

- Data center management;
- Data center security and backup;
- Communications network management;
- Burroughs computer efficiencies (lessons learned); and
- Vendor service experience.

We believe these subjects are of direct concern to regional management. Our data center reviews at each of the regions showed there is wide variability in expertise and success with these subjects. Substantial advantage should accrue to the State, in our opinion, from such technical forums.

REGIONAL DATA CENTERS

We recommend that regional data centers should be used as the primary vehicle for delivering ESV-IS services to districts. The activities which should be conducted at regional centers are:

- operations; and
- training and technical support.

It is possible that systems development and user documentation activities could be performed effectively at the regional centers. This would occur under the control and direction of the ESV Planning and Control group or committee.

For operations, we believe that substantial progress can be made in the area of processing resources planning. In the section on Data Center Reviews, we make specific recommendations for this critical area of performance. As we note in the preceding section on MECC ESV-MIS, we believe considerable advantage exists in the data processing management expertise in some of the regions, and this should be utilized. The Technical Forum is a good method to accomplish that management goal.

For training and technical support we recommend that functions committees be used in each region as a method to receive information on district experience and desires in each of the functional areas of finance, payroll/personnel, and student. Function committees would act to aid the region in:

- addressing district-unique reporting requirements; and
- compiling district enhancement and modification requests to be presented to the ESV Planning and Control Advisory Committee.

To remain responsive to district needs, the ESV Regions, we believe, will need to meet many of the unique reporting requests of their district. Those reporting enhancement and modification requests which cannot be met by the region should be sent to the Advisory Committee, and a prioritized work plan should be developed considering whether the work will be performed by MECC ESV-MIS, an ESV region, or an outside vendor.

SUMMARY

We believe this proposed organizational arrangement will help the State to develop a rational and acceptable organizational structure and effective management of statewide computing. Our approach provides a logical, easily understood process to resolve differences and to enlist support for ESV-IS goals and objectives.

II. DATA CENTER REVIEWS

Our data center reviews addressed data processing organization and administrative practices, planning activities, operational procedures and control features. The data centers reviewed were MECC, TIES, METRO II, and Regions III and V. The review scope also included data communications and data management activities in each of these centers.

The methods employed to gather the data presented in this report included:

- document reviews;
- survey questionnaire;
- personal interviews; and
- on-site inspection.

The survey questionnaires were completed by the data center managers in advance of our on-site inspections. The personal interviews, on-site inspections, and all analysis activities were performed by management consultants specializing in data processing technical and managerial practices.

This section presents the findings and recommendations, including anticipated benefits, resulting from our review, and includes both strengths and improvement opportunities. As such, the findings and observations in this section of the report present a more balanced perspective of general data center performance than those sections dealing with the specific data centers. The results of the data center reviews are in the following subsections: (a) Organization and Administrative Practices, (b) Planning Activities, (c) Operational Procedures, (d) Control Features, (e) Data Communications, and (f) Data Management.

ORGANIZATION AND ADMINISTRATIVE PRACTICES

Data center organization and administrative practices are relatively consistent between the five data centers reviewed. Strengths and improvement opportunities common to all or most of the centers are summarized in the paragraphs which follow.

Organization Structure

Our review of organization structure concerns included consideration of proper placement of functions, adequate representation of all necessary functions, span of supervision, consistency of the formal organization chart with the informal organization, and provision for succession to key positions. Our review of the organization structure of the five data centers revealed two potential problem areas:

(1) The span of control of the director of MIS at METRO-II is in our opinion, too broad to provide effective management. We recommend that METRO-II personnel be divided, together with adequate supervision, into two major areas:

- operations; and
- user services.

(2) MECC-MIS has had difficulties filling staff positions since November 1977, when MECC went on the State of Minnesota personnel system. Extensive personnel system delays and a pay scale not fully competitive for senior systems analysts have contributed to the situation. This has resulted in insufficient staff in the division and does not allow for adequate backup for key positions.

The specific circumstances and the associated recommendations for these two situations are addressed in greater detail in the specific data center report sections.

Employee Selection

Employee selection procedures, which we have observed being effectively used, include: position specification statements, appropriate use of testing for prospective employees, documented reference checks, multiple documented interviews, security checks, considerations for internal selection and transfer, and affirmative action plans. Application of these procedures can assist in the selection of qualified individuals, while at the same time satisfying legal requirements.

All of the data centers reviewed had position specification statements available and, in the case of METRO-II, TIES, and MECC-MIS, specific personnel recruitment and selection policies have also been prepared. In the case of MECC, the employee selection policies are established by the Minnesota personnel system. The lack of responsiveness to meet market pay scale and minimize turnover in this system has contributed significantly to MECC's inability to attract qualified personnel at the senior systems analyst level.

Training

The benefits of an effective training program can include improved employee efficiency and morale, increased employee skill level, and training which is more consistent with organizational needs. A good training program could include:

- on-the-job training;
- self study (programmed instruction);
- adequate cross-training;
- formal training (vendor and internal);
- audiovisual training aids;
- training for users of data processing services;
- specific programs of training for each employee;
- a training schedule;
- evaluations of training effectiveness;
- accurate training records; and
- skills inventory as a basis for planning training.

All five data centers reviewed rely heavily on on-the-job training as a primary training methodology. Most of the centers also provide some essential technical training and encourage personal professional growth efforts.

Since all five data centers use similar equipment and have comparable training needs, a significant opportunity exists to reduce training costs and at the same time increase the total level of training received, by coordinating and sharing training plans and results among organizational units.

Employee Performance Reviews

The employee performance review practices of the five organizational units were reviewed, as part of this study, to determine if the programs consisted of:

- documented, scheduled evaluations;
- evidence of a review with employees, including identification of goals;
- statements of measurable performance goals for employees to meet; and
- measurement against documented goals and job descriptions.

Incomplete performance reviews were discovered in two centers, Region III and METRO II.

Such programs typically result in more highly motivated employees, better employee understanding of his performance goals, and more objective evaluation of employee performance. Except as noted under specific data center findings, all five centers conduct formal employee performance reviews at least annually.

Position Descriptions

Current position descriptions should exist for all employees and should include definition of responsibilities, assignment of duties appropriate to the function, descriptions of reporting relationships (including span of supervision), and statements of education and experience requirements for the position. Such position descriptions can provide the employee with a better understanding of his responsibilities, duties, and reporting relationships. In all five data centers reviewed, position descriptions were available for each position on the organizational chart. Regions III, V, and TIES have position descriptions with detailed skill requirements. We recommend these descriptions be shared with the other regions.

Compensation

An effective wage and salary program should provide for internal and external equity, periodic adjustments to market conditions, communication of the program to employees, and a positive correlation between pay and performance. Such a program will help the organization to attract and retain qualified employees, and increase employee morale. While not all of the data centers reviewed had formal compensation policies or guidelines, all of the data centers except MECC have wage and salary programs consistent with their needs.

As noted in the section on Organization Structure, MECC falls under the auspices of the statewide personnel system. The lack of responsiveness of this system to current private sector compensation trends is affecting MECC's ability to attract and retain qualified personnel. As a result, MECC is resorting to other methods for accomplishing their mission. One of these methods is to hire contractor personnel on a level-of-effort basis at a fixed hourly rate. The difficulty with these types of contractual arrangements is that there are no performance warranties or time lines established for contract personnel. Consequently, there is difficulty in assigning responsibility for performance in delivery of systems or subsystems to the individual contractor.

Financial Control

Effective financial control should include participation in the budget preparation process by those responsible for budgetary performance, and effective reporting of actual expenses, including:

- variance justification and control; and
- appropriate level of detail consistent with authority levels.

A budgetary approach of this type provides acceptance of budget objectives at all management levels, and establishes control over expenditures at the appropriate management level. This bottom-up approach to budget preparation and expense reporting is employed at METRO II and TIES, but not at any of the other centers reviewed. The level of budget detail varies widely from center to center. ESV-Region III in St. Cloud has published expenditure guidelines which define the reporting practices for expenditures to date, encumbrances, encumbrances as a percent of expenditure, and budget and balances remaining. This is an extremely useful report that permits the individual coordinators within the regions to track their expenses compared to budget. This region and TIES are the only centers which have this kind of budgetary control, although Region V uses an extremely detailed budget with many breakouts of the various operational costs. We suggest that regional directors exchange copies of budget and expense control policies, procedures, and reports as a method of sharing the better features of each approach. As an alternative, the regions should have the assistance of SDE in the preparation of generalized budget and expense control guidelines.

Physical Work Environment

The physical work environment of the data centers should be conducive to high productivity. Environmental factors that affect productivity include:

- logical flow of work;
- lighting;
- work space; and
- noise control.

In addition to higher productivity, other benefits that result from an appropriate physical work environment include increased control over the work in process and improved employee motivation and morale.

Two of the regional data centers, Regions III and V, that were reviewed are operating in undesirable physical work environments. Observations and recommendations relative to these data centers are presented in the specific data center review comments.

Staff Utilization

In order to determine the degree to which staff is effectively utilized in the five data centers, the following characteristics were examined:

- control of overtime;
- balancing of workloads; and
- use of proper skill levels for functions performed.

Proper staff utilization should result in minimized personnel expenses, better employee morale, and improved productivity. While no specific staff utilization problems were noted during the review, it should be pointed out that TIES is the only operation utilizing a formal automated project control and reporting system. This system monitors individual activity against specific project areas. These activity levels are then compared to the resource levels which have been previously committed via the functions committee to the Joint Board. A manual project control system is in effect at METRO II for development work. These systems appear to be reasonably efficient and have applicability to MECC-MIS. PMM&Co. recommends that MECC-MIS institute some form of project control system. The TIES and METRO II models are a good start.

Vendor Support

All five of the installations reviewed are utilizing Burroughs hardware, software and support services. Proper utilization of vendor support should include use of available vendor services and mutual resolution of outstanding problems. This typically results in improved productivity and greater cost-effectiveness through the use of additional resources, particularly bundled services, and improved vendor/customer relationships. All five centers which we reviewed appear to be making extensive use of available vendor services. Vendor support to the metropolitan area installations appears to be adequate, but out-state installations are not satisfied with their current level of support. These out-state support problems should be reviewed with Burroughs marketing and support services personnel to determine what course of action is available to improve this level of service. PMM&Co. recommends regional centers take advantage of performance audits conducted by Burroughs. Such audits have recently been performed at METRO-II and Region V.

PLANNING ACTIVITIES

The planning review addressed long-range systems planning, capacity planning, and contingency planning at each of the five data centers. In all cases, the planning area presents significant improvement opportunities.

Business Systems Planning

Business systems planning addresses future systems development and enhancement activities in support of the enterprise. The product of business systems planning activities should be a long-range systems plan. The plan should include a documented description of proposed systems development and enhancement activities, including:

- relative priorities;
- impact of anticipated technological developments;
- anticipated due dates;
- manpower estimates and personnel demand backlogs;
- additional skill requirements; and
- responsiveness of specific projects to organizational needs.

Effective business systems planning should assure the organization that systems portfolio selection and development will be responsive to operating needs, that operations planning can be based on a systems development timetable, and that management focuses on systems development priorities rather than individual projects.

MECC-MIS and TIES appear to have the greatest degree of business systems planning experience, with METRO-II just beginning to get into planning future application activities. Both MECC-MIS and TIES have developed general systems plans that set forth management goals and establish general priorities for development activities In neither case did these plans establish manpower estimates or address the needs for additional skills and resources which may be required to meet specific project objectives. The TIES Long-Range Plan did establish fiscal year project due dates through FY 1985, but the MECC-MIS plans did not.

Regions III and V do little long-range systems planning, since all of their systems development activities are managed by MECC. There are, however, some significant enhancement activities taking place within these regions. Of particular note is the use of distributed data processing concepts in Region III. These types of activities need to be carefully considered in the context of the long-range systems planning activities of MECC.

Processing Resources Planning

Long-range planning activities in each organizational unit should address anticipated needs for hardware, software, personnel and facilities. The processing resource plan should consider:

- volume increases;
- cost effectiveness;
- integration with other long-range organizational plans;
- impact on other operational units;
- migration to various facilities changes; and
- technological changes.

Through such planning, the organization can minimize costs by coordinating processing resource needs with demand, and by integrating processing resource planning with other organizational planning efforts.

TIES is doing a great deal of planning with regard to the processing resources required to support their distributed data processing concept as outlined in their long-range plan adopted in January 1980. The other organizations reviewed are doing little or no planning for processing resource requirements. The absence of such planning has contributed significantly to the number of unanticipated hardware enhancements, particularly to disk and memory enhancements, that have occurred over the last two years.

Processing resources planning for MECC-MIS (or the proposed MECC ESV-MIS) and the regions should be consolidated under the direction and leadership of MECC ESV-MIS technical personnel. Capacity measurement and reporting requirements should be identified, and procedures should be established to gather, to report, and to consolidate this data. Based on these inputs, together with business growth projections and new application development and enhancement plans, MECC ESV-MIS should be able to project additional resource requirements well enough in advance to avoid unexpected performance problems, unnecessary delays, and premature cost increases.

Computer Operations Contingency Planning

The benefits of effective computer operations contingency planning are obvious and have been well known to the management of the reviewed organizations for some time. The obvious benefits are the continuation of organizational operations despite possible computer outages, thereby minimizing associated incremental expenses, and identification of critical factors requiring special attention in advance of any potential disaster. The contingency plan should provide for:

- off-site copies of plans, work flow language, source programs, operational instructions, and system documentation;
- names and addresses of vendors;
- provisions for restoration of power;
- off-site media availability;
- configuration schematics;
- alternate processing sites;
- data reconstruction;
- definitions of all types of records required for successful operation of the center;
- priorities for re-initiating processing following any major failure; and
- well-defined procedures for the users to follow in the event of extended processing interruption.

None of the data centers reviewed presently have a current contingency plan. TIES has had an untested disaster plan developed in 1977, which was updated in 1979. Several of the installations have established 1980

objectives for their development of these plans. MECC-MIS was originally designated to operate as a backup for the regional operations; however, there was no documented disaster or support plan in place. Continued MECC-MIS growth and resource demands from Region IV at MECC-MIS are diminishing the viability of this alternative. MECC-MIS, TIES and METRO-II should all develop contingency plans addressing potential long-term outage of the central processing facilities. In the case of the MECC-MIS plan, the needs of the regional operations should be taken into account. As in the case of processing resources planning, the regional operations and the MECC-MIS data center should be considered a single organizational unit located in multiple sites throughout the state.

OPERATIONAL PROCEDURES

Well documented and consistently applied operational procedures contribute significantly to the attainment of consistently high levels of service. While no service level performance problems were identified during the review period that could be attributed to weaknesses in operational procedures, there are several opportunities for improvement. Some of these improvement opportunities are addressed in the following paragraphs; others are addressed in those sections of this report dealing with the specific data centers.

Computer Operating Instructions (Run Sheets)

Basic operating instructions and documentation elements that are provided to the operators and others responsible for processing the production applications should be simple, straightforward, consistent, and in conformance with the programming documentation. Adequate run instructions typically include, but are not limited to:

- operator intervention requirements;
- restart/recovery procedures;
- nature, source, and disposition of inputs and outputs; and
- forms alignment and standards.

While the new statewide financial, payroll/personnel and student information systems are highly operator-independent, and require little or no operator involvement, properly documented run instructions can reduce the time required to train new employees, and reduce overall processing time by providing for better response to exception conditions.

Operating instructions are available for every production job that is run at the TIES facilities. These run sheets are current, easy to use, and quite comprehensive. Although these run sheets do not apply to current ESV-IS systems, we recommend that copies of these run sheets be made available to MECC-MIS to serve as a basis for preparation of similar run instructions for distribution to the regional data centers.

The METRO-II computer facility has no run sheets or operating instructions for any of the applications programs that are run on their system. Since all of their METRO-II runs are initiated by users at remote locations, there doesn't appear to be any significant justification for additional operator run instructions.

Computer Operations Procedures

If consistent, predictable computer operations performance is desired, computer operations should have detailed, documented operating procedures covering:

- load instructions;
- error handling and reporting;
- equipment usage logs and incident reports;
- housekeeping activities;
- vendor liaison activities;
- preventive and emergency maintenance;
- emergency procedures;
- shift turnover;
- inventory controls over forms and other media;
- "dump" standards;
- printer ribbons, carriage tapes, forms and other supplies under inventory control; and
- ancillary equipment operations.

In addition to the benefits of more consistent, predictable computer operations performance, comprehensive computer operations procedures typically reduce the time required to train new employees and minimize recurring problems through their identification by means of routine reporting.

All five of the installations reviewed had computer operations procedures available, although the operator's instructions employed at two of the data centers, Regions III and MECC-MIS, are not well organized and are not indexed. Recommendations relative to these two installations are presented in the report sections addressing specific data center findings. Region V's operations manager has stored much of the operations manual material on the system under CANDE so that it can be easily printed and modified, as necessary. A copy of these operating instructions could be made available to MECC-MIS and the other regions as a basis for enhancement of their operations manuals.

Computer Operations Scheduling

Effective scheduling procedures provide for more efficient use of resources and improved response to user requirements by establishing priorities and by insuring that all jobs are processed as planned. Such scheduling procedures should include:

- all processes to be completed;
- due-in and due-out times for each application or task;

- provisions for periodic or one-time special requests;
- priority handling; and
- resource utilization and allocation.

In all centers reviewed, the user is primarily responsible for establishing the processing schedule. The regional data centers schedule processing on a daily basis, and all requests are handled on a first-in, first-out basis. The regional data centers receive monthly processing schedules, which are monitored and maintained by the data control clerks. The data control clerks assure that the data is processed through the region in a timely manner and returned to the user as scheduled.

The computer systems are scheduled on a queue priority basis, with both fast response and low priority queues available to the users depending upon their turnaround requirements.

Program Modification/Implementation Acceptance

Written standards for acceptance and implementation of program modifications should include:

- required operations documentation;
- review of job stream processing for efficiency;
- review of compliance with standards;
- authorized work order;
- operational right to reject unstable or incomplete work; and
- source statement and production library control and integrity procedures.

Facilities employing such standards have enjoyed improved stability and operating efficiency resulting from implementing modifications in a timely manner and under controlled conditions.

The program modification process for the consortium has two approaches:

- MECC-developed systems utilize a "green sheet" to notify MECC of problems, enhancements or modifications; and
- TIES-developed systems go through Advisory Committees (Finance, Payroll/Personnel and Student) to establish change requirements. These requests are then forwarded to the Functions Committee which prioritizes efforts for TIES.

MECC-MIS does have advisory committees in the functional areas of finance, payroll/personnel and student. However, there is no "higher" body which takes the requests from the advisory committees and prioritizes these requests into an action plan for MECC-MIS. An additional impediment is that MECC-MIS' advisory committees are not tied directly to the user community. Rather, we believe they are less user oriented than should be optimal for their responsibility.

Program modification and implementation procedures at MECC and TIES differ. MECC relies on the senior systems analyst in the functional area to complete the modification and implementation. TIES has a staged process for modification and implementation which is based on the following milestones:

- Review and Design

  Brainstorming
  Forming the Team
  Assigning the Responsibility
  Preliminary Internal System Design Review
  System Functional Definition
  Subsystem Review
  System Technical Review

- Installation Procedure

  System Test
  Development and Documentation Procedure
  System Installation

- Post Installation Review

  System Review
  System Changes
  System Implementation.

Although TIES is not using the state's PRIDE system development methodology, they are following a logical and reasonable procedure for their work.

PMM&Co. believes that MECC should expand their present development practice to include the following omitted phases of the PRIDE methodology:

- System Feasibility (Phase I)
- Alternative Analysis (Phase II)
- System Test (Phase VI)
- Post-implementation Review (Phase IX)

Systems Feasibilities Studies

The purpose of a feasibility study is to document and analyze alternatives for the development or modification of information systems. Typical feasibility studies include:

- proposed system description, including a definition of user requirements;

- cost-benefit estimates for both development and operations, including:

  - displaced personnel
  - processing efficiency gains
  - reduced fixed costs;

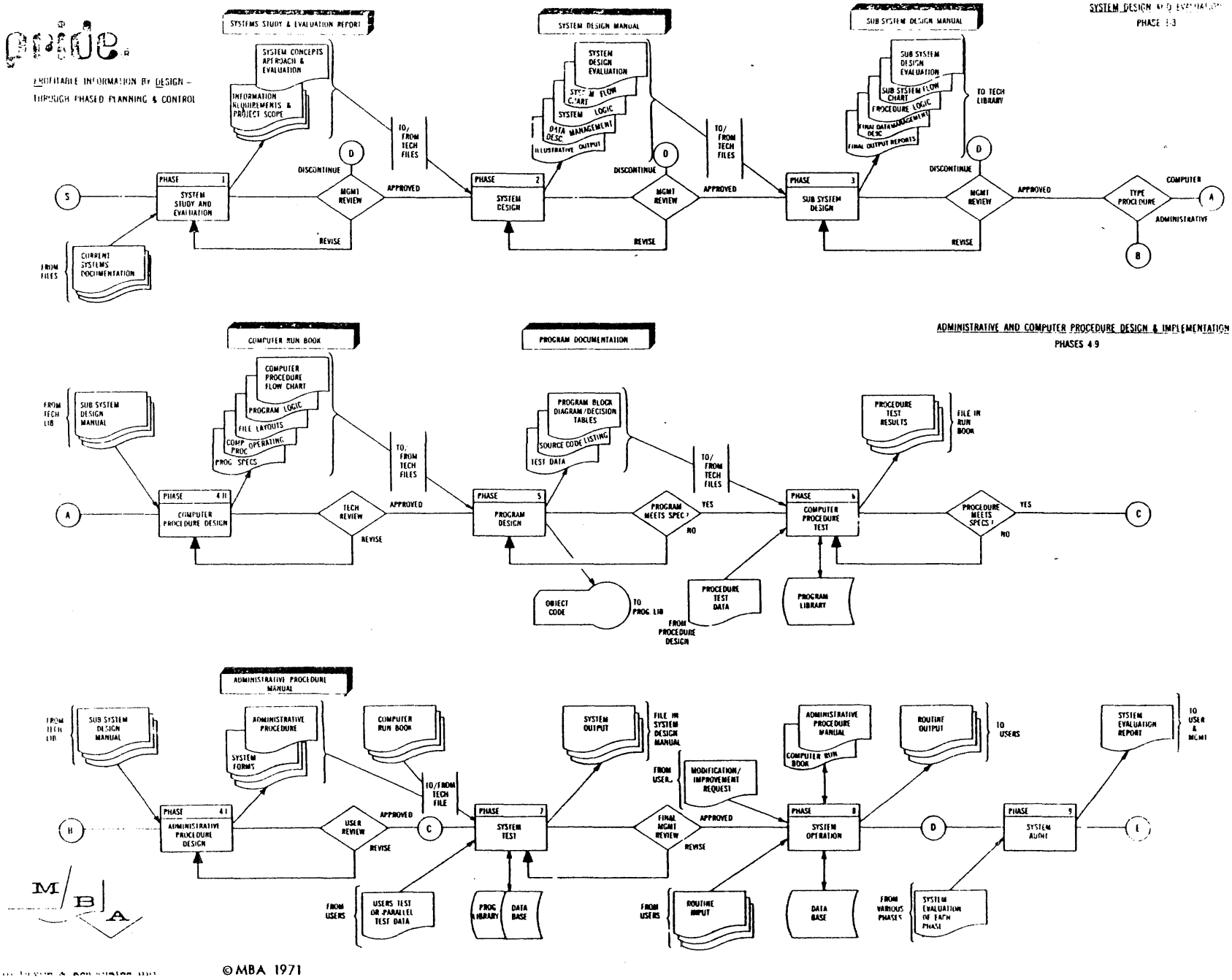

PROFITABLE INFORMATION BY DESIGN –
THROUGH PHASED PLANNING & CONTROL
SYSTEMS STUDY & EVALUATION REPORT
SYSTEM CONCEPTS APPROACH & EVALUATION
INFORMATION REQUIREMENTS & PROJECT SCOPE
SYSTEM DESIGN MANUAL
SYSTEM DESIGN EVALUATION
SYSTEM FLOW CHART
SYSTEM LOGIC
DATA MANAGEMENT DESC
ILLUSTRATIVE OUTPUT
SUB SYSTEM DESIGN MANUAL
SUB SYSTEM DESIGN EVALUATION
SUB SYSTEM FLOW CHART
PROCEDURE LOGIC
FINAL DATA MANAGEMENT DESC
FINAL OUTPUT REPORTS
TO TECH LIBRARY
SYSTEM DESIGN AND EVALUATION
PHASE 1-3
S
PHASE 1
SYSTEM STUDY AND EVALUATION
FROM FILES
CURRENT SYSTEMS DOCUMENTATION
D
DISCONTINUE
MGMT REVIEW
APPROVED
REVISE
TO/FROM TECH FILES
PHASE 2
SYSTEM DESIGN
PHASE 3
SUB SYSTEM DESIGN
TYPE PROCEDURE
COMPUTER
ADMINISTRATIVE
A
B
ADMINISTRATIVE AND COMPUTER PROCEDURE DESIGN & IMPLEMENTATION
PHASES 4-9
COMPUTER RUN BOOK
COMPUTER PROCEDURE FLOW CHART
PROGRAM LOGIC
FILE LAYOUTS
COMP OPERATING PROC
PROG SPECS
PROGRAM DOCUMENTATION
PROGRAM BLOCK DIAGRAM/DECISION TABLES
SOURCE CODE LISTING
TEST DATA
PROCEDURE TEST RESULTS
FILE IN RUN BOOK
FROM TECH LIB
SUB SYSTEM DESIGN MANUAL
PHASE 4-1
COMPUTER PROCEDURE DESIGN
TECH REVIEW
PHASE 5
PROGRAM DESIGN
PROGRAM MEETS SPEC?
YES
NO
PHASE 6
COMPUTER PROCEDURE TEST
PROCEDURE MEETS SPECS?
C
OBJECT CODE
TO PROG LIB
PROCEDURE TEST DATA
FROM PROCEDURE DESIGN
PROGRAM LIBRARY
ADMINISTRATIVE PROCEDURE MANUAL
ADMINISTRATIVE PROCEDURE
SYSTEM FORMS
COMPUTER RUN BOOK
TO/FROM TECH FILE
PHASE 4-1
ADMINISTRATIVE PROCEDURE DESIGN
USER REVIEW
APPROVED
REVISE
H
C
PHASE 7
SYSTEM TEST
SYSTEM OUTPUT
FILE IN SYSTEM DESIGN MANUAL
FROM USER
MODIFICATION/ IMPROVEMENT REQUEST
FINAL MGMT REVIEW
APPROVED
REVISE
PHASE 8
SYSTEM OPERATION
ADMINISTRATIVE PROCEDURE MANUAL
COMPUTER RUN BOOK
ROUTINE OUTPUT
TO USERS
PHASE 9
SYSTEM AUDIT
SYSTEM EVALUATION REPORT
TO USER & MGMT
D
E
FROM USERS
USERS TEST OR PARALLEL TEST DATA
PROG LIBRARY
DATA BASE
FROM USERS
ROUTINE INPUT
DATA BASE
FROM VARIOUS PHASES
SYSTEM EVALUATION OF EACH PHASE
M B A
©MBA 1971

Figure 1

- impacts of privacy legislation;
- organizational impacts, including:
  - operating procedure changes
  - organizational restructuring
  - job function changes;
- consideration of purchased software;
- alternatives considered and reasons for rejecting;
- computer time and manpower resource estimates; and
- user approvals.

The benefits of properly conducted feasibility studies include an improved return on data processing investments, development of cost-effective systems through application of cost-benefit techniques, greater user acceptance resulting from an agreement between data processing and users regarding work to be performed, and identification of benefits and establishment of responsibility for their realization.

Only TIES and MECC-MIS provide systems development services to their users. METRO-II relies entirely on MECC-MIS to perform feasibility studies. Our review of the TIES operation reveals no feasibility studies that had been performed for any past system development activities. As an alternative, TIES utilizes the services of an advisory committee for each application area. Annually, the advisory committee goes through the list of all the requirements that have been submitted, deciding which ones should be put forth as systems for development and which ones should be shelved for later consideration. This technique relies heavily on the knowledge of the advisory committee members, which may or may not be sufficient to adequately assess the technical viability of a request. This is particularly true for the more complex requests, where significant additional data may need to be gathered as part of a feasibility study before a meaningful decision can be made.

The requests which have been detailed by TIES Advisory Committees are forwarded to the Functions Committee for overall prioritization. This body recommends priorities to the TIES Executive Committee, which commits the TIES organization to the next year's activity. Again, the Functions Committee is faced with the same technical dilemma as the Advisory Committees, namely the need to understand the technical issues in system development prior to committing resources past the feasibility stage.

MECC uses the PRIDE system for systems development. The system consists of nine phases, beginning with the system study and evaluation and concluding with the system audit. (See Figure 1 on the facing page.) Phase I, Systems Study and Evaluation, is that portion of the PRIDE system which defines the following activities:

- development of preliminary project scope;
- analysis of current systems;
- surveys of information needs;
- preparation of information requirements and project scope;

- review of information requirements;
- development of the system approach and feasibilities;
- preparation of a systems evaluation; and
- review of system approach and evaluation.

In reviewing the system feasibility studies (Phase I) performed for the ESV financial system and the ESV personnel/payroll system, PMM&Co. understands that, in both cases, the evaluation concluded without having developed a system approach or feasibility for the proposed system. Specific performance criteria for Phase II completion have not been defined, nor were they formally accepted by the prospective users.

Failure to comply with this development methodology can result in systems that do not fully satisfy the user's needs, perform poorly, or cost too much.

Systems Design

Effective systems design establishes a front-end controlled blueprint that can be used to assure performance of work according to pre-established specifications and additionally assure that all concerns are adequately covered. Effective systems design is often recognizable through the following attributes:

- clarity and completeness of documentation;
- practicality and viability;
- flexible, modular structure;
- incorporation of all appropriate user needs;
- ease of programming and testing;
- consistency with established design standards;
- implementation with a minimum of disruption to users and computer operations;
- established performance testing, and acceptance criteria; and
- defined training requirements.

As in the case of systems feasibility studies, systems design activities are performed only by TIES and MECC.

TIES is presently not engaged in extensive systems development efforts. One current activity at TIES consists of modification to the ESV-FIN system to bring this system into conformance with TIES' processing methodology. Such modifications are:

- operation of the TIES FIN system under the transaction processor GEMCOS;
- conformance to PRIDE data element naming conventions as defined by SDE (general to specific); and

- conformance to TIES processing methodology which requires the use of multidistrict work flows.

An example of a difference in design is the naming convention. TIES would name all dates beginning with the name "date," such as "date-last-paid" or "date ref." In the MECC-MIS-developed ESV-FIN, these are listed as "ref-date" and "date-last-paid." Such differences have significant impact when the objective is the maintenance of common software and data element dictionaries.

As noted in System Feasibility Studies, MECC-MIS uses the PRIDE system for systems development. Phase II, Systems Design, under the PRIDE documentation methodology, calls for the following actions:

- define system into subsystems;
- prepare system flow-chart, logic and data management descriptions;
- prepare illustrations of output for review and approval;
- prepare systems design evaluation; and
- review systems design and evaluation.

A review of the system design work done for the ESV financial and ESV personnel payroll systems indicates that MECC-MIS generally follows the PRIDE documentation methodology for Phases I and II of this nine-phase process. For further discussion, please refer to our comments under the section entitled Post-Implementation Reviews.

Program and Unit Testing

Standardized programming and unit testing activities typically provide improved ability to maintain programs and program documentation, to establish procedures for early failure identification and analysis, and to minimize conversion and production problems. The characteristics of an effective programming and unit testing standard include:

- preparation of program specifications, including:
  - detailed narrative
  - detailed block diagram
  - record layouts
  - file specifications and organization
  - printer layouts
  - program decision tables
  - code tables and edit tables;
- appropriate use of utilities;
- unit testing that covers:
  - clean compiles
  - end of job routine
  - exception transaction testing;
- review of source code and unit testing by supervisory personnel.

MECC-MIS and TIES have not established formal programming and unit testing standards. TIES typically tests routine and exception transactions on a new system before implementation to determine that the edit processors are working properly. MECC-MIS has relied upon a comparison technique whereby reports produced by the new programs or subsystems are compared to reports generated from the same data by the programs or subsystems being replaced. While both of these approaches appear to have been reasonable under the circumstances, more formalized programming and unit testing standards should be developed and implemented to address future development activities.

Systems Testing and Conversion

A systems testing plan should include descriptions of routine and non-routine test transactions and conditions, provision for volume testing, acceptance criteria and performance criteria test specifications. Conversion plan characteristics should include:

- specific data and file conversion procedures;
- data processing and user manpower requirements and responsibilities;
- documented conversion events and a timetable for their implementation;
- training requirements and plans;
- complete user and operations documentation; and
- formal user and operations acceptance.

Effective systems test and conversion plans can reduce implementation costs by identifying most problems during testing, minimize disruption of routine user and computer operation activities through smoother conversion and implementation, and reduce future program maintenance requirements by identifying program bugs during testing.

The current procedure for testing software at MECC-MIS is to run reports against the software before it has been changed and after it has been changed. In PMM&Co.'s opinion, these procedures do not form a comprehensive set of testing standards and procedures. For example, the current procedure does not address the testing of transactions. A complete set of standards and procedures for the testing of software would include at least the following:

- Stratification of software testing; for example, there should be different procedures for unit testing, subsystem testing and full system testing.
- Standards and procedures for test data creation. For example, test data should include boundary values.
- Methods for keeping documentation of actual test results.

Post-Implementation Reviews

Formal post-implementation reviews (PRIDE Phase IX) for new systems and major enhancements to existing systems should be conducted within the first six months and periodically thereafter. The reviews should evaluate:

- documentation maintenance;
- identified problem areas;
- system responsiveness to current operating requirements; and
- program maintenance requirements and effectiveness.

Post-implementation reviews are important as a method of identifying unresolved application system problem areas and system weaknesses, evaluating system responsiveness to current operating requirements, identifying appropriate enhancements, and evaluating systems maintenance effectiveness.

Formal post-implementation reviews have not been conducted for the financial or personnel/payroll systems. The state auditor was requested to audit the financial system, a request which we were told was denied. Alexander Grant & Company has conducted an audit of the financial system at the request of METRO-II. No significant weaknesses or problems were noted in the report from that audit.

The lack of a formal sign-off and post-implementation review procedure for the financial and personnel payroll systems seriously degrades system development efforts as there is no check point for final systems acceptance by the individual school districts or the region. In addition, the absence of these procedures denies the development group a significant opportunity to obtain feedback on their performance and accomplishments.

MECC-MIS only makes use of Phases I and II of the PRIDE systems development methodology. Furthermore, the PMM&Co. review indicated the following problems with the MECC-MIS uses of Phase I and II:

- there are no assessments of the impact of new systems on operations, or on the user organization;
- there is no analysis of the applicability of commercially available software; and
- there is no analysis of alternatives.

While MECC only makes use of Phases I and II, there are no formal replacement procedures for the remaining PRIDE Phases. For example, the phases dealing with the development of computer procedures and of computer testing have not been replaced with adequate procedures developed by MECC. Our data center reviews, user survey, and interviews confirm that operational procedures for ESV-FIN, ESV-PPS and ESV-SSS have not been developed. (Please see our comments under Production Control Procedures.) Furthermore, MECC appears to rely on a software design methodology (Warnier diagrams) in place of a comprehensive system development methodology such as PRIDE. This can result in well-designed software which does not meet fundamental user requirements.

Data Conversion Scheduling

Effective data conversion scheduling typically includes workload forecasts, staffing arrangements appropriate to the arrival of work, and the ability to accommodate special requirements. The benefits of effective data conversion scheduling include minimized staffing and improved ability to meet the workload demands.

Data conversion activities are an inconsequential aspect of the operations of the five data centers reviewed. In light of the limited staff sizes and the relatively small processing volumes, formal data conversion scheduling procedures are not considered necessary.

Data Conversion Operating Instructions

Data conversion operating instructions should be current and complete for every application and should include:

- all data elements to be converted;
- source of data elements;
- keying and conversion instructions; and
- verification and other special instructions.

The benefits of such operating instructions include reduced training time, quicker through-put by minimizing problems arising from incomplete information, and an improved ability to measure adherence to established practices.

Data conversion operating instructions were reviewed at the Region II and V data centers. In both instances, they appeared to be reasonable and appropriate to these environments. Our review of TIES data conversion instructions showed them to be extremely detailed, easy to understand, and rigorously applied.

Data Conversion Procedures

Documented data conversion and operating procedures should address topics such as source document routing control; work-in-process assignment and tracking, including identification of individual task performance; disposition of source documents and prepared inputs; and verification instructions. Such procedures provide better control over work-in-process, identify bottlenecks, provide faster through-put, and reduce conversion errors.

Since the data conversion activities at the Region III and V data centers are not significant, more formalized data conversion procedures are not appropriate. TIES necessarily has formal procedures for this process due to a different operating methodology.

Magnetic File Library Procedures

Improved computer hardware utilization through reduction of library errors and reduced library costs are two of the benefits that can result

from effective magnetic file library procedures. The procedures should be documented and include:

- file inventory controls;
- support of automated systems;
- pulling and filing of physical volumes;
- care and maintenance of media;
- off-site rotation and retention;
- retention practices, including scratching and purging of files; and
- degaussing and destruction of sensitive files.

All of the reviewed data centers have relatively small tape library operations since, in each case, the applications supported within the data center are disk-oriented. Magnetic tape is used primarily for file backup purposes. With the exception of MECC-MIS, all the installations use manual tape library procedures, although Regions II and V are in the process of implementing a tape management system provided by General Mills, Inc.

In all installations, magnetic disk operations are simplified by the fact that the disks are generally left permanently mounted.

It is our understanding that use of the tape management system being provided to the two regional data centers by General Mills requires some modifications to the Burroughs operating software. Since both regional data centers are interested in implementing the tape management system, it would be more economical for MECC-MIS to prepare the necessary operating software modifications and the associated TMS implementation instructions for use by the regions. MECC-MIS may also want to compare the characteristics and capabilities of this General Mills provided tape management system to their in-house developed tape management system currently in use. If the General Mills provided system is superior to the existing MECC-MIS system, then MECC-MIS should convert to the newer system. If, however, the existing tape management system is superior to the system being provided by General Mills, then that system should be made available to the regional data centers.

An additional issue in tape management is the number of tapes created during the backup process for centers with a large number of districts. MECC-MIS should investigate the possibility of merging these individual district tapes into a single tape for each application system (FIN, PPS, SSS).

Production Control Procedures

Documented production control procedures should address input acceptance, scheduling, work-in-process, production program set-up and submission, output quality checking, output balancing, output reconciliation and distribution, and user support. When such procedures are consistently applied, they typically improve through-put and resource utilization, provide more effective control over work-in-process, reduce rerun requirements, and assure delivery of timely and accurate output.

TIES has defined production control procedures for its users. Accordingly, TIES users are expected to share responsibility for all production control activities with the TIES input/output control staff and services staff. Distribution is accomplished through regularly scheduled pickups and deliveries.

The Region III and V data centers have full-time data control staffs with specific preassigned responsibilities for controlling user production. These procedures are well understood and documented, and appear to be consistent with the needs of the organization. METRO-II uses remote job entry procedures for the submission of jobs. Users of this center are responsible for job setup and for establishing their own processing priorities.

Operating Software Evaluations

Implementation of operating software modifications and new releases should be preceded by authorized evaluation studies, which should address the benefits of, or need for, the change; assess the impact on operations; identify and evaluate fallback options and alternatives; and specify testing and installation criteria. The benefits of such procedures include selection of the most appropriate operating software, reduced operations interruption, and improved systems programmer productivity.

Systems programmers at TIES and MECC-MIS are responsible for all operating system software. It is our understanding that TIES does not modify operating systems software; changes by MECC-MIS systems programmers are minor. In both cases, all operating systems software releases and modifications are tested before implementation and/or release to the regional data centers. While the testing and installation criteria appear to be somewhat informal, the procedures appear to be appropriate to the nature and extent of such activities.

Systems Programming Procedures

Documented systems programming procedures should include authorization and assignment of projects, project time reporting, formal change implementation procedures, performance measurement and system tuning, and operating software evaluations. Such procedures reduce systems programming manpower requirements, improve computer system utilization and performance, and provide an increased ability to measure compliance with standards.

System programming activities in the data centers reviewed are a relatively minor aspect of the total operation. As a result, while the system programming procedures are not highly formalized in any of the data centers, there does not appear to be any justification for such a level of formality.

Operating Software Implementation and Integration

Implementation and integration of operating software modifications and new releases should be documented and performed under controlled conditions which specify:

- adequate pre-implementation testing against predetermined results;
- identification of fall-back plans;

- adequate updating of documentation; and
- availability of current vendor manuals and other source materials.

These actions typically provide a more stable and efficient operations environment and insure a level of continuity of operations in the event that fall-back requirements are necessary.

As previously noted, all operating software modifications and new releases are tested by MECC-MIS prior to release to the regional data centers. Implementation of software modifications and new releases in the MECC-MIS and TIES data centers are typically performed over the weekend after normal production runs have been completed. These procedures appear to be consistent with the needs of the organization.

CONTROL FEATURES

Methods and procedures for measuring and controlling data processing resources are essential to the cost-effective management of installations such as those revised. While many measurements and controls are in place, there are several significant improvement opportunities.

Computer Resource Utilization

In order to measure and compare performance and utilization against established standards and to reduce operating costs through better resource utilization, utilization data should be collected, reduced, interpreted and reported, including:

- CPU, memory, and device allocation and utilization;
- utilization history and trends; and
- recording of all equipment use, by application and by user.

Until recently, computer resource utilization measurement and reporting has not been a major concern at any of the five data centers, due primarily to ample capacity. All of the installations utilize the LOGGER, SPARK or BARS measurement packages provided by Burroughs on a periodic basis, based on their perceived needs. The TIES technical personnel have developed an on-line monitor for operators which appears to be a superior approach to that provided by the standard Burroughs software. It is our understanding that METRO-II has already acquired this software. The package should also be made available, through MECC-MIS for use at the other regional data centers.

In all cases, data center management needs to develop and implement a computer resource utilization program for collecting, reducing, interpreting and reporting a standard set of measurements on a frequent basis. Since all of the installations have a common need and interest in this area, pooling of resources may be the most cost-effective approach to developing such a program. We recommend that MECC-MIS begin developing resource utilization procedures and coordinate regional efforts for this important work.

Computer Operations Performance Objectives

Service level performance objectives acceptable to users and operations should address accuracy, reliability, and timeliness characteristics. Accuracy characteristics include both reruns and operator, data, program and equipment errors. Typical reliability measures include equipment down times and halt-load incidents. Timeliness measures include on-time performance, turn-around for tests, terminal response, and on-line availability. While the measurement and reporting of service level performance should be meaningful to users, the benefits accrue to both users and the data center. The benefits include reduced costs and better utilization of resources through improved problem identification and resolution, ability to evaluate performance by measuring actual versus expected goals, and improved communications between users and the data center.

Each of the data centers reviewed has established one or more computer operations performance objectives. The most common objectives are terminal response time, system availability, production turnaround, and error rates. However, none of the installations has developed a comprehensive set of computer operations performance objectives. As in the case of the computer resource utilization comments, there should be significant cost-benefit advantages to the pooling of resources for the development of performance objectives. We recommend MECC-MIS begin and coordinate the process of developing computer operations performance objectives.

Computer Operations Cost Accounting and Charge-Backs

A computer cost accounting systemport a charge-back system, should identify costs related to resource utilization by users such as CPU and peripheral use, tape and disc mounts, forms and supplies costs, reruns, data storage requirements, other services, and direct and overhead labor. When a charge-back system is employed, charges should be consistent with the level of service provided. The benefits of such an approach are that costs for data processing services are attributed to the actual users and management can focus on the costs of services provided by data processing.

With the exception of Region V, the principal method of charging data processing services back to the users is by student head count, with additional charges for identifiable services such as keypunch and special forms. Comprehensive cost accounting systems are not being employed in any of the installations to report the value of actual resource use by user. METRO-II has a project underway to define resource usage by district so that the charge can be allocated in that manner. The initial METRO-II plan is to charge 10% of the user's bill for resource utilization and the balance on a student head charge basis. Their ultimate goal will be to charge about half for usage and the balance on a head charge basis. The recently adopted TIES long-range plan lists a study for alternative fee assessment approaches.

Region V is using the LOGGER output to account for all computer costs and to charge these costs back to the user based on the level of use. Region V is employing a unique charge-back structure that takes into account district size as well as number of students. The charge-back components are a membership fee, a service fee based on district size categories and services used, and a computer usage fee that accounts for the processor,

input/output volumes, lines printed, and disk storage used. This charge-back methodology should be more responsive to district resource usage than the head count approach and should be considered for implementation at the other data centers.

Computer Operations Trouble and Error Reporting

The computer operations trouble and error reporting and follow-up system should include the following characteristics:

- description of problem (hardware, software, application program, or human);
- apparent cause of the problem;
- impact of the problem on users and operations;
- recommended solutions;
- responsibility assignments;
- follow-up, analysis and resolution of the problem; and
- cumulative reporting for management review.

The benefits of such a system can include the timely identification and resolution of operating problems and improved ability to address problem causes rather than the results of the problems.

While all of the reviewed installations had some form of operations trouble and error reporting, the most effective techniques appeared to be those employed by the TIES data center and the Region V data center. In the case of TIES, problem reports are controlled by a form that operations personnel can use to report any kind of failure. Region V utilizes the Burroughs incident report form, which has been locally modified. In every case, the incidents are discussed on a frequent basis with the Burroughs customer engineering and marketing personnel. The other installations may wish to review the forms being employed at TIES and Region V to determine if this documentation could beused more effectively than those presently employed.

Systems and Programming Standards

The most frequently cited benefits of systems and programming standards are reduced programmer, analyst, and user training time; improved ability to evaluate programmer and analyst performance; more consistent, reliable, and maintainable applications; and improved programmer and analyst productivity. Systems and programming standards should be documented and should include, at a minimum, the following items:

- standard systems development life-cycle methdology and procedures, including provision for requirements engineering, feasibility studies, systems design, programming and unit testing, systems testing and conversion, and post-implementation reviews;

- programming standards including coding conventions, naming conventions, utilities and common subroutines, processing standards and limitations, checkpoint restart procedures, device dependencies, operator intervention requirements, programming techniques, and file labeling techniques;

- documentation standards, including symbols and flow-charting standards, forms, and procedures;

- data base and data communications standards;

- user manual standards; and

- provision for maintaining the standards.

There are differences in the use of systems and programming standards within the reviewed organizations. Our analysis determined that:

- MECC-MIS uses the State's adoption of PRIDE documentation methodology (see Figure 1);

- TIES uses locally developed programming and implementation procedures with the following characteristics:

  - COBOL naming standards in which elements are named from the general to the specific (consistent with PRIDE);

  - Use of a multidistrict processing methodology in which district processing is batched together and executed in a single processing run;

  - Data element definition which is consistent across application systems;

  - All systems use the GEMCOS transaction processor as the link into application systems; and

  - All systems must pass an implementation acceptance procedure; and

- METRO-II conforms to PRIDE documentation in their enhancement and implementation work with ESV-PPS and ESV-SSS.

We believe that MECC-MIS should expand their present systems and programming methodology to ensure that systems are developed and maintained which present a standard processing methodology. That is, systems should not be developed or enhanced which do not exhibit common characteristics to users, such as:

- Common naming conventions for data elements;

- Common data element definitions across application systems; and

- Common transaction processing methodology.

Such standardization reduces user learning requirements, reduces programmer and analyst learning and work time, and results in a more consistent applications product.

With regard to the systems development life cycle methodology and procedures, MECC, as noted in Systems Feasibility Studies, formally employs only the first two phases of the PRIDE systems development methodology. These are the systems study and the systems design phases. There are no adequate established standards and procedures for subsystem design, computer procedure design, program design and computer procedure testing.

The programming standards at MECC-MIS are very good. They are based primarily on Warnier diagrams and on the use of structured programming techniques. The program code examined by PMM&Co. closely parallels the Warnier diagrams and exhibits quality structured programming. One area of concern at MECC-MIS is that the naming conventions for data elements do not follow the PRIDE convention of general to specific. This convention is being used at TIES. Our review indicated that the programming standards do not include sufficient documentation on operational items such as operator intervention requirements. Documentation such as this is invaluable for system users.

The documentation standards do not include system flow charts or flow charts of manual forms and procedures. Lack of such documentation makes it difficult for readers of the documentation to orient themselves within the system or to be able to grasp the system as a whole.

With regard to data base standards, there do not appear to be any documented standards at this time, particularly in the area of data base design. MECC-MIS has recently appointed a new data base administrator who will have responsibility for standards with regard to data base usage and data base design. However, the new data base administrator primarily has a telecommunications background and will have to master a significant learning curve before he can effectively consult with others and provide them with information on designing and using the Burroughs data base management system, DMS II.

Systems and Programming Project Management

A project management system, either manual or automated, should be employed to schedule and control systems development activities, regardless of the size of the organizational unit. Such a system should provide the following capabilities:

- identification of tasks and their interrelationships;
- assignment of responsibilities;
- resource requirements definition (hardware, software, personnel, and support);
- hierarchical reporting;
- completion forecasting;
- manpower availability control;

- timely reporting of resource application and task completion by type of effort; and

- narrative status descriptions.

The benefits of systems and programming management systems include (a) more realistic work schedules and completion forecasts, (b) improved management control over systems and programming performance, (c) ability to identify present and future problems in a timely manner and develop effective solutions, and (d) reduced manpower needs and better control over manpower use.

There is no formal project management system in place at MECC. Each functional manager is responsible for enhancements and modifications to the application system. Because these functional managers are generally operating on their own, project management is less formal than would be the case if there were a larger project team. MECC has no manual or automated workload accounting system to account for the specific project efforts of each of the functional managers or project personnel. Consequently, MECC is unable to determine how human resources are being used in the modification or enhancement process on MECC-developed software. This lack of information, combined with difficulties in the prioritization process for the assignment of work at MECC results in less than optimum deployment of personnel resources. PMM&Co. recommends MECC review the automated project management system in use at TIES for possible application at MECC. We also recommend that METRO-II consider implementing such a project management system in view of METRO-II's increasing role in the development and enhancement of the ESV-PPS and ESV-SSS systems.

Systems and Programming Cost Accounting and Charge-Backs

A systems and programming cost accounting system should identify all direct and indirect systems and programming operational costs and identify costs to projects on an equitable basis. Consideration should be given to the following:

- identification and assignment of all costs;

- determination that services rendered are charged back;

- reconciliation of total project costs to total costs; and

- determination that internal rates are competitive with local external rates.

Such a system assures management that costs for data processing services are attributed to the actual users and provides a basis for management to focus on the costs of services provided by data processing.

There is no systems and programming cost accounting methodology at MECC-MIS. MECC-MIS has been able to respond with manually generated workload information as a first step in determining actual resources used in the support of a specific application system. Because there is no workload accounting system for personnel, it is impossible for MECC to account for the use of this resource. Refer to our comment in Systems and Programming Project Management for further detail on a project management system which should be the foundation of systems and programming cost accounting.

Data Entry Resource Utilization

Since data entry activities are such a minor aspect of the operations for those data centers reviewed, a formal data entry resource utilization program is not cost-justifiable except at the TIES data center where extensive data entry work is accomplished. TIES has such an accounting system in place.

Data Entry Performance Measurement

In larger installations, data entry performance is measured by collecting actual production data and comparing it to predetermined job and individual standards. The information typically covers productivity, error rates, and turnaround time. These measurements provide management the ability to measure overall operations by comparing actual performance to standards, evaluate individual performance, monitor data entry equipment utilization, and identify problem areas on a timely basis so that measures to correct them may be implemented.

The level of data entry activity in the reviewed installations, except TIES, does not warrant a data entry performance system.

Data Entry Standards

Data entry standards typically include key strokes per hour by job, anticipated error rates by job and turnaround times. The benefits of these standards include (a) a smoother work flow, (b) reduced scheduling and other errors, and (c) a more objective basis for performance assessment.

METRO-II and TIES have data entry standards. These standards for METRO-II are consistent with the SDE standards manual. In light of the level of data entry activity in the reviewed installations, additional data entry standards are not considered necessary.

Data Entry Cost Accounting

Data entry services should be equitably charged back to the user on the basis of actual work effort. Efficient cost accounting in a data entry area assures that all costs are properly identified and assigned, only services performed are charged back, and total charge-backs are reconciled to total costs. The benefits are that costs for data processing services are fairly attributed to the actual users and school district management will know the total cost of data processing services.

Data entry costs in Regions III and V are charged back to the requesting district on the basis of a per-hour wall clock charge. At TIES, key punch input which could have been input from the CRT is also charged back to the individual user. These appear to be reasonable approaches in light of the relative insignificance of the data entry activities.

Systems Programming Standards

In larger installations, systems programming should be guided by established standards, the scope of which should include:

- testing and implementation;
- performance measurement and systems tuning;
- documentation;
- standard test decks;
- use of sensitive utilities; and
- use of performance degrading utilities.

These standards provide for more controlled systems software implementation environments and more effective testing, implementation, documentation, and performance measurement and systems tuning.

While many of these standards can be applied with equal facility to smaller installations, the volume of systems programming activity at the reviewed installations does not, in our view, warrant a formal systems programming standards manual.

DATA COMMUNICATIONS

All of the reviewed data centers have data communications networks of varying levels of sophistication and complexity. Region III has the most complex data communications network, with remote job entry and data terminal equipment installed throughout central and northern Minnesota. Regions III and V use the state-wide telecommunications network.

The communications network of METRO-II is modest. It is comprised of 20 inbound lines from member districts to the METRO-II computer facility. However, at TIES, the lines are dial-up, rather than leased.

As the number of remote locations grows in response to mandated use of ESV-FIN, and the level of sophistication and complexity of the communications network continues to increase, greater attention should be given to improvement opportunities in this area. The following paragraphs describe some of the characteristics and benefits of proper communications procedures.

Communications Migration Planning

Development of a new or updated data communication system should, from an overall planning perspective, incorporate the following characteristics:

- functions to be performed and required levels of performance;
- types and quantities of terminal devices employed or required;
- type of network typology;
- hardware and software interfaces; and
- cost justifications.

The cost of data communications is generally high relative to the cost of other system elements. Therefore, a methodical approach during the planning stages for such systems is critical to maximizing cost-effectiveness. Careful planning for data communications systems also tends to offset and appreciably nullify the subjective data, and/or intuitive, judgmental analysis prevalent in all planning and decision making. Examples of the types of judgments PMM&Co. believes are relevant are: use of leased circuits versus WATS, and the use of purchased, rather than leased modems.

Communications Feasibility Studies

This is the preliminary process of determining the overall suitability of data communications as a solution to specific business problems. Feasibility studies for communication-based subsystems should recognize and address factors which include:

- history of the operation;
- known experiences with similar applications;
- expected benefits to be derived;
- anticipated costs;
- personnel requirements; and
- relationships of affected areas within the organization;
- resource requirements;
- flexibility.

Communications feasibility studies provide assurance that careful analysis has been performed and overall efficiencies have been identified which mitigate against expending time, resources, and capital in the pursuit of projects which may prove infeasible. PMM&Co. recommends investigation of traffic volumes to reconfigure existing multidrop circuits or to operate with dial-up lines. We also recommend the examination of multiplexors if traffic volume levels are low enough to warrant their use.

Communications Long-Range Planning

Long-range planning is a process of forecasting the data communications requirements for an organization and is usually based on extrapolations of current utilization factors. A data communications long-range plan will incorporate:

- organizational goals and capital constraints;
- unit objectives and marketing strategies developed for the future or for upgrading current markets and services;
- current and projected operating environments;
- current data communications environment; and
- projected technological advances.

Such a plan typically insures the existence of a framework for meeting organizational goals, minimizes redundancies, and insures that data communication systems development remains consistent with organizational goals and priorities. PMM&Co. has developed an action plan for this phase, reproduced as Appendix B.

Communications Contingency and Reliability Planning

Communications contingency plans are a set of procedures and/or techniques which can be invoked to facilitate the resolution of emergency conditions affecting a data communications network. Emergency conditions for on-line system failures can be denoted in terms of:

- processor error;
- memory parity error;
- communications network failures;
- failures in peripheral devices;
- operator errors;
- program bugs;
- power failures;
- environmental failures;
- gradual erosion of the data base;
- saturation of the system; and
- unexplained failures.

Proper contingency and reliability planning provides some assurance that the integrity of data is maintained when a failure occurs. It also provides for development of efficient procedures for reconstructing data in the event of hardware and software malfunctions and provides some level of assurance that the organization will not be adversely affected by failures occurring in the on-line system.

It should be noted that two of the installations reviewed, TIES and Region III, have begun to address this issue. TIES installed a patch panel at Region III and acquired line test equipment. Region III is also utilizing the Burroughs hardware reporting package called RADAR, which provides error reports daily on controller and line problems.

Communications Operating Procedures

Communications operating procedures should describe the various operations, schedules, reports, and forms which are required for the data communication systems to maintain continuity of operations. Specific procedural categories are:

- operational procedures;
- maintenance procedures;
- material control procedures;
- system technical manuals;
- training programs;
- personnel position descriptions;
- record formats and procedures; and
- system operation reports and forms.

These procedures are designed to insure that effective procedures, schedules, reports, and forms are maintained, and that system weaknesses or points where operational improvements can be implemented are identified. We recommend MECC ESV-MIS develop these operating procedures and design trouble reporting forms for regional use.

Communications Systems Testing, Integration and Check-Out

Procedures in this area should describe the test plan for the data communication system. The problems posed by remote operations, transmission speed requirements, and transient errors in the data communications network mandate a system testing cycle with the following phase attributes:

- unit testing of individual components;
- component integration and resolution of interface problems; and
- system check-out.

These procedures should be designed to insure that adequate testing has occurred prior to implementation and that the system being implemented will perform as originally intended. MECC-MIS should build upon the techniques developed at Region III and MECC Timesharing to ensure adequate test procedures are shared with other regions.

Communications Resource Utilization

Utilization is a data communications network design criterion for continuously keeping each line on a data communications system busy. This optimal line utilization implies:

- data should be continually moving over these lines;
- only the minimum terminal configuration line support should be considered; and
- terminal network transfer waiting time will always occur.

Utilization standards will insure that network facilities are optimized from the standpoint of available capacity and facilitate the realization of overall cost efficiency for the data communications system. MECC should formulate resource measurement approaches using RADAR as the measurement device.

Communications Performance Objectives

Analysis of the expected performance of the data communication system, and verification that it conforms to requirements previously established, consists of two major subfunctions:

- checking the functional specifications to determine their completeness in meeting these requirements; and
- insuring that the postulated system will be capable of supporting the data communications workload.

Properly defined objectives should insure that previously established goals for data communication systems performance are being achieved. Refer to Appendix B for PMM&Co.'s recommended action plan for communications performance planning.

Communications Trouble and Error Reporting

Of the many problems in data communications systems, the frequency and severity of transmission errors are paramount. Therefore, error detection and control techniques are needed to reduce the impact of various errors to an acceptable level. These techniques operate in one or a combination of the following ways:

- hardware error detection, a capability usually associated with a parity check in the data, by character and message block, or with the detection of signal loss in the line; or

- software error control routines, which offer significant capability to insure adequate transmission services; selected examples include:

  - threshhold error counts
  - line test messages
  - on-line terminal or cross-patching tests
  - automatic disconnect/reconnect
  - operator awareness
  - willful intercept
  - contextual editing

Effective communications trouble and error reporting methods will insure that effective error detection and correction schemes have been incorporated into the overall systems design. Such procedures will also help to identify areas where inadequate error detection or identification of failure type exist. Deficiencies so identified will have to be evaluated to determine whether the consequences of the failure are serious enough to warrant the application of resources for developing preventive and/or corrective procedures. MECC-MIS should collect communication error reports from regions through the Technical Forum and analyze patterns of outages. From these analyses, MECC-MIS could recommend new communication procedures or negotiate with vendors for improved performance.

Communications Standards

Data communications standards consist of the agreements necessary to promote the efficient exchange of data, while affording the highest degree of compatibility, reliability, and flexibility. Data communication standards should be continually updated and improved through use and experience. Compatibility standards for data communications should address the following:

- user to link;
- user to network;
- network to network; and
- user to user.

Communications Cost Accounting and Charge-Backs

Data communication software maintains records of events which occur during the operation of an on-line system. As such, various types of files can be created to include:

- a log of input messages;

- statistical records of user and system performance;
- a log of special messages to be used for subsequent processing;
- records of user error; and
- records of terminal activity and task requirements for fulfilling the requests.

These records can be used to insure that adequate logging of input messages is effected to facilitate recovery from systems failures and as a basis for verifying that proper audit trails are maintained for all transactions. MECC ESV-MIS should work with the Regions to develop reports using RADAR data which can more accurately portray communications network performance.

DATA MANAGEMENT

All five reviewed installations utilized the Burroughs data base management system, DMS-II. The selection of this data base management system was the result of the vendor selection process conducted by MECC for all installations. While many of the attributes of effective data management are mandated by the conceptual design and logical data base structures which were defined by MECC as part of its standardized applications design, there are a variety of information resource management procedures that require further attention in the reviewed installations.

Information Resource Management Organization

Two of the most difficult information resource management control aspects to specify are the responsible organizational structure and function. There are inherent contradictions between traditional data processing organizations and those suited to supporting the information resource management perspective. Traditionally, data control activities are redundantly performed for each subsystem. In the case of information resource management, such activities are typically delegated to a centralized function often known as "data administration."

Since the data administration function evolves differently in different organizations, it is impossible to specify a general data administration organization chart with which all installations should comply. However, the basic information resource management functions that must be performed can be specified. These include:

- data access and update control and authorization;
- conceptual data base design;
- logical data base design;
- physical data base design;
- data base security and integrity;
- information resource management standards;
- data base content and relationships;

- data base resource management and performance measurements;
- information resource availability;
- data base tuning;
- data utilization;
- data definitions and dictionaries;
- data base maintenance;
- system restart and recovery;
- data base management system evaluation and generation; and
- evaluation of information resource management quality versus requirements of the organization served.

Generally, the more activities that are centralized into the data administration group, the greater the payoff from information resource management efforts. The most common benefits are:

- increased cost-effectiveness of the data processing department;
- greater return on investment from information resources; and
- smoother and quicker evolution to an information resource management methodology.

MECC-MIS has designated a data base administrator. This individual is new to the job and does not have extensive experience in this function. We recommend that MECC ESV-MIS assisted by TIES, which has an experienced person, define the role of this administrator to include responsibility for: (a) the data dictionary; (b) the data base management software (applying updates and ensuring system efficiencies); (c) quality reviews, and (d) consulting on data base design. Such consultation would include access efficiencies, security considerations, and backup/recovery procedures. TIES has had a data base administrator established for five years. We recommend that this expertise be used as a resource by MECC-MIS.

Data Base Management System Evaluation and Selection

Although there are a variety of data base management systems available from which to select, procurement of Burroughs computer equipment made DMS II the obvious choice. It should be noted, however, that there are significant differences among commercially available data base management systems including:

- ease of use;
- flexibility to accommodate new information requirements;
- supported data structure;
- front-end teleprocessing;
- core requirements;
- required training;
- complexity; and
- functional capabilities.

Selection of the proper data base management system provides the right tool at the right cost for the specific organization, insures the ability to implement planned organizational systems, and avoids costly system redevelopment caused by selection of the wrong data base management system. PMM&Co. has analyzed the conversion scenario which might have to be undertaken if the State does not reselect Burroughs at contract renewal. This scenario is included in Appendix C.

Data Base Integrity Control

Data base integrity generally refers to the quality, soundness, and properties of the data base content such as accuracy, completeness, currency, and timeliness. Proper integrity control will minimize the possibility of an inadvertent destruction of the data base, will improve report accuracy and decision making, will provide greater management and user confidence, and should improve information resource cost effectiveness. The responsibility lies with the MECC data base administrator to: (a) execute integrity control over the data dictionary, (b) maintain cognizance of application program changes, and (c) consult on data access efficiencies.

Data Base Security Control

Data base security refers to protection against purposeful and unauthorized accessing, destruction, or dislocation of the data base contents. Such procedures are essential if the organization is to comply with privacy legislation and protect information resources against theft, destruction, improper use, and fraudulent alteration.

DMS II data base security features have included user codes, passwords, guard files, and user ignorance. The data can also be protected by the "logical data access method" which prevents users from obtaining access to unauthorized portions of the data base. This facility is not currently being employed because many of the school districts use variations of data base structures that could cause rejections to occur to legal or legitimate inquiries if this facility were employed.

We recommend that the MECC data base administrator examine security features presently implemented on ESV-IS systems to ensure that:

- Security capabilities of DMS-II and GEMCOS are utilized to the fullest extent practicable; and

- User passwords are subject to an issuance/review cycle.

We understand that the most recent Burroughs operating system release has been enhanced to include an additional level of security called an access code, which is user defined. Once implemented, this will provide the third of a three-level security structure:

1. user code;
2. password; and
3. access code.

PMM&Co. recommends the implementation of the access code when it becomes available.

MECC-MIS

A review of MECC-MIS in Minneapolis addressed data processing organization and administrative practices, planning activities, operational procedures, and control features. The review scope also included data communications and data management activities under the control of MECC-MIS. The methods employed to gather the data presented in this report included:

- document reviews;
- survey questionnaires;
- personal interviews; and
- on-site inspection.

The survey questionnaire was completed by MECC-MIS management in advance of our on-site inspection. The personal interviews, on-site inspections, and all analysis activities were performed by management consultants specializing in data processing technical and managerial practice.

The balance of this section presents the findings and recommendations, including anticipated benefits, resulting from our review. This section of the report concentrates on improvement opportunities and does not reflect the many outstanding practices and procedures observed during the review. As a result, these findings have a negative bias, which should not be construed as representative of overall MECC-MIS performance.

ORGANIZATION AND ADMINISTRATIVE PRACTICES

Organizational Structure

On September 12, 1979, MECC-MIS reorganized. There are now four managers under the Director of MIS. The primary emphasis of this reorganization is to improve communications with the regional centers. Team leaders are designated for the finance, payroll personnel, and student systems. There are gaps in this organization chart for positions which are not filled. Unfilled positions have been a continuing problem to MECC-MIS. In November 1977, MECC was placed under the State of Minnesota personnel system. MECC must therefore conform to those regulations. The hiring process has, as a result of this system, become convoluted. The hiring process consists of first establishing a qualified personnel list. This list typically is out of date and consists of individuals who have responded to ads which have been placed by MECC in local papers. Because there is an open enrollment time, individuals can remain on this list for many months. State personnel next "rate" the applicants who have applied and compile a "selected list" which becomes the input for the interview process. Finally, MECC interviews those candidates which MECC chooses from the "selected list." Those candidates are screened by the Executive Director and offers are extended.

Of particular note in this state personnel process is the difficulty associated with the job vacancy posting process and the time requirements for advertising of the position. Considering the time lines which MECC must operate under, and in view of the staff turn-over in the senior analyst and data base administration areas, such delays can have a long-range effect on performance. We recommend specific time performance standards be negotiated between MECC-MIS and the State Personnel System. Job vacancy postings, job descriptions, and the selected list should have specific turnaround times established.

Contracts, such as with Schroeder Associates, Inc., are an example of the MECC approach to dealing with the inadequacies of the state payroll and hiring practices. Unfortunately, such deviations are not in the state's best interests, as these contracts do not include established performance warranties and delivery times established.

MECC maintains pay comparability with competitive industries for entry-level systems analysts and programmers. MECC is less competitive with private industry for the senior systems analysts and data base administrator positions. Specifically, these senior level analysts have a maximum permissible direct cash compensation of $27,700 (July 1979) per year. Private industry typically ranges up to $31,000 for this type of position. This lack of pay comparability with the private sector detracts from MECC's ability to bring in talent at the higher levels of expertise. This lack of senior systems analysts seriously detracts from MECC's ability to respond as a developer and maintainer of systems for the State of Minnesota.

Employee Training

There is no specific training program which is conducted for each employee, other than trainees. There are no records of any training which has been conducted. In view of the size of the staff, it is not recommended that an extensive training program be implemented. However, there should be some effort to gauge the current and potential effects upon MECC of the recent personnel turnover experience, and some response to those identified or anticipated effects.

Since all five data centers use similar equipment and have comparable training needs, a significant opportunity exists to reduce training costs and, at the same time, increase the total level of training received by data center personnel by coordinating and sharing training plans and results between regional centers and MECC-MIS.

Position Descriptions

Position descriptions exist for all employees in MECC-MIS. Their responsibilities are detailed, along with specific types of experience which are required for the position. Several areas need strengthening in these position descriptions. Section C of the form, which describes the nature and scope of the job, is a useful portion of the position description. However, PMM&Co. believes that Section C on knowledge, skills and abilities can be strengthened. More specific types of skill requirements need to be enunciated within the description. Additionally, there is a need in all of these position descriptions for identification of specific educational requirements for the position. A complete position description in the industry includes educational requirements.

Financial Control

Budgetary control at MECC-MIS is exercised by the Director of MIS. The staff has no responsibility in the budgetary process and does not receive a regular budget for the year. There is the need to establish annual objectives for division activities, and use this to develop a list of priorities. It is desirable to be able to assign budgeted amounts of expenditures to this activity objectives.

Physical Work Environment

MECC-MIS has adequate working space. The physical work environment in the computer center is considered adequate for operation with the B6700. Although this data center was not initially configured to act as a production shop, space exists to support these needs. The environmental systems are considered adequate.

There are no electromechanical security devices in the MECC-MIS data center. Access to the computer room and adjacent areas is restricted only by the security awareness of the employees working in the area. As MECC-MIS has become a production center, it has custodial responsibility for school district data for Region IV. This custodial responsibility dictates a higher level of attention to physical security than presently exists. At a minimum, electromechanical security devices should be installed to restrict access to the computer room and report distribution areas.

Staff Utilization

MECC-MIS has an informal project management system. Because responsibility is divided into functional areas, this work process permits the Director of MIS to easily monitor work being performed for that functional area. However, there is the need to have greater precision in committing and monitoring the use of personnel resources in developmental and maintenance efforts. Specifically, PMM&Co. recommends that a work measurement system or work reporting system be put into use at MECC-MIS to permit the Director of MIS to more formally monitor effort against specific developmental and enhancement activities.

Vendor Support

The management and staff of MECC-MIS feel that Burroughs' field support has been satisfactory. MECC-MIS presently keeps a handwritten log of trouble reports on the B6700.

We recommend MECC-MIS adopt the Burroughs' Incident Report Form as it has been modified by Region V. Operators can prepare the incident report each time a hardware or software incident occurs. This document would then be referred to the supervisor or customer engineer. The Burroughs' customer engineer can then correct whatever is wrong and annotate the incident report as to the corrective action taken.

PLANNING ACTIVITIES

The planning review addressed long-range system planning, capacity planning, and contingency planning. In all cases, planning presents a significant improvement opportunity for MECC-MIS.

Business Systems Planning

Business Systems Planning addresses future systems development activities in support of MECC-MIS. The long-range plan for MECC-MIS is a series of budgetary documents which have been presented to the Regional Steering Committee of the State Board of Education. This committee has responsibility to review systems specifications and set priorities for system develop-

ment and revision. PMM&Co. has not found any prioritized long-range planning document for MECC-MIS systems. Phase I and Phase II PRIDE Systems documentation begins this objective setting process for MECC. The information contained in these documents was developed by functional advisory committees for the financial, payroll, personnel and student areas.

The difficulty in this planning process comes when MECC-MIS efforts must be prioritized for future developmental and enhancement opportunities. PMM&Co. has concern that the functional advisory groups for finance, personnel/payroll, and student, which support this process, have no link to the region and to the user. Therefore, any prioritization which occurs must be taken by MECC-MIS, placing MECC-MIS in the position of prioritizing user requests for service.

PMM&Co. examination of the PRIDE Phase I and Phase II documents shows that there is no estimate of manpower required, there is no specificity on due dates for delivery of modules, nor is there a discussion of the skills that will be required to meet specific project requirements. Additionally, the Phase I and Phase II documents do not actually specify the system requirements, rather they are "wish lists."

Phase VII in PRIDE (modification) is supported by the "green sheet" which is a request for enhancement/modification. On October 24, 1979, PMM&Co. reviewed a new "green sheet" with an enhancement/breakdown categorization for the request. In PMM&Co.'s opinion, this breakdown is still not sufficient for management of the system change process. Specifically, there is a need for a structured change process on MECC developed systems. There needs to be a method for stratifying requirements for change between those which impede the operation of the system (failure) and those which are desired enhancements to the system. PMM&Co. proposes the use of the following categorization:

- incident reports - this category represents those data processing errors which would be encountered in a production environment, such as logic errors or "bugs";

- system change request - a system change request would consist of changes to the technical systems. These changes can be unanticipated (quick fixes) or anticipated problems (policy changes);

- work request - the work request would consist of DP support requests which, when implemented, have no effect on the technical system. Such changes would be report requests, report format changes, sort orders, and new column delineations.

This classification scheme is a method to provide managers with a picture of the general health of the EDP system. It can also help to determine how manpower resources are being used by MECC-MIS. It should be noted that PMM&Co. recommends that the system change request be coordinated between the technical system and the functional system in the field. That is, any change to the technical system must be reflected in changes to the procedures which are in effect to the user group.

Processing Resources Planning

At present there is no long-range plan for processing resource requirements for MECC-MIS. There are no algorithms which have been developed to compute consumption of resources by the ESV-FIN, ESV-PPS and ESV-SSS systems. This lack of analysis, combined with a lack of documentation for operation of these particular systems, results in confusion concerning the level of processing resources which will be required to support any mandated extensions of the ESV-FIN system by July 1, 1980. An additional development for MECC-MIS has been the movement of Region IV to the MECC B6700 processor. This new production role, assumed on October 17, 1979, has affected the initially scheduled turnback of the B6700 in January 1980. It does not appear feasible for this turnback to occur in the near future.

The application of Burroughs Network Architecture to distribution of computer processing resources to individual school district has not been addressed in MECC planning documents. MECC-MIS is not prepared to develop software to support these distributed systems. Pressure from regional processing centers (Region III) and the resulting demand by school districts will force MECC-MIS back into a software development mode as regions move ahead to deliver processing to the districts. However, MECC-MIS lacks trained personnel to conduct the data communication analysis, DMS II downsizing, and applications programming required for this distributed network.

Processing resources planning for MECC-MIS and the regions should be consolidated under the direction and leadership of MECC-MIS technical personnel. Capacity measurement and report requirements should be identified, and procedures put in place to gather, report, and consolidate this data. Based on these inputs, application growth projections and new applications development and enhancement plans can be developed. MECC-MIS should then be able to project additional resource requirements well enough in advance to avoid performance problems, delays, and premature cost increases.

Computer Operation Contingency Planning

None of the data centers which PMM&Co. reviewed has a current contingency plan. TIES has had an untested disaster plan since 1977 which is now being presently reviewed. Several of the installations had established 1980 objectives for the development of contingency plans. Although it was originally intended that MECC-MIS would operate as a backup for the regional operation, it would seem that continued MECC-MIS growth and resource demands are diminishing the viability of this alternative. MECC, TIES and METRO-II should all develop contingency plans which would link their central processing facilities together. In the case of the MECC-MIS plan, the needs of the regional operation should be taken into account. As in the case of processing resources planning, the regional operations in the MECC-MIS data center should be considered as a single operational unit located in multiple sites around the state.

OPERATIONAL PROCEDURES

Well documented and consistently applied operational procedures contribute significantly to the attainment of high levels of services.

Computer Operations Procedures

There are no documented computer operations procedures for the ESV-IS systems. MECC provides new releases by tape output. These new application releases are then loaded into the regional processing computer. There is a need for documentation of computer operations procedures for these application systems. Specific information is needed concerning weekly dumps, backup requirements, and data retention requirements.

The statewide financial, payroll/personnel, and student information systems are highly operator-independent, and require little or no operator involvement. However, properly documented run instructions can further reduce the time required to train new employees, can provide for uniform and consistent procedures and instructions, and can reduce overall processing time by providing for better responses to exception conditions.

General computer operation procedures do exist in the MECC data center. The daily procedures outline specific actions which are detailed in subsequent sections of the manual. These procedures consist of weekly dumps, weekly reports, data retention, and general housekeeping functions. This is an operational manual which has been subject to many changes and additions. In view of the Region IV processing requirement, this manual does not appear adequate to handle the new data center support role. This log should be upgraded to include current cold start procedures, and SDE should be removed as a user on this system. The system user processes detailed in this log book should be removed for security purposes on the ESV system.

Program Modification/Implementation Assistance

Written standards for acceptance and implementation of program modification can improve stability and operating efficiency. The System Release/Control process utilized by MECC-MIS is a step in this direction. We believe the primary issue for MECC-MIS in this area is to resolve the enhancement/modification process on MECC-MIS developed application systems. The present process, which does not result in a clear set of "marching orders" to MECC-MIS, is not optimal. We recommend that functional user committees for ESV-FIN, ESV-PPS and ESV-SSS describe and prioritize their development and enhancement requests. The requests of these three functional user committees should then go to a MECC-MIS advisory committee composed of system user and technical personnel. This body should prioritize all development and enhancement requests to MECC-MIS. This approach would remove MECC-MIS from the unenviable position of having to prioritize user requests, as is the present situation.

System Feasibility Studies

The purpose of a feasibility study is to document and analyze alternatives for the development or modification of information systems. MECC is using the PRIDE system for system development. PRIDE consists of nine phases beginning with the system study and evaluation and concluding with the system audit. There are two particularly critical portions of this process:

- Phase I system study and evaluation

  - defines preliminary skill requirements for project;

- analyzes current systems;
- surveys information needs;
- defines information requirements and project scope;
- reviews information requirements;
- develops a system approach and feasibility study;
- prepares system evaluation; and
- reviews system approach and system evaluation.

- Phase II system design, which

  - defines systems into subsystems;

  - prepares system flow charts, logic and data management descriptions;

  - prepares illustrations of output for review and approval;

  - prepares system design and evaluation; and

  - reviews system design and evaluation.

In examination of the PRIDE Phase I documentation for the ESV-FIN system, there are no specific performance criteria or requirements which have been formally accepted by the prospective user. Throughout this Phase I documentation, there are no assessments of the impact on a particular organization for which the systems are being developed. There is no assessment of the requirements for operating procedure changes or the need for an organizational restructuring for the independent school district. Additionally, there are no written considerations of the use of externally purchased software. Finally, in the system design document, there is no discussion of alternatives which had been considered nor any reasons for rejecting those alternatives. There is no assessment of estimated computer time or manpower resources required to install the system.

Systems Design

MECC-MIS uses the PRIDE documentation methodology. The review of the system design work done for the ESV-FIN and ESV-PPS systems indicates that MECC-MIS follows this documentation methodology, which is in conformance with SDE requirements.

The ESV-FIN data base was designed in 1976 and has experienced no significant change since 1976. The design is clean, with Warnier diagrams and COBOL code, and uses DMS II as the data base management system. PMM&Co.'s examination of the ESV-FIN system shows that the system has been well designed and cleanly executed. The ESV-PPS system is similar to ESV-FIN in concept and facilities. The quality of the data base and system concept is similar. Program code for the ESV-PPS system was not examined by PMM&Co.

Program and Unit Testing

Standardized programming and unit testing activities typically provide improved ability to maintain programs and documentation. MECC has not established formal programming and unit testing standards. Instead, MECC-MIS has relied upon a comparison technique whereby reports produced by the

new programs or subsystems are compared to reports generated from the same data by the programs or subsystem being replaced. While both of these approaches appear to be acceptable under the circumstances, more formalized programming and unit testing standards should be developed in conjunction with user input to address future development activities.

System Testing and Conversion

Effective system test and conversion plans can reduce implementation costs by identifying most problems during testing. This approach minimizes the disruption of routine user and computer operations activities and reduces potential program maintenance requirements by identifying program "bugs" during testing. It is recommended that MECC-MIS involve users directly in the development of test criteria to be used prior to the implementation of major enhancements, or prior to the development and piloting of new systems.

Post Implementation Reviews

Post implementation reviews are important as a method of identifying unresolved application systems problem areas and system weaknesses. Formal post implementation reviews have not been conducted for the financial or payroll/personnel systems. The State Auditor was requested to audit the FIN system, but has not to date responded to this request. Because formal acceptance criteria was not defined in the Phase I and Phase II implementation documents, there is difficulty in defining what is "post implementation." It is recommended that, prior to development, formal criteria be established for the acceptance of systems.

The lack of a formal written sign-off procedure for the ESV-FIN and ESV-PPS systems seriously degrades the system development effort. There is no checkpoint for final system acceptance by individual school districts or regions as a result of this action.

Magnetic File Library Procedures

Magnetic tape is used as the primary medium for file backup at MECC-MIS. In the backup procedures for the ESV-FIN and ESV-PPS systems, regions with large numbers of districts are encountering tape management difficulties. As each district creates a separate tape, the management of these tapes becomes an important process. We believe MECC-MIS should investigate the possibility of merging these individual district tapes into a single tape for each application system (FIN, PPS, and SSS).

CONTROL FEATURES

Methods and procedures for measuring and controlling data processing resources are essential to cost-effective management of installations. There are several areas for significant improvement at MECC-MIS.

Computer Resource Utilization

Computer resource utilization measurement and reporting has not been a major concern at MECC-MIS. MECC-MIS utilizes LOGGER and SPARK measurement packages provided by Burroughs. TIES has developed an on-line monitor for

operators which appears to be a superior approach to that provided by the standard Burroughs software. We suggest that this package be made available, through MECC-MIS, for use in the regional data centers.

MECC-MIS data center management needs to develop and implement a computer resource utilization program for collecting, reducing, interpreting and reporting these standard measures on a frequent basis. This measurement of resource consumption is an important process since MECC-MIS has become a production center.

Computer Operations Performance Objectives

Service level performance objectives acceptable to user operations should include accuracy, reliability, and timeliness characteristics. MECC-MIS has not established computer operation performance objectives. There are informal procedures for the measurement of "up" time and for the notation of failed devices in the computer center. At present, no regional installation has developed a comprehensive set of computer operations performance objectives. We believe there are potential cost-benefit advantages to be gained from development of performance objectives, under the guidance of MECC-MIS, which would be applicable to all regional centers.

Computer Operations Cost Accounting and Charge-Back

A computer cost accounting system should identify costs related to resource utilization by users. This data may or may not be used to support charge-backs to end users, depending upon organizational philosophy. In MECC-MIS's new role as a production center, it is important that a cost accounting system be in place. Region V has developed a cost accounting system which supports a user charge-back methodology. It is recommended that MECC-MIS examine the Region V charge-back system which uses LOGGER output. The techniques and approaches used in the Region V model could be communicated to other regional processing centers and could be used to establish a charge-back methodology which is more responsive to district resource usage than the per student method presently used at the other regional data centers.

Computer Operations Trouble and Error Reporting

There is no formal computer operations trouble and error reporting from MECC-MIS to Burroughs. It is recommended that MECC utilize the Burroughs emergency service request form (marketing form #1462) as a means of detailing performance by device and to communicate difficulties to Burroughs field engineering.

Systems and Programming Project Management

A project management system, either manual or automated, should be employed at MECC-MIS to schedule and control systems development activities. The present process at MECC-MIS is an informal one, relying on the knowledge of the individual functional specialist. It is recommended that the TIES automated workload accounting system be examined by MECC-MIS as a possible model for control over project management resources.

Data generated from such workload accounting systems will permit MECC-MIS to detail the costs incurred in program fixes, modifications, and

enhancements. Combined with the structured change process recommended previously, this system will permit MECC-MIS to measure and to account for the consumption of their personnel resource. This data can be used for more formal management planning and can assist in defining priorities. This detailed data will permit MECC-MIS to establish more accurate time lines for the delivery of enhancements and modifications to ESV-IS systems.

Data Communications

As the number of remote locations in each region increases and the level of sophistication and complexity of the communication network continues to increase, MECC-MIS should give greater attention to improvement opportunities in this area. Specifically, there are opportunities in communications migration which should be addressed to reduce the cost of data communications. A preliminary step in the process of determining the overall suitability of data communications is a communications feasibility study. Such studies support analysis of overall system efficiency and help identify those factors which reduce the cost effectiveness of the existing data communications network.

MECC-MIS should develop methods of reporting errors on the communication network. Such a package could utilize the Burroughs reporting system called RADAR. This data could be used to analyze controller and line problems in the data centers. The use of RADAR can also be helpful in determining utilization of the communications network. Utilization standards could be developed by MECC-MIS to insure that network facilities were optimized from the standpoint of available capacity and to facilitate the calculation of overall cost efficiency for the data communications system.

Data Management

Regional centers and MECC-MIS utilize the Burroughs-provided data base management system DMS II. The selection of this data base management system was the result of a competition conducted by MECC for the State of Minnesota. PMM&Co. examined documents produced for this competition and found them to be professionally executed. We believe the results fairly represent the parties involved.

Data Base Integrity Control

Data base integrity refers to the quality and soundness of the data base content. Such terms as accuracy, completeness, currency, and timeliness help to describe these properties. PMM&Co. has examined each of the ESV-IS systems. Our specific comments are contained in the Data Base section of the final report.

Data Base Security Control

Data base security refers to the protection against purposeful and unauthorized access, destruction, or dislocation of the data base contents. DMS II data base security features are user codes, passwords, and user ignorance. Additional security features are available from Burroughs, such as guard files. An additional feature of Burroughs is the "logical data

access method" which prevents users from obtaining access to unauthorized portions of the data base. This facility is not currently being employed because many of the school districts use variations of the data base structures that could cause rejections to occur to legal or legitimate inquiries. In the Data Center Review section of this report, PMM&Co. recommends specific steps which should be taken to ensure security for ESV-IS users.

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PMM&Co. thanks MECC-MIS personnel for their cooperation during this study. Their efforts in providing us ESV system development documentation and copies of detailed reviews of ESV systems are especially appreciated.

ESV REGION III

Our review of ESV Region III in St. Cloud addressed data processing organization and administrative practices, planning activities, operational procedures, and control features. The review scope also included data communications and data management activities under the control of Region III.

The methods employed to gather the data presented in this report included:

- document reviews;
- survey questionnaire;
- personal interviews; and
- on-site inspection.

The survey questionnaire was completed by Region III management in advance of our on-site inspections. The personal interviews, on-site inspections, and all analysis activities were performed by management consultants specializing in data processing technical and managerial practices.

The balance of this section presents the findings and recommendations, including anticipated benefits, resulting from our review. This section of the report concentrates on improvement opportunities and does not reflect the many outstanding practices and procedures observed during the review. As a result, these findings have a negative bias, which should not be construed as representative of overall Region performance.

ORGANIZATION AND ADMINISTRATIVE PRACTICES

Organization and administrative practices in Region III are somewhat informal, which is typical for an installation of this size. The most significant opportunity for improvement is in the physical facilities. This and other, less significant, improvement opportunities are presented in the following paragraphs.

Physical Work Environment

The physical work environment should be conducive to high productivity and positive employee morale. At Region III, the lack of adequate working space is a severe problem. The problem is particularly acute in the computer room and surrounding support areas. There is inadequate workspace in the computer room; data entry operations, the Burroughs B80, and the report distribution work area are contained in a single, small room. These environmental problems are compounded by the absence of electromechanical security devices. Access to the computer room and adjacent areas is restricted only by the security awareness of employees working in the area.

Region III management should investigate alternatives for increasing the available work space and providing improved separation of potentially incompatible functions, such as data entry and B80 operations. These changes should result in higher productivity, increased control over work in process, and improved employee motivation and morale.

While physical security is not a critical issue, Region III's custodial responsibility for school district data dictates a higher level of attention to physical security than is presently the case. At a minimum, electromechanical security devices should be installed to restrict access to the computer room and report distribution areas.

Employee Selection

Region III employee selection practices do not include reference and security checks, and the interview process is not documented. Consistent application of these practices should result in the selection of the most qualified individuals with a minimum of security risk, while at the same time possibly contributing to reduced employee turnover.

Training

On-the-job training is the principal training tool used at Region III. This is augmented by a detailed professional growth and study procedure and formal technical courses provided by the computer vendor. However, there is no specific employee training program, and training records and skills inventories, which could provide a basis for planning future training requirements, are not maintained.

Region III management should develop a skills inventory, including education and training history, to serve as a basis for planning future training needs. This approach should provide more cost-effective training consistent with organizational needs, improved employee efficiency and morale, and a more skilled employee group.

Employee Performance Reviews

An evaluation of employee performance is completed quarterly during the first year of employment, and every six months thereafter. The reviews are keyed to the major accountability areas as described in the position descriptions, which are typically quite general in nature. These general goals are difficult to measure objectively and provide only limited direction to the employee.

The employee performance reviews should, where possible, be based on specific, measurable objectives, mutually agreed upon in advance by the employee and his supervisor. This may require revision of the job description and the employee rating form, but should result in greater employee motivation, improved employer-employee communication, and more objective evaluation of performance.

Position Descriptions

Region III position descriptions present the best list of employee qualifications of all descriptions reviewed. These position descriptions should be made available to the other regions as model qualification statements.

PLANNING ACTIVITIES

The planning review addressed long-range systems planning, capacity planning and contingency planning. This is a major area of weakness in Region III, since no long-range plan has been developed and contingency planning is only now beginning to be addressed.

Business System Planning

There is no long-range systems plan for Region III. Priority setting is accomplished by the director and his service coordinators as a result of district service requests. The region does consider the impact of technological change and has been innovative in the application of distributed data processing techniques.

Region III should develop and maintain a long-range business systems plan. The plan should include a description of proposed system enhancement activites, including:

- relative priorities;
- impact of anticipated technological development;
- anticipated completion dates;
- manpower estimates and personnel demand backlogs; and
- responsiveness of specific projects to region/district needs.

Such a plan helps to ensure that enhancement selection and implementation will be responsive to operating needs, that operational and capacity planning can be based on a reasonable activity timetable, and that management attention is focused on systems enhancement priorities rather than individual projects.

Contingency Planning

The Region III Director has instructed the operations supervisor to develop a computer operations contingency plan. Region III is currently relying on informal reciprocal agreements with other regions for computer support in the event of a disaster. These agreements are not documented, and there are no written procedures for activation of such an alternative.

Region III should move as quickly as possible to develop and test a contingency plan. The plan should include:

- off-site copy of the plan, work flow language, source programs, master files, operating instructions and systems documentation;
- names and addresses of vendors;
- provisions for restoration of power;
- off-site media availability;
- configuration schematics;
- alternative sites;

- off-site processing priorities;
- priorities and procedures for reinitiating processing following significant interruption; and
- well-defined procedures for the users to follow in the event of extended processing interruption.

A contingency plan should provide some assurance as to (a) continuation of Region III processing despite possible computer outages and (b) identification of critical factors that require special attention under such circumstances.

OPERATIONAL PROCEDURES

Well documented and consistently applied operational procedures contribute significantly to the attainment of high service levels. While no significant service level performance problems were identified during the review period that could be attributed to weaknesses in operational procedures, there are several opportunities for improvement.

Computer Application Run Instructions

The newly developed financial, payroll/personnel, and student information systems are highly operator independent and require a minimum level of operator intervention during processing. All problems are referred to the service coordinators and data control clerks for corrective action. As a result, only minimal run documentation has been provided to the regions by MECC-MIS. This approach appears to be adequate for day-to-day operations but the absence of documented run instructions can contribute to implementation problems with new applications and can unnecessarily prolong new operator training.

We recommend that MECC-MIS develop basic operating instructions for all three systems including:

- general system description;
- operator intervention requirements and limits;
- restart/recovery procedures;
- nature, source, and disposition of inputs and outputs; and
- forms alignment instructions.

If such instructions are not developed by MECC, the regions should proceed to develop their own. The potential benefits are:

- reduced employee training time;
- uniform and consistent employee performance; and
- reduced overall processing time, as a result of improved response to exception conditions.

Computer Operations Procedures

Region III has a written operator's guide covering a wide variety of activities, including power up/down, backup and restore, dumps, recoveries, and maintenance activities. The procedures do not address activities such as error handling and reporting, housekeeping, preventive and emergency maintenance, shift turnover, supplies inventory control, and ancillary equipment operations. The existing procedures are poorly organized, have no table of contents, and are not dated.

Computer operations should reorganize and date the existing procedures so that they can be easily referenced by an operator. Procedures for those areas previously noted as not existing should be prepared and included as part of the manual. The benefits should include:

- more consistent and predictable computer operations performance;
- reduction in the time required to train new employees; and
- elimination of recurring problems resulting from procedural misunderstandings.

Magnetic File Library Procedures

Most of the computer applications processed at Region III are disk-oriented. Magnetic tape is used primarily for file back-ups. The disk files are maintained as permanently mounted files; the tape library is relatively small and resides in the computer room.

Region III is planning to implement an automated tape management system (TMS) acquired from General Mills, Inc. While the need for an automated tape library management system is not clearly justifiable for a library of this size, there are some control benefits that should result from such an installation. It is our understanding, however, that this particular TMS requires some operating system modification before it can be successfully implemented. If this is the case, MECC-MIS should prepare the modifications and associated implementation instructions and provide them to all of the regions, rather than have each region prepare the modifications and plan the TMS implementation independently.

Three generations of Region III backups are maintained off-site, while ten backup generations are retained on-site. Backup tape copies are delivered to Sartell each Tuesday and Friday morning. If a disaster were to occur in the data center on Monday or Thursday night, as much as three days' data could be lost.

Region III management should carefully review their retention and recovery posture, reducing the numbers of backups and increasing the frequency of off-site rotation as necessary.

Production Control Procedures

Region III data control personnel are in the process of developing written production control and scheduling procedures for each of the three major systems. As in the case of the operating instructions, the production control procedures are inconsistently prepared and lack structure and organization.

Since the production control procedures should be similar in each region, the procedures should either be prepared by MECC or a method should be put in place for the regions to share the development and minimize the duplication of effort.

CONTROL FEATURES

Methods and procedures for measuring and controlling data processing resources are essential to the cost-effective management of installations such as Region III. While some measurements and controls are in place, there are several significant improvement opportunities.

Computer Resource Utilization

A minimal amount of resource utilization data is being collected, reduced, interpreted, and reported in Region III. Measurements are limited to CPU, input/output and memory utilization, job task and session counts, and system availability. History and trend data is not sufficiently accurate or comprehensive to provide management a reliable measure of performance upon which they can develop capacity plans.

The Region III operations manager should establish a computer resource utilization measurement program based on available Burroughs measurement tools such as LOGGER, SPARK, and BARS. Resource utilization data should be regularly collected, reduced, interpreted, and reported, including:

- CPU, memory, and device allocation and utilization;
- system overhead levels;
- mix and ready queue entries;
- overlay counts and overlay time decaying average; and
- job/task turnover.

A measurement and reporting program can provide for comparing performance utilization from period to period, highlight potential operational problems, and reduce total operating costs through better resource utilization.

Computer Operations Performance Objectives

The Region III computer operations performance objective is to complete all production by 8:00 a.m. each day. Since Region III is still primarily a two-shift operation, even though a third shift is scheduled, they have had little difficulty in meeting this objective.

On-time performance is only one measure applicable to computer operations. We believe Region III should establish and report against the following service level objectives:

- Accuracy; including operator, data, program, and equipment errors and reruns;
- Reliability; including equipment downtime (meantime between failures, meantime to repair) and halt loads; and
- Timeliness; including on-time performance, test turnaround, terminal response, and on-line availability.

Measurement and reporting of service level performance should be in terminology meaningful to users of the systems. The benefits of such a program typically include reduced costs and better utilization of resources, more objective measurement of performance, and improved communications with system users.

Computer Operations Cost Accounting and Chargebacks

Chargebacks to user districts by Region III are based on the number of students in the district, the number of report pages printed, and special supplies and services used. The bulk of the chargeback is the student charge at $3.00 per student. No measures of actual resources used by each district are available to determine if this charge equates with resources used.

Computer cost accounting data should be regularly gathered and analyzed to determine the level of resource use by district. A cost accounting system will allow management to identify the costs of services provided by data processing and to assign costs to users based on an agreed upon methodology.

DATA COMMUNICATIONS

Region III has implemented a reasonably complex network of remote job entry devices and data terminals, using the Statewide telecommunications network. Only limited attention has been given to the development of a communications migration plan, to error reporting and troubleshooting procedures, and to user alternatives in the event of network failure.

As one of the larger network users, Region III management should work closely with MECC data communications specialists to develop a cohesive and economic network plan, error reporting and troubleshooting procedures, and a realistic and tested alternative for users in the event of network failure.

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PMM&Co. thanks the Region III personnel for their assistance in this study. We appreciate their providing us operations documentation as needed, and compliment Region III for their commitment to readable and meaningful ESV system documentation.

ESV REGION V

Our review of ESV Region V in Mankato addressed data processing organization and administrative practices, planning activities, operational procedures, and control features. The review scope also included data communications and data management activities under the control of Region V.

The methods employed to gather the data presented in this report included:

- document reviews;
- survey questionnaire;
- personal interviews; and
- on-site inspection.

The survey questionnaire was completed by Region V management in advance of our on-site inspections. The personal interviews, on-site inspections, and all analysis activities were performed by management consultants specializing in data processing technical and managerial practices.

The balance of this section presents the findings and recommendations, including anticipated benefits, resulting from our review. This section of the report concentrates on improvement opportunities and does not reflect the many outstanding practices and procedures observed during the review. As a result, these findings have a negative bias, which should not be construed as representatives of overall Region performance.

ORGANIZATION AND ADMINISTRATIVE PRACTICES

Region V is, in our opinion, the best organized and administered of the three outstate regions reviewed. Organizational structure is more well-defined and employee selection and training is given greater attention and support.

Despite these strengths, there are several improvement opportunities, the most significant of which is the physical facility.

Physical Work Environment

The physical work environment should be conducive to high productivity and positive employee morale. At Region V the lack of adequate working space is a severe problem.

The problem is particularly acute in the computer room, which is located in the Mankato Area Vocational Technical Institute, several miles from the region office where the data services and data entry personnel are located. There is no work space in the computer room, which impedes organizing a logical flow of work. The air conditioning is inadequate and, as a result, Region V is having daily problems in this area. Over three hundred hardware incidents have occurred since the beginning of the year, most of which can be attributed to the space and air conditioning deficiencies.

Their location in the main corridor of the Vocational Technical Institute presents a security problem, despite the fact that the doors are kept locked at all times.

Region V management should investigate available alternatives for consolidating the regional administrative offices and computer operations in a single facility. Such a move should increase productivity, improve control over work in process, enhance employee motivation and morale, and provide better security.

Training

On-the-job training is the primary method used by Region V for communication of duties and responsibilities. No formal training programs have been established, and no skills inventory is maintained. Region V management recognizes the need for improved training, particularly in the operations area, and in the definition of training requirements for the ESV-IS systems.

While a highly formalized training program is not warranted, we believe management should develop a skills inventory by employee as a basis for planning future training needs. Arrangements should be made to provide the necessary training for those individuals requiring additional skills and knowledge. This training may be provided on the job, through self-study, through the use of audio-visual training aids or through formal classroom training. An approach of this type should provide cost-effective training consistent with the organization's needs. It should also result in improved employee efficiency and morale and in higher employee skill levels.

Vendor Support

The management and staff of Region V feel that Burroughs field support is not satisfactory. Burroughs committed to have a software engineer on site for two days every two weeks. This commitment has not been met. In addition, there have been three different Burroughs software engineers assigned to the Region V account in the last 18 months. Region V feels that, as individuals gain sufficient experience, they are being transferred to metropolitan accounts and less-experienced individuals are being assigned to the Mankato area.

Region V management also reports that Burroughs is maintaining an insufficient inventory of parts in the local area. According to the Region V operations supervisor, Burroughs continues to have parts on back order with critical components being flown in from other cities. This problem is critical in light of the three hundred plus hardware incidents that have occurred since the first of the year.

Region V management should coordinate the resolution of this problem with Burroughs' marketing personnel and MECC management through the Technical Forum. Resolution of these problems should result in improved productivity, through increased resource availability, and a significantly improved vendor/customer relationship.

PLANNING ACTIVITIES

The planning review addressed long-range systems planning, capacity planning, and contingency planning. As in the case of Region III, planning is a major area of weakness within Region V. No long-range plan has been developed and contingency planning is only now beginning to be addressed.

Business Systems Planning

Region V does not have a long-range system plan or other documentation of proposed development activities. Relative priorities are established by reviewing regional evaluation forms, which are distributed to the school districts in October or November of each year. This document, addressing requirements and needs, is the only formal communication between the user and Region V management.

Region V should develop a long-range systems plan that includes documented descriptions of proposed system development activities, including:

- relative priorities;
- impact of anticipated technological developments;
- anticipated due dates;
- manpower estimates and personnel backlog demands;
- additional skill requirements; and
- responsiveness of specific projects to regional needs.

Such a plan will help assure Region V management that systems portfolio selection and development will be responsive to operating needs, that operations planning can be based on a systems development timetable, and that management will focus on systems development priorities rather than individual projects.

Contingency Planning

The Region V operations manager has included the development of a contingency plan as one of his 1980 objectives. At present, Region V is relying on an informal agreement with Region III for backup services. This agreement is not documented, and there are no written procedures for activation of this alternative.

Region V should move as quickly as possible to develop a contingency plan. The plan should include:

- off-site copy of the plan, Work Flow Language, source programs, master files, operating instructions, and systems documentation;
- names and addresses of vendors;
- provisions for restoration of power;
- off-site media availability;
- configuration schematics;
- alternative sites;

- off-site processing priorities; and
- priorities and procedures for reinitiating processing following significant interruption.

A contingency plan should provide assurance of continued Region V processing despite possible computer outages and identification of critical factors requiring special attention under certain circumstances.

OPERATIONAL PROCEDURES

Well documented and consistently applied operational procedures contribute significantly to the attainment of high service levels. While no significant service level performance problems were identified during the review period that could be attributed to weaknesses in operational procedures, there are several opportunities for improvement.

Computer Application Run Instructions

As in the case of Region III, Region V operations have been provided only minimum run documentation by MECC-MIS. This has been supplemented by Region V in several instances. While the available documentation, as supplemented, appears to be adequate for day-to-day operation at Region V, the absence of documented run instructions can contribute to implementation problems with new applications and can unnecessarily prolong new operator training.

MECC-MIS should develop basic operational instructions for all three application systems, including:

- general systems descriptions;
- operator intervention requirements and limits;
- restart/recovery procedures;
- nature, source, and disposition of inputs and outputs; and
- forms alignment instructions.

If such instructions are not developed by MECC-MIS, the region should proceed to develop their own. The potential benefits are:

- reduction in new employees' training time;
- provision for uniform and consistent employee performance; and
- reduction in the overall processing time, as a result of improved response to exception conditions.

Records Retention

An area of concern within Region V is records retention. The regional director has been unable to obtain an adequate definition of records retention requirements from MECC. As a result, Region V has no idea how long tape files and other records should be maintained before purging.

MECC should define record retention requirements for the key files and other records maintained by the regions. Definition of retention requirements should result in increased protection against inadvertent loss and a

reduction in the total cost of storing and maintaining tape files and other records.

CONTROL PROCEDURES

Methods and procedures for measuring and controlling data processing resources are essential to the cost-effective management of installations such as Region V. While some measurements and controls are in place, there are several significant improvement opportunities.

Computer Resource Utilization

Region V prepares performance reports on the hardware and records all service interruptions on a daily console log. Resource utilization measurements are taken with SPARK but are not being reduced and reported at this time.

The Region V operations manager should establish a computer resource utilization measurement program based on the available Burroughs measurement tools such as LOGGER, SPARK, and BARS. The resource utilization data should be regularly collected, reduced, interpreted, and reported including:

- CPU, memory, and device allocation and utilization;
- system overhead levels;
- mix and ready queue entries;
- overlay counts and overlay time average decaying average; and
- job/task turnover.

A measurement and reporting program can provide for comparing performance utilization from period to period, can highlight potential operational problems, and can reduce total operating cost through better resource utilization.

Computer Operation Performance Objectives

Region V has established two computer operations performance objectives: (1) 98% of the work will be completed as scheduled; and (2) 97% availability will be maintained. These objectives are compared to actual performance on the biweekly Region V performance report, which is discussed regularly with the Burroughs support personnel.

While the two established performance objectives are valid measures, we believe Region V should also establish and report against other service level objectives, including:

- accuracy, including operator, data, program, and equipment errors and reruns;

- reliability, including equipment downtime (meantime between failures, meantime to repair) and halt loads; and

- timeliness, including on time performance, test turnaround, terminal response, and on-line availability.

Measurement and reporting of service level performance should be in terminology meaningful to users of the systems. The benefits of such a program typically include reduced cost, better utilization of resources, more objective measurement of performance, and improved communications with system users.

Systems Programming Standards

The Region V systems programmer is aware that the privileged user codes under CANDE are not adequately controlled. There are approximately ten user codes assigned at this time. However, the systems programmer had no record of the user codes assignments.

There are no restrictions on the activities of the holders of privileged user codes under the Burroughs operating software. Since these privileged user codes present a very significant control problem, every effort should be made by Region V management to limit the number of outstanding privileged user codes and to restrict the activities of those to whom they are assigned.

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PMM&Co. thanks Region V personnel for their assistance to us in this study and for providing the details of the newly adopted charge-back methodology.

METRO II

Our review of METRO II in St. Paul addressed data processing organization and administrative practices, planning activities, operational procedures, and control features. The review scope also included data communications and data management activities under the control of METRO II.

The methods employed to gather the data presented in this report included:

- document reviews;
- survey questionnaire;
- personal interviews; and
- on-site inspection.

The survey questionnaire was completed by METRO II management in advance of our on-site inspection. The personal interviews, on-site inspections, and all analysis activities were performed by management consultants specializing in data processing technical and managerial practices.

The balance of this section presents the findings and recommendations, including anticipated benefits, resulting from our review. This section of the report concentrates on improvement opportunities and does not reflect the many outstanding practices and procedures observed during the review period. As a result, these findings have a negative bias, which should not be construed as representative of overall region performance.

ORGANIZATION AND ADMINISTRATIVE PRACTICES

Organizational Structure

During our on-site visit at METRO II in late September 1979, we noted that the Director of MIS was the focal point for systems development, technical services, and user services. This single manager was responsible for the operations of finance, student, payroll/personnel, and the instructional systems. Additionally, the data base administration functions and the systems development and enhancements contemplated for the ESV-IS systems were focused through this individual. This span of control would have to be considered somewhat challenging. PMM&Co. recommends that these duties be divided into two major areas:

- operations; and
- user services.

The Executive Director of METRO II has obtained Board approval for this reconfiguration of the organization at METRO II. We believe this new division will permit operations personnel to concentrate on the actual delivery of services to users and will permit the user services group to concentrate on managing the functional service which is delivered.

Training

At the time of our review, there were no specific programs of training designed for employee needs. PMM&Co. recommends that METRO II develop and

maintain a skills inventory as a basis for future planning and training. The compilation of such a skills inventory will permit METRO II to determine those skill areas in which training programs are needed. Additionally, such an inventory would permit comparison of the need for cross-training in specific functional areas to reduce the impact of employee turnover.

Employee Performance Review

In reviewing the METRO II staff appraisal system, PMM&Co. noted the need for a more objectives-based appraisal process. Specific objectives should be set with each employee to permit measurement of specific employee performance. There should also be a specific policy specifying when these performance reviews will be conducted. PMM&Co. recommends redesign of the appraisal form and establishment of a specific review cycle for appraisals.

PLANNING ACTIVITIES

The planning review addressed long-range systems planning, capacity planning, and contingency planning at METRO II.

Business Systems Planning

Business systems planning addresses future systems development and enhancement activities in support of the enterprise. The product of the business systems planning activities should be a long-range system plan. PMM&Co. recommends that METRO II recognize its changing responsibilities in regard to ESV-IS systems; specifically, that they are becoming increasingly more responsible for enhancement of ESV systems. The METRO II long-range plan should include a documented description of proposed systems enhancement activities, including:

- relative priorities;
- anticipated due dates;
- manpower estimates and personnel demand backlog; and
- skill requirements.

Processing Resources Planning

METRO II is using LOGGER data which is reduced for reporting resource utilization by district and by application. This analysis effort is one of the most sophisticated being applied by any of the regional processing centers. It is recommended that the resource utilization measurement also include calculations of disk space being used by the particular district. METRO II users have been informed of costs based on their consumption of the processing resource. PMM&Co. encourages this effort and recommends the addition of disk space utilization computations.

Computer Operations Performance Objectives

The overall performance objective of METRO II is that the equipment be up and available to users 90% or more of the time. Industry standards typically require 96% to 98% up time on on-line systems. The measurement of this availability is at the port. METRO II has a response time goal of

5 to 10 seconds. This response time goal is not defined in terms of specific application processing or a specific type of transaction. Generally, industry defines this performance measurement from the time the SEND key is hit until the system responds with a receipt message. Response time goals for this definition in industry are typically 5 seconds. PMM&Co. recommends that METRO II define their operations performance objectives along these industry guidelines.

Computer Operations Contingency Planning

At the time of PMM&Co.'s on-site visit to METRO II, there was no formal disaster plan. Work has begun on a written disaster plan which would include use of the MECC machine as a back-up. METRO II should develop its contingency plans in coordination with MECC-MIS and TIES. Such a contingency plan should address the essential long-term outage problems at the central processing facility. It is recommended that METRO II work with MECC-MIS to develop this long-range contingency plan.

OPERATIONAL PROCEDURES

Well-documented and consistently applied operational procedures contribute significantly to the attainment of consistently high levels of service.

Computer Operations Instructions (Run Sheets)

While the statewide ESV-IS systems are highly operator independent, and require little or no operator involvement, properly documented run instructions can reduce the time required to train new employees, provide for uniform and consistent procedures and instructions, and reduce overall processing time by providing for better response to exception conditions. PMM&Co. recommends that METRO II work directly with MECC to accomplish this objective and that this work then be shared with other regions.

CONTROL FEATURES

Methods and procedures for measuring and controlling data processing resources are essential to the cost-effective management of installations.

Computer Resource Utilization

During our visit to the METRO II facility, we recommended that METRO II obtain the TIES on-line monitor for operators. METRO II has requested and has installed this supplement to the standard Burroughs software. It is recommended that METRO II continue to work with TIES on the refinement of this resource monitor program.

Computer Operations Cost Accounting and Charge-Back

PMM&Co. suggests that users of METRO II service be billed the gross amount of their computer resource consumption. This cost would include processing, I/O, and storage charges. From this gross amount, the SDE share could be deducted. Using this billing method, users would be more

aware of the "real" cost of processing. Adoption of this recommendation would require that METRO II amend its present cost accounting calculation to add the additional cost of disk storage.

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PMM&Co. wishes to thank METRO II personnel for their cooperation during this study. METRO II's willingness to work directly with PMM&Co. was exemplary and their candid response has contributed directly to the outcome of this project.

TIES

Our review of TIES addressed data processing organization and administrative practices, planning activities, operational procedures, and control features. The review scope also included data communications and data management activities under the control of TIES.

The methods employed to gather the data presented in this report included:

- document reviews;
- survey questionnaire;
- personal interviews; and
- on-site inspection.

The survey questionnaire was completed by TIES management in advance of our on-site inspections. The personal interviews, on-site inspections, and all analysis activities were performed by management consultants specializing in data processing technical and managerial practices.

The balance of this section presents the findings and recommendations, including anticipated benefits, resulting from our review. This section of the report concentrates on improvement opportunities and does not reflect the many outstanding practices and procedures observed during the review period. As a result, these findings have a negative bias, which should not be construed as representative of the overall organization performance.

ORGANIZATION AND ADMINISTRATIVE PRACTICES

Data center organization and administrative practices are a key ingredient for consistent performance in a data center.

Training

The benefits of an effective training program may include improved employee efficiency and morale, increased employee skill levels, and more cost-effective training consistent with organizational needs.

There is no formal training program at TIES. Training is documented in the personnel procedures manual under the area of professional activities and professional growth. It is therefore up to the individual who initiates this process to request approval for a course of study at a college or university. It is recommended that records be maintained on this educational process and emphasis be placed on establishing a definitive educational program for technical employees. Additionally, it is recommended that, as a part of the program to provide backup to employees in critical positions, the backup individuals be enrolled in a specific course of study which will qualify them for the next position.

PLANNING ACTIVITIES

The planning review addressed long-range systems planning, capacity planning, and contingency planning.

Computer Operations Contingency Planning

The benefits of effective computer operations contingency planning are well known to TIES management and they have completed review of their 1977 disaster plan, which was updated during our review in 1979. PMM&Co. recommends that this disaster plan be coordinated with the other metropolitan ESV organizations, MECC-MIS and METRO II.

OPERATIONAL PROCEDURES

Well-documented and consistently applied operational procedures contribute significantly to the attainment of consistently high levels of service. TIES has the most advanced set of operational procedures for the regions. As such, there are no comments in this section.

CONTROL FEATURES

Methods and procedures for measuring and controlling data processing resources are essential to the cost-effective management of installations.

Computer Resource Utilization

To measure and compare performance and utilization against established standards and to reduce operating costs through better resource utilization, utilization data should be collected, reduced, interpreted, and reported.

TIES does not have a charge-back methodology based on actual computer resource consumption. PMM&Co. recommends that TIES install a resource measurement system which would identify usage related to resource utilization by users for such items as CPU, I/O, and disk storage. This data may or may not be used to charge back to end users, depending upon the organizational philosophy of the governing board of TIES.

PMM&Co. recommends the use of LOGGER output to account for all computer usage and to inform the user of the consumption of these resources.

System and Programming Standards

Typically, systems and programming standards permit reduced programmer, analyst, and user training time. These programming and system standards should be documented. TIES has a task group that is in the process of updating documentation standards. PMM&Co.'s examination of the TIES modification to the ESV-FIN system shows that the systems design, programming and unit testing procedures, and system test procedures were well structured and documented.

Systems and Programming Cost Accounting and Charge-Back

A systems and programming cost accounting system should identify all direct and indirect systems and programming operational costs, and accumulate project costs. The automated workload accounting system maintained by TIES is a good vehicle for establishing systems and programming costs. PMM&Co. recommends that users be informed of these development and enhancement costs and that these costs be spread across the user environment.

* * * * *

PMM&Co. thanks TIES management for their enthusiastic cooperation during the study. PMM&Co. was most impressed with the operational management of the TIES data center. TIES' efforts at long-range planning and commitment to user involvement in system development and enhancement are exemplary.

COMMUNICATIONS LONG-RANGE PLANNING

1. Prepare an inventory, with component costs for each location, of present data communications systems and network configurations.
    - Processing equipment (communications oriented)
    - Terminals
    - Modems/multiplexors/concentrators
    - Communications lines
2. Analyze data communication systems utilization for all locations.
    - Applications
    - Record description
    - File sizes and formats
    - Transmission volume and distribution by application
    - Equipment utilization and appropriateness
    - Line utilization (loading factors)
    - Transmission schedules
3. Prepare data communication systems profile.
    - Equipment and network configuration
    - Cost by component
    - Utilization levels
    - Identified needs (present and future -- for a 10-year period)
    - Appraisal of present operations
        - efficiency
        - cost effectiveness
        - strengths and weaknesses
        - overall appropriateness
4. Evaluate operating efficiency and cost-effectiveness of alternative data communication systems and network configuration, including:
    - Common carrier offerings
    - Modems
    - Multiplexors

- Communication line types
- Conditioning arrangements
- Transmission methods (line discipline)
- Speed considerations
- Response time considerations
- Reliability
- Security
- Computer teleprocessing software capability
- User programming responsibilities
- Computer line control alternatives

5. Formulate appropriate recommendations with suggested priorities and an implementation plan.

    - Organization and staff
    - Equipment and lines
    - Common carrier facilities
    - Implementation procedures
    - Review evaluation and management control techniques

CONVERSION SCENARIO

Costs associated with a conversion from Burroughs to IBM (as an example):

- Disposal of current hardware
  - if owned, residual value
  - if leased, penalty costs
- You would have to change
  - mainframe
  - peripherals
  - communication controllers
  - terminals
  - minicomputer (e.g., B-80)
- Operating system software
  - retrain system programmer (internals)
  - retrain operators - dialogue with the machine
  - retrain applications people in JCL instead of work flows
  - learn new utilities
  - establish rapport with new vendor
- Data base management system
  - redesign the data base
  - create new data base descriptor
  - training (learning basics and idiosyncracies of the new language)
  - new data dictionary
  - new host language interface
  - new query/report generator
  - new backup recovery
  - unload-reload programs
- Data communications
  - convert CANDE to TSO
  - convert GEMCOS to CICS
  - new protocol (SDLC)
  - new terminals, 3270 family
- Applications software
  - change to accommodate new DBMS
  - change to accommodate new data communications
- Applications software personnel would have to be retrained
  - SDE
  - MECC
  - regions
  - districts

- Documentation changes

    - new manuals for new system
    - modify system documentation
    - modify program documentation
    - modify user documentation
    - modify operations documentation

- Personnel

    - potential for massive personnel turnover, since they may feel that their expertise is with Burroughs and/or they don't feel a challenge with regard to a conversion effort

- User frustration

    - often accompanies conversion efforts since they don't see any tangible improvement in service or product quality during the year(s) involved in the conversion effort

Bottom line

- The cost would easily be in the millions.

- If conversion will be considered, reasons (the benefits) for the conversion should be concrete. We found no reason for conversion in many areas of the review. All the people PMM&Co. talked with were quite satisfied with Burroughs.

III. DATA BASE SYSTEMS

A. SDE-IS DATA BASES

PURPOSE

The purpose of the SDE-IS data base is to receive, store and make available detailed data reflecting the operation of all school districts in the state, spanning at least five years. The collection of data bases is a state-level repository for appropriate levels of summarized operational data from all public school districts in the state. The concept is to have a set of MIS-type, large, interrelated data bases supported by a flexible system of generalized software and application programs which will provide its users with direct access to their data. The primary users of the data base are the State Legislature and the State Department of Education.

APPROACH

The effort to develop the SDE-IS concept and design began in July 1976. The approach to the design of the SDE-IS was to develop a number of data bases and applications to make use of the information contained within them. There are currently four data bases included in the SDE-IS with plans for expansion to each of the four and the addition of several new ones. The data bases are:

- SDEDB - This is the main data base. It is organized by school district with data for each year going back to 1973-74. There are also data set occurrences which represent projections through 1981-82. SDEDB is the most frequently used data base of the SDE-IS. It is basically a summary of the data provided by school districts through the ESV-IS.

- LICDB - This is the largest of the data bases. It holds all the data collected for all licensed staff members in the state who have had an active assignment in any year since 1973-74. This data base is created annually from data contained in an old batch-oriented system which is still being used to regularly update state files on staff licensing. LICDB will eventually replace the old system. When this happens, the data base will be updated approximately once a month.

- MEDID - This is a fairly small data base which will expand in the near future. It is a type of data directory which will serve as the control point for forms management for the SDE. It will contain the descriptions and definitions of about 700 forms and 42,000 data items collected and used by the SDE.

- Additional data bases - Other data bases are under development to meet the need for small, special-purpose data bases to serve unique and sometimes isolated applications. For example, there is presently work underway to develop a data base of migratory workers.

The development of programs to make use of data within the data base, i.e., to provide information to users, are thought of as applications instead of systems. These applications represent functions that must be performed at the state level rather than at a regional center. Some of the major applications currently existing in the SDE-IS are the following:

- calculation of district levy limitations;
- analysis of district financial condition;
- projection of student memberships and the simulation of various aid calculations based upon these calculations;
- calculation of and accounting for the various state aids to school districts; and
- analysis of various experience, training, and age patterns of the district professional staff.

The significance of considering these programs as applications rather than as systems is that they can be developed more quickly and in response to user needs, but the development efforts bypass many of the controls used to insure that products are developed accurately and in response to definite user needs. That is, when a system is being developed, it is generally subjected to the rigorous requirements of a set of standards for systems development. However, the development of individual application programs often bypasses such a rigorous approach. In summary, the philosophy of the SDE-IS support staff is that they are service-oriented, rather than product-oriented.

The SDE data bases are primarily summarizations of operational data contained elsewhere. The SDEDB data base is a summary and synthesis of the operational data contained in the ESV-IS data bases. The operational data is extracted from the regional centers and summarized and reduced via a series of application programs developed by the SDE staff. The LICDB data, as previously mentioned, is recreated annually from the files of the current batch-oriented system. In turn, the data from the LICDB data base is further reduced and synthesized and becomes a part of the SDEDB data base.

EFFICIENCIES

The design of the SDEDB data base reflects a relational-type data structure. This type of data structure presents data in the form of two-dimensional tables, much the way an individual would view a set of summarized information. This is an effective data base design structure for the reporting requirements that the data base is meant to satisfy; that is, MIS-type information requests. Given the limitation of current computer technology, the relational data base structure can only be considered efficient if the primary information requests require an examination of all the data, or most of the data, within a major portion of a data base. This appears to be the type of information request that the data base is meant to satisfy. That is, users of the data base usually want to know information about the entire state. An information system which supports operational level activities requires a different type of data structure since these applications need to access individual records within the data base;

and typically the access must be supported by a variety of keys or identifiers. Also, the information in multiple data bases often needs to be interrelated. Such operational level data bases typically have a hierarchical or network type data structure rather than the relational-type data structure.

The annual financial report data set within the SDEDB data base (general ledger, revenues, expenditures, miscellaneous) is an example of the relational data structure within the SDEDB data base. The data is stored and presented in the form of a two-dimensional matrix. The horizontal axis of the matrix is made up of fund codes. The vertical axis is composed of line items. An amount is entered at the intersection of each fund code and line item, indicating how the annual financial report was completed by each of the school districts. This is a conceptualization of the data structure. In actuality, each data set occurrence in the AFR data set is composed of the following elements: district; school type; school year; line item; fund; and amount. There are an average of 300 data set occurrences for each district, reflecting the fact that approximately 300 items out of the 1,400 data items on the annual financial report are completed by each of the school districts.

MAJOR PROBLEM AREAS

Data Base Aging/Purging

Data exist within the SDE-IS data bases for the years 1973 through 1982, representing historical data as well as projected data. A problem often encountered in managing a data base for first-time users is the aging and purging of data. For example, the original intent of the data base was to be a repository of data over a five-year time frame. However, the data base now contains data for a ten-year period and the users of the information are obviously happy to be able to make analyses and projections over a larger time frame. This reflects the users' satisfaction with the data base and their recognition of it as a tool unlike those which they may have had before. However, a problem arises from the fact that the data base grows larger and larger each year. As a result, more resources are required, both in terms of storage and computer time, to handle the enlarging data base.

Development Plan

Because the SDE-IS support staff is working primarily in a service-oriented role, developing application programs as opposed to systems, there is not an overall systems development plan that one can match progress against. As a result, it is not clear what the objectives of the support staff are in developing these new applications, or what the time lines are for operation of the specific applications. PMM&Co. believes that the magnitude of some of the efforts, such as the conversion of information about staff licensing from the current batch system through the LICDB data base, is of sufficient magnitude to warrant the use of a full systems development methodology with its attendant control procedures and standards.

Based on personal interviews in the School Management Division of SDE, the information needs of the other operating divisions of SDE have not been requested in the development of the SDE-IS. The information requirements for completing financial reports to the U.S. Office of Education have evidently been considered.

Commissioner Casmey, in July 1975, issued an implementation plan for SDE-IS, "Implementation Plan for State Department of Education Management Information System Development," which indicated that manually prepared forms do not adequately meet the needs of education decision-makers for timely data and management information. This report stated that comparisons of Federal data definitions with state definitions needed to be completed. Evidently this comparison and needs analysis was completed. To our knowledge, the internal needs analysis has not been completed.

Data Dictionary

The State Department of Education commenced development of the Minnesota Educational Data Item Directory (MEDID) to provide descriptions of all data items included on forms sent to school districts by SDE. Subsequently, SDE replaced the development of MEDID with an effort to compile a data element dictionary. The SDE data element dictionary, incomplete during our review, is intended to describe all data elements of SDE-IS and identify the linkages between common data items in both systems, SDE-IS and ESV-IS.

Because no single reference exists for the definition of data elements to the SDE-IS or ESV-IS, there are a number of parallel efforts at definition underway. Both MECC-MIS and TIES are in the process of examining the application of a Burroughs software product which will be included with a new operating system (Release 3.1) for the B-6800 computer.

Although this Burroughs data dictionary software product will give MECC-MIS and TIES additional capabilities over their present data dictionary software, this new product still does not address the fundamental problem of uncoordinated and nonexistent definitions of data elements.

We believe a significant opportunity now exists for the State to coordinate the definition of data elements and to bring ESV-IS, TIES systems and SDE-IS closer to standard definitions of data elements.

Staffing

The State Department of Education, Data Systems Section, does not have staff which is capable of developing and operating the SDE-IS system. Present support is received by a contractual agreement with an outside organization. The PMM&Co. interviews with this contractor led us to believe that a competent systems analysis job has been conducted. This contractor is capable of handling the operation and maintenance of the SDE-IS. It should be noted that the SDE-IS is really a reporting system which is supported by a data base management system. There are no "production" reports run. Most reports are "ad hoc" and not recurring. As such, this type of system requires a level of flexibility, on the part of personnel who must support it, which is greater than that required from other production systems.

RECOMMENDATIONS

To address these problem areas and to make the SDE-IS data bases more valuable as a statewide resource, we recommend the following:

- Purging Guidelines - Guidelines should be developed for retiring data in the SDE-IS data bases from an active status to a retired status. This would typically involve removing the data from disk storage and placing it on tape storage. Information requirements which need to be met by using the retired data should tend to be less frequent than those requiring inquiry against the active data. These requests could be satisfied with overnight turn-around by running the query programs against the data on the tapes.

- Development Plan - A development plan should be prepared which includes identification of projected time and resource requirements for developing the applications that are currently planned and/or being developed. This document should then be reviewed to determine the level of controls and degree of systems development methodology which should be applied to the development of each of the given applications.

- Staffing - PMM&Co. observes that it is unlikely that the State will be able to attract the caliber of persons necessary to operate in this environment. This statement is based on observations we have made of MECC experience. For MECC, the State personnel system is not flexible enough, nor responsive enough, to attract a candidate with financial and data base expertise for this type of senior level position.

- Data Dictionary - A coordinated effort should be made to review the data dictionary requirements of the entire state, including SDE, MECC, and the regional centers. Such a review could result in one consolidated data dictionary or a common data dictionary approach that meets the needs of the entire state.

  As a first step, it will be necessary for SDE to complete the definition of the information requirements for the operating divisions of SDE if the original objective of reducing the reporting burden which presently must be borne by the individual school district is to be met. The data acquisition calendar is the first step in this process. The next step is to complete the listings of the data elements which are required by each of the operating divisions of SDE. From these data definitions, linkages from SDE-IS to the ESV-IS system cn be defined. We understand that the ultimate integration of the ESV-IS and SDE-IS systems is expected to eliminate the need for school districts to submit manual reports to SDE. Commissioner Casmey has expressed this goal in the above report as "...practically no forms will be sent out to the school people in the fall..."

  PMM&Co. believes that completion of the definition of the operating division information requirements is of the highest priority for SDE.

There are several issues which need further elaboration for this question:

- Lack of expertise in SDE to operate and maintain its SDE-IS; and

- Impact of more frequent reporting requirements from the Legislature.

Because SDE does not have expertise to operate or maintain the SDE-IS, the State faces a significant exposure if funds were cut off for contractor personnel. As noted in A(2)-5, MECC-MIS should document the SDE-IS.

Finally, if the Legislature were to (a) request more frequent reporting intervals of districts, or (b) demand production-type reporting from the SDE-IS, such changes would necessitate documentation and knowledge of the SDE-IS by the State. To preclude an exposure situation, MECC-MIS should develop expertise in the SDE-IS.

- Regional MIS - The summarization and reduction process involved in translating operational data from the regions into MIS-type data at the state level produces a very good management information data base. However, the information in the data base is only used at the statewide level. It has been our experience that those who are required to enter data into a data base, i.e., the districts, are generally more receptive to handling data requests if they in turn can see some benefit to themselves of the data collection process. Therefore, we recommend that an analysis be made to determine the feasibility of returning the summarized and synthesized data back to the regions for use by the districts in their own planning efforts.

B. ESV-IS DATA BASE

1. FINANCE SYSTEM (ESV-FIN)

FINDINGS AND RECOMMENDATION

PMM&Co. examined the operational performance of the ESV-FIN system. This review included examination of:

- user manuals;
- PRIDE documentation for Phase I and II;
- transaction creation;
- transaction processing; and
- reporting.

We believe that ESV-FIN has been designed to standards established in the original PRIDE Phase I and II documentation. ESV-FIN is generally understood and easily operated by districts above 2,000 students. We believe ESV-FIN is a system which has been accepted by districts and which enjoys a reputation for reliability and accuracy.

Our major ESV-FIN recommendation is that the present user manual is too extensive for small district use. We recommend that the ESV-FIN modified documentation produced by Regions II and III be adopted by MECC and distributed as an alternative form of user manual for ESV-FIN.

The following subjects are discussed in succeeding subsections to support these recommendations:

- Background of ESV-FIN;
- Description of UFARS;
- Features of ESV-FIN; and
- Features of TIES-FBA and TIES-FIN.

BACKGROUND OF ESV-FIN

The ESV-FIN system has been developed to provide financial accounting capability to local school districts. The finance system has many capabilities, including transactions processing, subsystems for accounts payable and inventory, and financial report production. Other than the mandatory accounting and financial reporting, the additonal capabilities of the ESV-FIN system are provided to local school districts for their use as desired on a voluntary basis.

Before ESV-FIN was developed, the Legislature enacted a law requiring each school district to submit an annual financial report to the State Department of Education pursuant to a set of uniform accounting and reporting standards. These standards, Uniform Financial Accounting and Reporting Standards (UFARS), were to be followed by all school districts commencing with school year 1976-77. The reporting of school district financial information using an automated computer system rather than manually prepared annual financial reports is to be effective on July 1, 1980 for succeeding fiscal years.

REVENUE ACCOUNTS
UNIFORM FINANCIAL REPORTING SYSTEM
FOR MINNESOTA SCHOOL DISTRICTS
Figure V - 1

DIMENSIONS

STATE			LOCAL
F	SOU	PRO	ORG
XX	XXX	XXX	XXX

STATE REPORTING REQUIREMENTS

FUND - An independent fiscal and accounting entity relating expenditure, revenues, assets and liabilities which are segregated for the purpose of carrying on specific activities in accordance with special regulations or restrictions. Examples include General, Transportation, Capital Expenditure.

SOURCE - Provides identification of receipts. Examples are Community Services Levy, Special Education Tuition from Minnesota School Districts (Capital Outlay), Foundation Program Aid, School Library Resources (ESEA Title II), Sale of Equipment, Refunds Received.

PROGRAM CATEGORY - Provides separation of revenue only when such revenues need additional description. Examples are Special Education Tuition (by handicapping category, e.g. - Educable Mentally Retarded), Field trips (subject matter area, e.g. - Natural Sciences) or Adult Vocational Fees (by subject matter area, e.g. - Agriculture).

Unless indicated otherwise, the program category Code 000 District Wide is used.

LOCAL ACCOUNTING USE/FUTURE EXPANSION

ORGANIZATION - Provides separation of revenue by school (where appropriate). May be used for student activity, clubs and school lunch receipts.

REVENUE ITEM - If available, may be used to summarize level of revenue (local, intermediate, state, federal).

EXPENDITURE ACCOUNTS
UNIFORM FINANCIAL REPORTING SYSTEM
FOR MINNESOTA SCHOOL DISTRICTS
Figure IV - 1

DIMENSIONS

F	ORG	PRO	FIN	OBJ
XX	XXX	XXX	XXX	XXX

FUND - An independent fiscal and account entity relating expenditure, revenues, assets and liabilities which are segregated for the purpose of carrying on specific activities in accordance with special regulations or restrictions. Examples include General, Transportation, Capital Expenditure.

ORGANIZATION - Provides separation of expenditures by major educational level, school and building (where appropriate). Examples are Brown Sr. High, Elementary Services, etc.

PROGRAM CATEGORY - Provides separation of expenditures for direct instructional and supporting services by type of instruction or nature of supporting service. Examples are District and School Administration, Mathematics (Secondary), Distributive Ed (Secondary or Post Secondary), Trainable Mentally Retarded, Staff Development, Debt Redemption.

FINANCE/COURSE/PROJECT - Provides a breakout by source of reimbursement (state or federal) as required. Alternate uses at local option include separating program category by course, or defining a project to gather and identify costs that may include many dissimilar program categories and objects. Examples are ESEA Title I, School Lunch.

OBJECT - Relates to the service or commodity purchased. Examples are Teachers' Salaries, Food, Bond Interest, Dues and Memberships, Fund Modifications.

Figure 2

It is important to distinguish between ESV-FIN and UFARS. The policies and standards for the accounting and financial reporting are included in the UFARS law and administrative rules. ESV-FIN, on the other hand, is the application software developed as the process or system for accounting and reporting consistent with UFARS. ESV-FIN is a system, while UFARS specifies the accounting standards to be applied by school districts. The UFARS requirement exists whether a school district maintains a manual or automated accounting system, such as ESV-FIN.

DESCRIPTION OF UFARS

The Legislature enacted, in 1975, the Uniform Financial Accounting and Reporting Standards (UFARS) law to accommodate the need for more accurate financial reporting by school districts. Since the year ended June 30, 1977, the local school districts have completed an Annual Financial Report (AFR) pursuant to UFARS and submitted it to SDE. Beginning in school year 1976-77, school districts were required to convert to a modified accrual basis of accounting from the previous generally used cash basis. SDE has delayed implementation of the multidimensional account structure until the automated system was developed. The multidimensional structure is a requirement in the UFARS law, but the specific dimensions result from an SDE policy decision based on the programmatic types of financial information desired.

The facing page, Figure 2 shows the dimensions for expenditures and revenues. Figure 3, which follows, identifies in more detail the variables for each expenditure dimension. Figure 4 shows the same information for revenues.

The implementation of UFARS was intended to improve financial reporting of school districts in four ways:

1. Timeliness. The financial data was to be more current and more readily available than previously.

2. Comparability. The financial statements and data of one school district were to be comparable to other districts because of the application of uniform methods.

3. Consistency. The UFARS rules and regulations prescribe specific accounting treatments and reporting methods to ensure consistency of financial data from period to period.

4. Information Content. The financial reports were to present historical as well as current period information and provide information in a form for the use of management.

These factors represent the anticipated benefits of implementing UFARS for the purpose of providing the Legislature with their desired financial information. The improved timeliness of financial information was presumed to be a function of the developent of the automated system, ESV-FIN.

During the period when the UFARS concept was developed, enacted, and implemented, two accounting manuals were prepared. These two manuals are known as the "Gray Manual" and the "Blue Manual". The "Gray Manual" was intended to be the interim manual only until the "Blue Manual" was revised

EXPENDITURE ACCOUNT DIMENSIONS
UNIFORM FINANCIAL REPORTING SYSTEM FOR MINNESOTA SCHOOLS
Figure II - 2

FUND *	ORGANIZATION	PROGRAM CATEGORY *		FINANCING	OBJECT
GENERAL	DISTRICT WIDE	DISTRICT & SCHOOL ADMINISTRATION (Board of Ed., Supt., Principal)	INSTRUCTIONAL SUPPORT SERVICES	NOT APPLICABLE	SALARIES
FOOD SERVICE	INDIVIDUAL SCHOOLS	DISTRICT SUPPORT SERV. (Business, Legal, Personnel)	(General Adm. Curriculum, Media, Human Relations, Staff Development.)	STATE REIMBURSEMENT PROGRAMS *	EMPLOYEE BENEFITS
TRANSPORTATION	DISTRICT ELEMENTARY SERVICES	REGULAR INSTRUCTION (K, Elem., Sec. Subj. Areas)	PUPIL SUPPORT SERVICES (Counseling, Health, Attendance & Census, Social Work, Transportation, Food Services)	FEDERAL REIMBURSABLE PROGRAMS *	SUPPLIES & MATERIALS
COMMUNITY SERVICE	DISTRICT SECONDARY SERVICES	VOCATIONAL EDUCATION (Sec. - Subject Areas, Post Sec. - Subj. Areas, Adult - Subj. Areas)	SITE, BUILDINGS & EQUIP. (Oper. & Main., Cap. Improvements & Build. Construction)	LOCAL OPTION COURSE/PROJECT	PURCHASED SERVICES
CAPITAL EXPEND.	DISTRICT ELEMENTARY/ SECONDARY SERVICES	EXCEPTIONAL INSTRUCTION (Disadvantaged, Gifted, Spec. Ed. By Disabil.)	OTHER PROGRAM CATEGORIES (Debt Redemption, Employee Benefits, Transfers, etc.)		CAPITAL EXPENDITURE
DEBT REDEMPTION	DISTRICT POST. SEC. SERVICES	COMMUNITY EDUCATION AND SERVICES (Adult Basic, Day Care, Pre-K, Other)			DEBT SERVICE
SCHOOL AUX.	DISTRICT SECONDARY/ POST SEC. SERVICES				OTHER EXPENSE
TRUST	COMMUNITY SERVICES				TRANSFERS
AVTI					

* SAME AS USED IN REVENUE REPORTING

Figure 3

REVENUE ACCOUNT DIMENSION
UNIFORM REPORTING SYSTEM FOR MINNESOTA SCHOOLS
Figure II - 3

FUND *	SOURCE	PROGRAM CATEGORY *	ORGANIZATION *	
GENERAL	LOCAL TAXES (Gen. Levy, Unemployment)	NOTE: SELECTED PROGRAM CATEGORIES ARE USED TO DIFFERENTIATE SPECIAL ED. AND VOC. ED. SOURCE OF RECEIPTS.	USED FOR LOCAL PURPOSES ONLY	NOT USED FOR STATE REPORTING
FOOD SERVICE	LOCAL REVENUE FROM MINNESOTA SCHOOLS (Tuition, Special Ed., Voc. Ed.)		NOT USED FOR STATE REPORTING CURRENTLY	
TRANSPORTATION				
COMMUNITY SERVICE	LOCAL REVENUE FROM OUT-OF-STATE (Tuition, Special Ed., Voc. Ed.)			
CAPITAL EXPEND.				
DEBT. REDEMPTION	GENERAL STATE AIDS (Foundation, Gross Earnings, Homestead)			
SCHOOL AUX.	STATE REIMBURSABLE PROGRAMS *			
TRUST	SALE OF ASSETS, PROCEEDS OF BONDS			
AVTI	OTHER RECEIPTS			

* SAME AS USED IN EXPENDITURE REPORTING

Figure 4

and enhanced for use beginning July 1, 1980. We briefly reviewed the procedures in the manuals, as discussed in the next sections, to determine their compatibility to the ESV-FIN system.

"Gray Manual"

The Manual of Instructions for Uniform Financial Accounting for Minnesota School Districts, also known as the "Gray Manual," was originally published in 1962 by the State Department of Education (SDE) and was based on Handbook II of the U.S. Office of Education. Subsequent modifications and additions to this publication, the latest revision dated July 1, 1978, enabled SDE to have an interim document to support the UFARS law. The major change in the manual occurred in 1976, following Legislative action, when use of generally accepted accounting principles, including the modified accrual basis of accounting was mandated. The account structures prescribed in the Gray Manual are generally the same as established in 1962. According to SDE, the recent changes in this publication have incorporated NCGA Statement 1 and standards necessary to comply with generally accepted accounting principles (GAAP).

At the present time the Gray Manual is the authoritative manual for UFARS.

"Blue Manual"

The Manual for the Uniform Financial Accounting and Reporting System for Minnesota Schools, also known as the "Blue Manual," was prepared by a consultant in 1974 and issued in 1975. The Manual was intended to be a user manual. Since it was prepared prior to the new UFARS law, it has not served its intended purpose.

We were informed that the program and account structures developed in the Blue Manual, which are different than those in the Gray Manual, were used by the two school districts which produced an automated AFR in 1979 using ESV-FIN. The AFRs which are manually prepared by the other local school districts, however, are based on the Gray Manual account structure. This results in financial information which is not comparable for all 437 school districts.

FEATURES OF ESV-FIN

The accounting and financial reporting currently done by school districts is performed manually or automatically. Regardless of the process, the accounting and financial reporting must be in accordance with generally accepted accounting principles (GAAP). We were told by members of the UFARS Council that UFARS is GAAP for public elementary and secondary school districts in Minnesota.

For fiscal years beginning on July 1, 1980, accounting and financial reporting by school districts will have to totally comply with UFARS, including the adoption of the modified accrual basis of accounting.

An automated system has been developed to support the new accounting and financial reporting requirements. SDE contracted with MECC-MIS to develop ESV-FIN as an automated accounting system alternative for school districts using manual methods or other automated systems. ESV-FIN was developed to be compatible with the UFARS standards.

Chart of Accounts

With ESV-FIN operational, each school district using ESV-FIN is able to establish its own chart of accounts. In all districts, however, the account structure must be consistent with the UFARS standards presented in the Blue Manual effective July 1, 1980.

The account structure in ESV-FIN, and required for UFARS, is referred to as a multidimensional structure. The basic structure has five dimensions with a maximum of 14 numeric characters, although ESV-FIN has an optional sixth dimension for AVTI use, as follows:

Fund(s)	2 digits	
Organization	3 digits	
Program Category	3 digits	14 digits
Finance/Course/Project	3 digits	
Object	3 digits	
Optional:		
Subprogram/Course (AVTI)	3 digits	

Reports

The ESV-FIN reports are designed to provide information at different levels of detail. The basic reporting levels are:

- balance sheet account totals, including revenue and expense control accounts;
- balance sheet account totals and total period transactions activity;
- statement of revenues with actual account totals and period transactions activity, and with budget comparison;
- statement of expenses and encumbrances, comparing actual and budgeted amounts; and
- transaction reports with document numbers and account numbers included.

ESV-FIN is intended to allow school districts to produce reports which satisfy their external reporting requirements to SDE and to the public as well as internal requirements. Depending on whether ESV-FIN, another automated system, or a manual process is used by the school district, compliance with UFARS to satisfy the information needs of the Legislature and SDE can vary. Using ESV-FIN for processing all district transactions, a school district will comply by ensuring the accuracy of the transaction input. In the other two situations, other variables will exist unless the UFARS standards are employed in the accounting system. A school district manually preparing an AFR and sending it to their regional center or sending transaction information to the regional center for reporting purposes should comply with the UFARS mandate. We believe the critical issue is the adoption by the districts of UFARS as their accounting standards. The external audit performed every second year at each school district by an independent auditor or by the State Auditor is the logical method to ensure conformance to GAAP and UFARS.

Auditability

The SDE contends that the ESV-FIN system is fully auditable. Two audit firms have expressed that the ESV-FIN lacks auditability. We have been advised by SDE that the interim system, POBAS, was used in the districts in which audit firms commented on auditability. We did not verify this, as it was outside the scope of our project.

PMM&Co. analyzed a series of month-end reports in ESV Region II. We believe that improvements in the internal reporting can be made, which are identified in the next section, but that, except for the General Journal (Sundry Journal), the records are auditable. As a prudent step, we recommend the State Auditor or an independent third party perform an EDP audit of ESV-FIN.

Reports Improvements

When an automated accounting system is designed, decisions are made about the variety of reports to be available. The ESV-FIN system uses one of the common alternatives for users with large transaction volumes: generate a separate report of beginning and ending account balances with total transaction activity and separate report of transaction details supporting the total transaction activity by account.

We believe that the documented reporting capabilities should be improved by adding or modifying several reports:

- Modify balance sheet reports to produce another report with the revenue and expense control accounts added to the fund balance to present the fund balance as of the end of the reporting period. This report would then be in a standard balance sheet format by fund.

- Add a report with actual compared to budgeted revenues, expenditures, encumbrances, beginning period fund balance, and ending fund balance. This report would then be in a standard Statement of Revenues, Expenditures, Encumbrances and Fund Balance format.

- Add a revenue and an expenditure report presenting the beginning balance, the total transaction activity by kind of transaction, and the ending balance. This report would then present an overview of revenues and expenses for analysis and would facilitate financial audits.

- Modify the reporting options for financial statement-type reports to provide for printing of summary totals without the details. Examples are the general ledger balance sheets with either all accounts (such as a each cash account) or with only the primary accounts (such as total cash), and a revenue summary report with only major group totals printed (such as total property tax revenues rather than each property tax revenue account). These reports would be appropriate summary reports for top management.

- Modify the following existing reports to identify, by transaction, the account affected by the computer-generated offsetting entry and to summarize at the end of the report the total amount, by account, of the computer-generated offsetting entries:

  Cash Receipts Book
  Cash Receipts Journal
  Cash Disbursements Journal
  Detail Check Register
  Summary Check Register

These revised reports will enhance auditability by improving the capability of tracing the original individual transactions into the individual accounts.

FEATURES OF TIES-FBA and TIES-FIN

Region VII (TIES) is currently using its automated Financial Budgeting and Accounting (FBA) system, and plans to implement, before July 1, 1980, a TIES ESV-FIN version of ESV-FIN. Based on our conversation with SDE personnel TIES-FBA will not satisfy all UFARS requirements expected in the final version of the Blue Manual. TIES-FBA was developed eleven years ago. TIES-FIN has recently been constructed to bring TIES into conformance with current UFARS requirements.

The TIES-FBA system can satisfy the anticipated UFARS requirement for balance sheet based on the UFARS minimum; however, the FBA balance sheet capabilities appear to constrain the school district's flexibility to tailor its balance sheet accounts to its needs. The TIES-FBA system does not satisfy the anticipated UFARS requirements for expenses because the FBA coding structure does not meet the Blue Manual coding requirements.

The TIES-FBA system appears capable of satisfying the anticipated UFARS revenue requirements; however, the school districts will not have the flexibility to use their own revenue accounts and reference them to the UFARS code.

TIES is adapting the ESV-FIN system under an agreement with SDE and MECC-MIS. The TIES adaptation will provide the following features:

- Operation of TIES ESV-FIN under the transaction processor, GEMCOS;
- Conformance to PRIDE data element naming conventions as defined by SDE (general to specific);
- Conformance to TIES processing methodology which necessitates multidistrict work flows;
- Conformance to TIES data element definition across TIES application systems; and
- Reporting improvements to TIES-FBA listed above and adding the capability to access all year-to-date accounting transactions via a terminal, improving auditability for the district accountant and auditor.

Based on the available documentation, we believe that TIES FIN has the necessary data elements to satisfy UFARS and still give the district flexibility to maintain its accounts in a manner tailored to its needs. We believe ESV Planning and Control should examine the applicability of the TIES ESV-FIN system for use in outstate regions with large numbers of small districts. TIES ESV-FIN has an advantage of permitting multidistrict processing which may have applicability for these other regions.

2. PERSONNEL/PAYROLL SYSTEM (ESV-PPS)

The Payroll/Personnel system was designed to enable school districts to automate a personnel function for maintaining employee personnel records and a payroll function to make payroll transactions. School districts may voluntarily decide to implement ESV-PPS, and 74 school districts had implemented or were scheduled to implement ESV-PPS on October 1, 1979.

PPS STAFFING REQUIREMENTS ARE LARGE

It appears to PMM&Co. that the minimum district staff required to support the PPS system is approximately three people. This is more than is available in many districts. Approximately 80% of the districts have less than 3,000 students, and we estimate that these districts generally have one to two clerks responsible for payroll. A staff of this size can support the payroll/personnel system only through the use of extensive overtime. Interviews with district personnel confirm that the overtime requirements have increased since they have been using the PPS.

SIMPLIFIED SUBSET OF PPS CANNOT BE DEFINED

The design of PPS is such that it will be difficult to develop a subset of the PPS. This is particularly true if the goal of subset development is to simplify the district clerical workloads. It may be possible to eliminate some of the codes in some fields, but the processing steps cannot be reduced. This is the result of the basic structure of PPS, rather than the capabilities which it provides.

Most Districts Desire a Simpler System

Fourteen districts have student enrollments in excess of 10,000 students. Eleven of these districts are concentrated in the Minneapolis - St. Paul area. MECC made an effort to collect system requirements from all state school districts; however, most of the requirements definition was based on information provided by the larger districts. Our interviews with and the survey responses from school districts indicate that most districts desire a considerably simpler system. They believe that such a system can, and would, meet their needs. The requirements gathering bias toward larger districts is the most likely reason most districts find the system is overly complex.

Editing Process is Inadequate

Batch update and transmittal transaction editing is complex and does not provide the user with adequate information. Editing takes place on three different levels. The first level forms a preliminary edit on the total transaction. For example, checks are made to determine that a numeric field does not contain any alphabetic characters. If an error is found on level one, the entire transaction is rejected. For the level two edit, the transaction is broken into its component fields. Each field is individually edited and, if no error is found in a particular field, it goes on to the third level of editing. The second level edits the field against specific information contained in either the district or employee records. For example, a check is made to determine that deduction type

codes are valid. The third level of editing takes place when the payroll is actually run. A third level edit could include such steps as checking to determine that a specific deduction amount is valid for the specific employee.

The problems associated with this editing technique are that, since the transaction is divided into its component fields for levels two and three, the user no longer has reference to the complete transaction, nor can the user identify the total effect of any given transaction. If a level two or three error is found, the user must be very careful to determine the exact nature of the error, the impact of those fields within the transaction that were not in error, and the action which should be taken to correct the error.

Current Pay Information is Not Kept Within the Data Base

The data base keeps period-to-date figures for each employee. Current period pay information is kept in a series of payroll work files. These files are generated by the payroll run and are manipulated during report generation. Upon completion of a payroll run, these files are backed up to tape and no longer kept on disk. This approach causes high system overhead, particularly during the report generation phases. (See sample and times.) It is also extremely difficult to back out a voided check from the system. It requires backing out each individual field associated with the check. Users have stated their desire to have a facility which will allow a specific check to be backed out of the system easily and conveniently.

Reports are Not Exception-Oriented

Current payroll reports list all transactions for a specific payroll run. Reports are not produced which identify only those employees who may require a special handling or which are near prespecified limits. For example, there should be a report which would identify employees which have either exceeded or are near exceeding their available leave, vacation, or sick leave time. Reports on employees whose contract is about to expire, and employees who are nearing their maximum allowable earnings would also be helpful to districts.

Data Base Structure Appears to be Inefficient

The PPS data base is a series of predominantly flat files. The primary sort key for many of these files is employee number. CPU and input/output times for report extraction and generation are relatively large compared to the total time required for processing of payroll. For the sample South Washington payroll (see Exhibit 1), total CPU time was 124.5 minutes and total input/output time was 203.3 minutes while, for the report extraction and generation phases, CPU time was 61.8 minutes and input/output time was 90.9 minutes. Thus, reporting consumed approximately 50% of total CPU time and 30% of total input/output time. Exhibits 2 shows the same information for Mounds View.

Exhibit 1

OCTOBER, 1979

PAYROLL PROCESSING TIME
for
South Washington

PROCESSING TYPE	TIME in minutes ELAPSED	CPU	I/O
REPORT GENERATION	1,458	61.8	90.9
UPDATE	382	14.6	23.7
TRIAL PAYROLL	152	15.1	24.0
FINAL PAYROLL	229	17.5	45.6
MISCELLANEOUS	755	15.5	19.1
TOTAL	2,976	124.5	203.3

OCTOBER, 1979

PAYROLL PROCESSING TIME AS A PERCENT OF TOTAL
for
South Washington

PROCESSING TYPE	ELAPSED		CPU		I/O	
	with MISC	without MISC	with MISC	without MISC	with MISC	without MISC
REPORT GENERATION	49	66	50	57	45	49
UPDATE	13	17	12	13	12	13
TRIAL PAYROLL	5	7	12	14	12	13
FINAL PAYROLL	8	10	14	16	22	24
MISCELLANEOUS	25	-	12	-	9	-

Exhibit 2

OCTOBER, 1979

PAYROLL PROCESSING TIME
for
Mounds View

PROCESSING TYPE	TIME in minutes ELAPSED	CPU	I/O
REPORT GENERATION	2,056	55.0	67.4
UPDATE	382	35.9	45.2
TRIAL PAYROLL	-	-	-
FINAL PAYROLL	-	-	-
MISCELLANEOUS	975	29.4	33.7
TOTAL	3,716	120.3	146.3

OCTOBER, 1979

PAYROLL PROCESSING TIME AS A PERCENT OF TOTAL
for
Mounds View

PROCESSING TYPE	ELAPSED with MISC	ELAPSED without MISC	CPU with MISC	CPU without MISC	I/O with MISC	I/O without MISC
REPORT GENERATION	55	75	46	60	46	60
UPDATE	18	25	30	40	31	40
TRIAL PAYROLL	-	-	-	-	-	-
FINAL PAYROLL	-	-	-	-	-	-
MISCELLANEOUS	26	-	24	-	23	-

EASE OF USE

Creation of a Payroll Employee Master Record is straightforward and easily understood.

An examination of the employee payroll information sheet shows that building the employee record is a simple process of inputting personnel information, deduction information, pay control information, and distribution information.

The employee payroll information sheet is a turnaround document which was created to allow school district examination of the employee record which has been input by the district. The document includes correction lines below the individual elements of information which the district may use to add, change, or delete information elements.

The personnel information sheet is another turnaround document produced by the PPS system for the school district. This document includes all new employee personnel information and employee status and health insurance information.

CREATION OF THE DISTRICT RECORD

Transactions which build the individual school records are easily understood. Such forms as building and school identification, pay group master schedule, special funds and accounts tables, pay adjustments descriptions, deduction descriptions, and payroll check-bank identification are simple and easily understood.

The forms design and forms input process is a logical one and should be understood by school districts. The major exception to that statement is the Deduction Description Table (format 978, transaction 921 against table 300). This particular table links account numbers and general ledger liability accounts to a particular deduction type. This linkage concept is a difficult one to grasp. The descriptions in the manual contained in Chapter II, pages 22-26 are difficult to understand. The major problem is the linkage between the account number and the general ledger account number. This linkage is important since, as it creates the general ledger account number through the interaction of the distribution information (% total gross) and the expenditure account number in the Deduction Table 300. The interaction of these two numbers then creates an expenditure account number which receives the final distribution amount for the pay of this particular person based on pay type.

PAYROLL ADJUSTMENTS

The system allows for a generalized adjustment capability whereby any field within the employee financial records can be changed. Since this is a generalized capability, the system performs virtually no edits on the validity of the input data. Changes to one field may, as described in the user manual, change additional fields as well. If the user desires to

change only one field, this may require performing multiple adjustments: (a) a first adjustment which changes the desired field and auxilliary fields and (b) a second adjustment, which reverses the changes to the auxilliary field. An example of this type of multiple adjustment is given on page 9-18 of the PPS User Manual.

> "To adjust the regular FICA wage and quarterly FICA wage without affecting the employee's calendar gross takes two gross pay adjustments: the first will adjust the regular FICA wage, the quarterly FICA wage, and the calendar gross. The second will reverse adjustments to the calendar gross."

The adjustment procedure appears to be unduly complex and has the potential for input errors. Since the system does limited editing and validity checking, it is possible that a district could make unintentional changes to an employees financial records.

PROCESSING CYCLE

Page 71-73 of the user manual provides an overview of the payroll system processing cycle. Data batches are created and edited and, if correct, a trial payroll is run. Upon completion of the trial payroll run, the PPS data base is restored to its original condition. If the results of the trial payroll run are acceptable, a regular payroll is then run. The regular payroll run uses the original PPS data base.

This processing technique, that of restoring the data base upon completion of the trial payroll run, increases computer resource requirements and processing time for generating an actual payroll. Many systems use the technique of producing a trial payroll run which actually updates the data base, making corrections to entries in error directly to the data base, and then producing the regular payroll based on the previously entered and updated data. This results in less processing time and more efficient use of computer resources.

GENERAL COMMENTS

While the data entry forms described above allow the required information to be entered relatively easily into the system, the system is structured such that the amount of required information is large, and the order in which it must be entered is complex. User experience is that, since the system does not provide for complete input edit checking and validation, they often have to enter the same data multiple times to correct their original error. The system does not detect the original input error at input time, and it is only revealed during subsequent processing steps. This increases payroll processing cycle time and leads to user frustration. The increased complexity of this system has also required that district personnel spend more time on data entry and correction. This is an observation that was made by most district personnel we interviewed.

USER MANUAL DIFFICULT TO UNDERSTAND

Examination of the user manual reveals the following deficiencies:

- There is no overview description of the Payroll/Personnel System.

- System flow and procedure from a user's point of view are not described.
- Examples used within the manual are not complete and self-consistent.
- Specific steps for preparing a normal payroll are not contained within the manual.
- Error messages are contained within the manual, but are difficult to locate.
- Input forms and input screens are not shown within the manual.
- The manual appears to be a mixture of (a) materials written specifically for the user and (b) systems development documentation. For example, input descriptions are a series of data element tables giving table element size and value, the function of each element, and which elements are optional.
- There is no comprehensive index to the manual. This makes it difficult for a user to find answers to specific questions.
- The manual apparently assumes that the user is already familiar with the Payroll/Personnel System, and that the primary function of the manual is to serve as a reference guide rather than as either an introduction, or instructional guide, to the system.
- The writing quality and clarity of explanation is not up to good documentation standards. This increases the user's dependence on the region and MECC for clarification and guidance through the whole Payroll/Personnel process.

The PPS User Manual can be more accurately described as a reference manual. There is a need for a true user's manual to be developed for PPS. A reference manual describes each system function and capability in detail, while a user manual describes user processes and the methods to perform those processes.

CHECK REVERSING DIFFICULTY

The system does not keep current period payroll information within the PPS data base. This information is contained on a series of work files which, upon completion of a payroll run, are destroyed. If it is determined that the check produced for a specific employee during the current period payroll run is in error, the system does not provide a specific transaction mechanism for voiding that check.

In such a circumstance, the district must use the adjustment process for backing out each individual piece of employee data. This process is both time-consuming and error prone since the adjustment process does not perform edit or validity checks.

PMM&Co.'s analysis of the PPS system concludes that:

- Extensive processing inefficiencies are encountered in the use of work files to hold current pay.
- Processing time, compared to commercially available payroll/personnel systems of similar complexity, is comparable.
- Editing, with the objective of reaching a final payroll, is convoluted, confusing, and wasteful of district time and processing resource.
- Documentation is poorly organized, system flow is not defined, error codes are difficult to locate, and the adjustment process is poorly described.

We recommend MECC-MIS examine the ESV-PPS system with the objective of preparing cost and time estimates for (a) redesigning the edits, (b) correcting the data base design inefficiency of not having current pay, and (c) redocumenting the system so users can operate it effectively.

The proposed ESV Planning and Control group would use this MECC-MIS generated cost and time information as one step in the process of generating alternatives for ESV-PPS which could include:

- Regional bids to rework the edits, data base inefficiencies and redocument ESV-PPS;
- Contractual bids to rework the edits, data base inefficiencies and redocument ESV-PPS;
- Regional bid by TIES to modify their current payroll/personnel system to meet current State requirements; and
- Contractual bids to supply a commercially available payroll/-personnel package to meet current State requirements.

PMM&Co. believes that current users of ESV-PPS should continue to be supported while ESV Planning and Control decides what is the most cost-effective alternative for the State. The current ESV-PPS, if extended to use by all districts within the State, will put a severe strain on current and planned computing resources.

3. STUDENT SUPPORT SYSTEM (ESV-SSS)

The Student Support System was developed for use by school districts in the following functional areas:

- student accounting;
- resident/family accounting;
- attendance/enrollment;
- student scheduling;
- mark reporting; and
- history.

Seven school districts had implemented ESV-SSS and were using some, but not all, of the functions. This system has not been fully developed, as the six functions are not complete at this time.

OBSERVATIONS

At present there are no MECC personnel who are directly responsible as functional managers for the student support system (SSS). The Director of MIS has been guiding the efforts to complete implementation of this system. Employees at METRO-II are assisting a contractor who has been hired to complete the implementation of SSS.

Based on information received in the survey conducted by PMM&Co., there is little knowledge of this system in the school districts. Districts do not believe that they have been consulted on the design of ESV-SSS. In interviews with MECC personnel and contractors who are working on the SSS system, it is apparent that there is no overall plan for the accomplishment of the original PRIDE Phase I objectives.

The present efforts of the contractor can be defined as "chipping away" at the correction of processing problems. The difficulty in this approach is that there has been no detailed analysis conducted and no recommended steps formulated to address the implementation problems.

More fundamental than this lack of detailed analysis of processing problems is a lack of contact with school districts to document what these districts want in a student system. If MECC were to complete this documentation of user needs, it would then be possible to build priorities for implementation of an ESV-SSS. Alternatives could then be defined for the modification, redesign, or scrapping of the present ESV-SSS system based on those defined user needs.

The documentation available to PMM&Co. for this analysis was as follows:

- memoranda from the ESV-SSS team;
- preliminary user documentation for ESV-SSS in the resident/family and student accounting modules; and
- system/program descriptions for a number of sort, extract, label, and copy routines.

PMM&Co. observes that there is no flow chart available to describe the overall processing for the ESV-SSS. Such a "road map" would be helpful in assessing the impact of proposed corrections to processing problems.

FINDINGS

There is no centralized development for the ESV-SSS. Rather, there are a diverse set of players in a number of organizations who are coordinated through the Director of MIS at MECC. Such an approach of systems development is at odds with the initial tasking given to MECC-MIS as a central design authority, and it is not a logical approach to completing systems on time and within budget.

The student system as presently configured for St. Paul is unlikely to be attractive to smaller districts. These smaller districts do not need the types of capabilities which have been built into the St. Paul model. Additionally, there are a number of differences in the grade reporting area which make St. Paul a unique situation within the State of Minnesota.

Although a Phase I document was produced in 1976, there has been no attempt to revisit this initial feasibility analysis in view of changes which have occurred over the last three years. A Phase II document will not be reworked for the ESV-SSS. PMM&Co.'s analysis of available documentation shows that this documentation is not continuous and is not easily understood. Changes of project team personnel, the resignation of the entire project team in January of 1979, and implementation of the system by METRO-II personnel for St. Paul have combined to result in disorganized documentation.

PMM&Co. has observed that the ESV-SSS system consists of a number of disconnected programs. These programs are run against a common data base. As such, it should be possible to operate the ESV-SSS with subsets of the data base which could be selected by the smaller districts according to their needs. As with ESV-PPS, district needs vary with numbers of students. Districts with smaller numbers of students do not desire the flexibility or resulting complexity which larger districts require.

RECOMMENDATIONS

PMM&Co. first recommends that a detailed analysis be conducted to define all processing problems which are presently occurring with ESV-SSS. Such analyses could be conducted by: (a) MECC-MIS; (b) regional centers; or (c) an independent third party. Second, we recommend that ESV Planning and Control contract to revisit the school districts to reaffirm the original objectives documented in the PRIDE Phase I and Phase II documentation for ESV-SSS. This contract could be with (a) MECC-MIS; (b) regional center; or (c) an independent third party. Using the Phase I and Phase II manuals as a reference point, the user's needs can be reaffirmed. Based on the results of this analysis, alternatives can then be identified for the remainder of the work to be done on the ESV-SSS. Such alternatives would include: modification; redesign; or scrapping of the current ESV-SSS.

Once the ESV Planning and Control Advisory Committee has prioritized the alternative selected, retrospective documentation can be created to update whatever alternative is selected. Part of this effort should be to construct an overall processing flow chart for ESV-SSS.

This recommended approach will help ESV Planning and Control to focus on the work which needs to be done to make ESV-SSS responsive to district needs. Additionally, this recommended approach has the advantage of committing the State to documenting the alternatives selected, the processing approaches agreed upon, and the overall system flow for ESV-SSS.

IV. ANALYSIS OF COST

PMM&Co.'s proposed workplan was developed to respond to the many cost-effectiveness questions in the Request for Proposal (RFP). An objective was to identify the costs of developing and operating ESV-IS and SDE-IS. We expected to be able to obtain and review (a) the costs incurred to date, (b) the anticipated future development costs, and (c) the current and potential processes for allocating system costs. However, we experienced difficulty in obtaining a minimum of financial data, specifically revenues and expenditures.

Compounding the difficulty of obtaining adequate and complete financial information, two different cost-related analyses have been directly or implicitly introduced:

- cost-effectiveness; and
- cost-efficiency.

Cost-effectiveness analysis seeks to relate costs incurred in the accomplishment of a predetermined objective. Besides the lack of complete financial information at a sufficient level of detail, we experienced difficulty in finding a relationship between costs incurred and objectives identified in the early MECC reports. Therefore, this analysis differs from a cost-benefit analysis; the former asks whether the objective(s) was completed (for example, was the ESV-FIN system developed on schedule and what costs were incurred?), and the latter is concerned with the cost of alternative situations and the related benefits.

Cost-efficiency differs from the other analysis, since it measures the relationship between inputs (generally costs) and outputs (units of work, labor, product, or other output). Cost-efficiency implies that monetary units are used to measure inputs and outputs. The objective of this analysis is to determine the optimum level of performance; that is, for a given level of service or output, were the inputs controlled?

Effective and efficient operations are independent of each other, in that an organization can be:

- effective and efficient;
- effective and inefficient;
- ineffective and efficient; and
- ineffective and inefficient.

Although the RFP questions did not include any direct efficiency questions, we believe the regions, MECC-MIS, and SDE should be concerned with developing efficient as well as effective operations.

FINDINGS

During the initial fact-finding phases of the project, we tried repeatedly to obtain financial information about ESV-IS and SDE-IS from the State Department of Education and MECC.

We obtained and reviewed the MECC prepared biennial budget reports for 1977-79 and 1979-81 and the annual report of MECC activities for each year from 1974 to 1979. We obtained and reviewed the ESV Regions budget documents for the biennium 1980-81 and fiscal year 1980. These regional budget documents were on file at the Department of Eduction, assembled with each region in a separate notebook.

At SDE, we inquired about obtaining financial statements, preferably audited, for all regions since they commenced ESV-IS activities. Copies of either audited and unaudited financial statements were not available at either MECC or SDE. We requested that SDE contact the Regions to obtain audited financial statements for the years 1976 through the most recent audited year. We have received an incomplete set of financial statements for the seven regions as follows:

- ESV Region I — FY 1979
- ESV Region II — FYs 1976, 1977, 1978
- ESV Region III — FYs 1976, 1977, 1978
- ESV Region IV — FYs 1977, 1978
- ESV Region V — FYs 1976, 1977, 1978
- ESV Region VI — FYs 1975, 1976, 1977, 1978
- ESV Region VII (TIES) — FYs 1972 - 1979

We intended to use financial information for fiscal years ended June 30, 1978 and 1979 to perform our cost analysis. However as the above list indicates, which represents the results of repeated requests, we still do not have a complete set of financial statements for any one year.

Based on available information, Exhibits 3 and 4 summarize the revenues and expenditures for the regions. Although we are unable to complete a cost-effectiveness analysis, the revenue and expenditure information is presented to indicate the financial magnitude of the system.

Exhibit 5 is included to show total expenditures by organization involved in the ESV-IS system. As indicated, the source of this information is the Biennial Computing Plan prepared by MECC for the biennium 1980-81. The source and validity of the expenditure amounts was not validated by us. As shown in this Exhibit, the districts expenditures were nearly six million dollars in fiscal year 1978 and were estimated to continue at the same approximate level in fiscal years 1979 and 1980.

HOW WAS MECC FORMED?

The MECC organization was formed by using as a basis all of the planning for educational data processing that had taken place over the years prior to 1973 within each of the educational systems. This planning was very extensive and included all levels of education in the state over a two- to three-year period. Included as evidence of this planning are the following reports:

- Governor's Advisory Committee for State Information Systems, Computers and Information Systems in Higher Education, part of Information Systems in the State of Minnesota 1970 - 1980 (1970).
- Minnesota State Department of Education, Summary: School District Computerization Survey, (November 1971).
- CRESEIS Reports on Instructional Applications, Administrative Applications and Occupational Instruction, (1972).
- CRESEIS, The final report to the Minnesota State Commissioner of Education by the Committee for Regional Elementary and Secondary Information Systems, (July 1972).
- Vocational - Technical Division of the Department of Education, Report on Electronic Data Processing in Area Vocational - Technical Institutes, (1972).
- Minnesota Higher Education Coordinating Commission, Summary and Review of Budget Reports for Support of Computing Activities in Minnesota Higher Education, (1972).
- MECC Planning Task Force, A Proposed Educational Computing Services Organization: Its Facilities and Services, (February 1973).

The planning began in each of the educational systems with representative personnel from various levels of the system involved in the discussions, research, and the drafting of a final report. These reports were used as a basis of study by the Governor's joint committee and the planning task force to finalize the proposed organization.

At the time of this report, one region was in existence and had been since 1967 -- TIES. During late 1973 and early 1974, the MECC organization was involved in establishing a second metropolitan region, called METRO-II, which consisted of school districts in Minneapolis, Moundsview, Robbinsdale, and St. Paul.

As of September 1974, MECC had identified seven regions covering the state. These regions were described as follows:

- Northwest - I (State Planning Regions I, II and IV)
- Northeast - II (State Planning Region III)

- Central - III (State Planning Regions V and VII)
- Southwest - IV (State Planning Regions VI and VIIII)
- Southeast - V (State Planning Regions IX and X)
- Metro - VI (State Planning Region XI and TIES)
- Metro - VIII (State Planning Region XI and METRO-II)

At this time each of these regions has formed their regional board of directors.

By analyzing the cost information available, we were unable to locate financial information identifying the amount of expenditures which have occurred in support of any of the three subsystems, ESV-FIN, ESV-PPS, ESV-SSS. We were further informed by MECC management that this information was not routinely gathered and presumably not available. We asked MECC to estimate the past of expenditures for each phase in the development cycle for any of the three systems. In response to our request, MECC-MIS estimated incurring costs of $918,000 for ESV-FIN, $918,000 for ESV-PPS, and $1,381,000 for ESV-SSS. These estimates through fiscal year 1979, are shown in Exhibit 6. Exhibit 7 shows the estimate of expenditures for salaries and contracts in the various phases of the development cycle for the ESV-IS systems. Because these are estimates, we are unable to tie these amounts of spending to any information contained in the financial statements obtained.

We are very concerned about the lack of overall financial management and control. Not only could we not find a single set of financial information, reports or records, but also the accuracy is questionable. We were unable to find amounts of revenue and expenditures, as shown in audit reports, in the budget documents used by the regions, MECC, and SDE. Without a financial audit of the "system," we cannot make an accurate and complete representation of total annual costs. Compounding this situation, the accounting practices employed by the ESV regions differ in that different fund accounting practices exist, and both cash and accrual bases are used.

Recommendations

After reviewing the information obtained, and considering the difficulty we had in obtaining the information gathered, PMM&Co. recommends the development of an effective financial management and control system. We recommend using ESV-FIN to account programmatically for all expenditures and revenues relating to the ESV-IS and the SDE-IS systems. The accounting would have to include spending at the regions, MECC, and SDE. Although it may be difficult to obtain, it would be desirable to obtain the direct expenditures for ESV-IS at the local school districts. Without this information, it is extremely difficult to determine total cost and complete a cost-effectiveness analysis of the current systems. We believe this is desirable for the future.

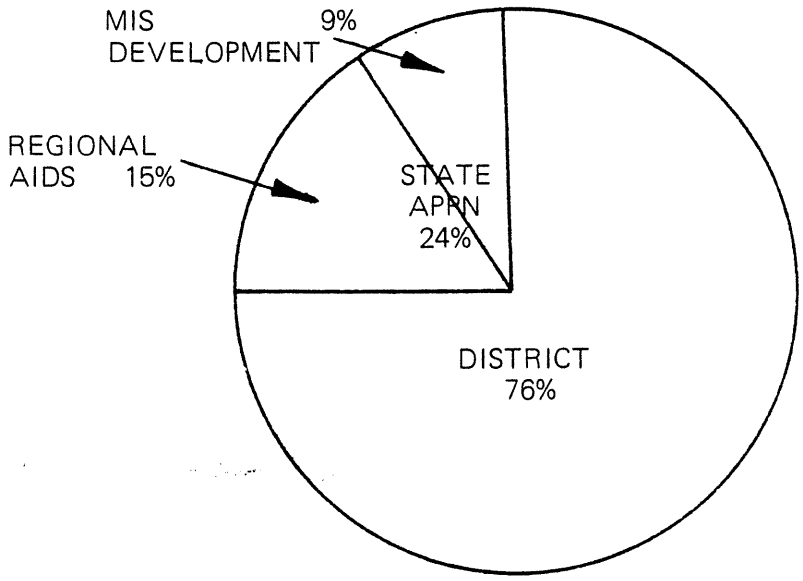
MECC is unable to identify the development costs of any of the three functional systems. To enhance MECC accounting, we recommend that provision be made for a labor accounting distribution of staff time devoted to phases of development and maintenance of the three functional systems. If it is desired to obtain a complete cost of each system, MECC should be encouraged to develop an indirect cost allocation plan to allocate overhead and agency administration costs to the functional systems, especially the voluntary subsystems, for providing total costs to individual school districts.

PMM&Co. recommends that copies of audited financial statements be submitted to SDE to provide better information on the spending occurring in the regions. At the present time, regional financial monitoring by SDE is limited to the annual review of budgets as part of the state biennial and annual budgeting process. We found the amount of actual spending in the prior years shown in these budget documents was not the same as that found in the audited financial statements. Although the differences were not large in most cases, differences did exist and our interviews with SDE

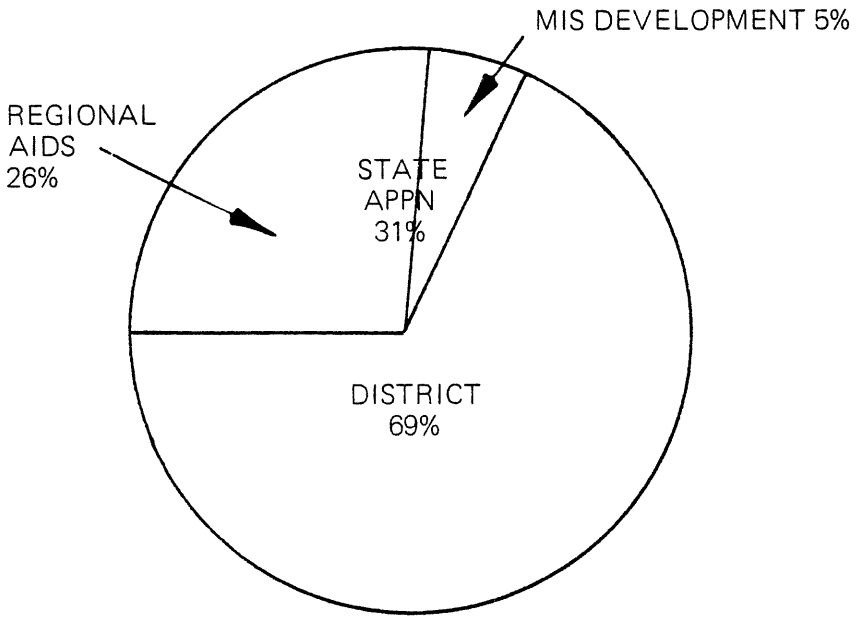
staff did not disclose this fact. The budgetary review by SDE should be based on complete and accurate financial information. SDE has a statutory responsibility for control of data processing spending by school districts. Our recommendations support the exercise of this authority by SDE.

Exhibit 3

SOURCE OF REVENUE



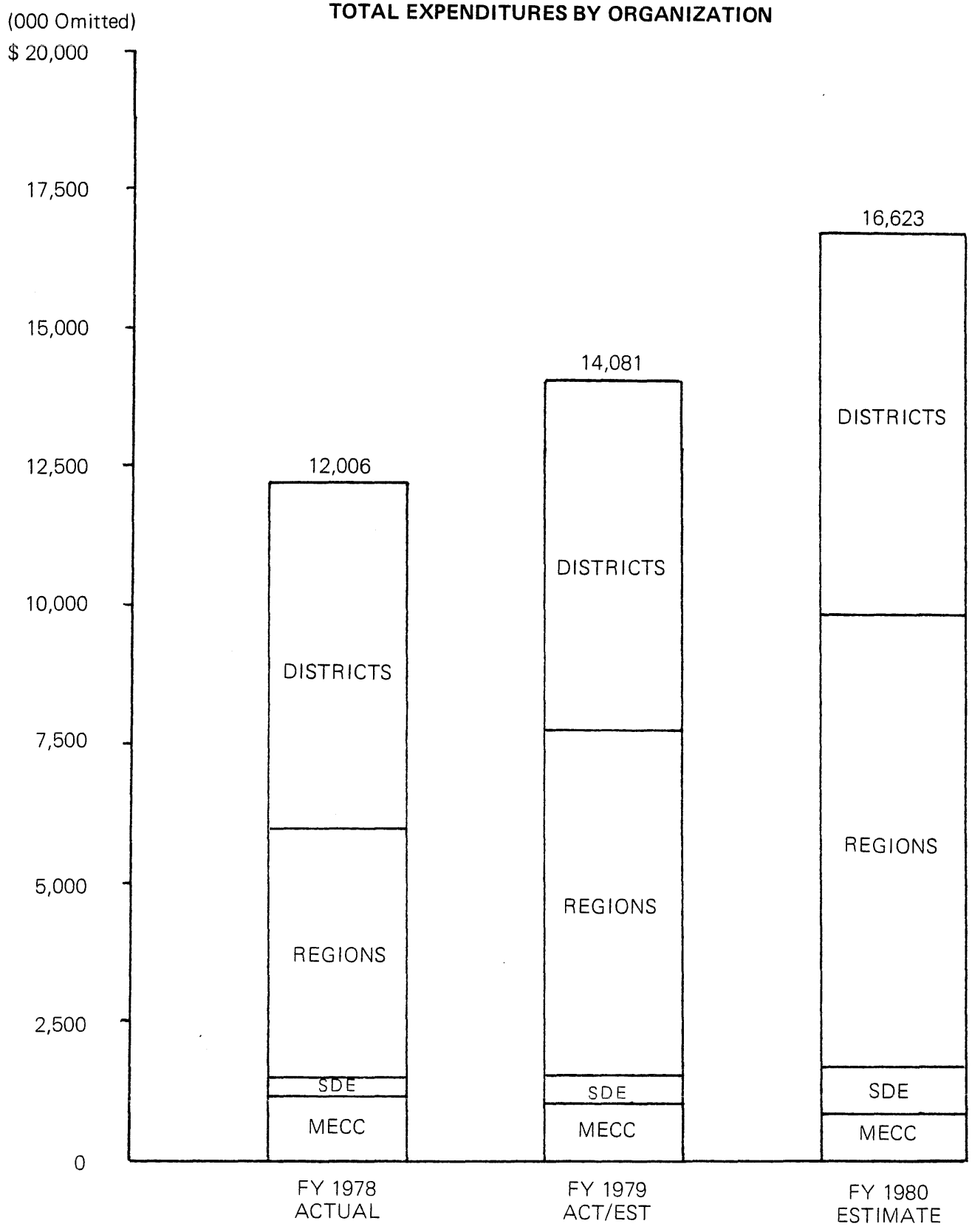
FY 1978 - $12,006,000



FY 1980 - $16,623,000

Exhibit 4

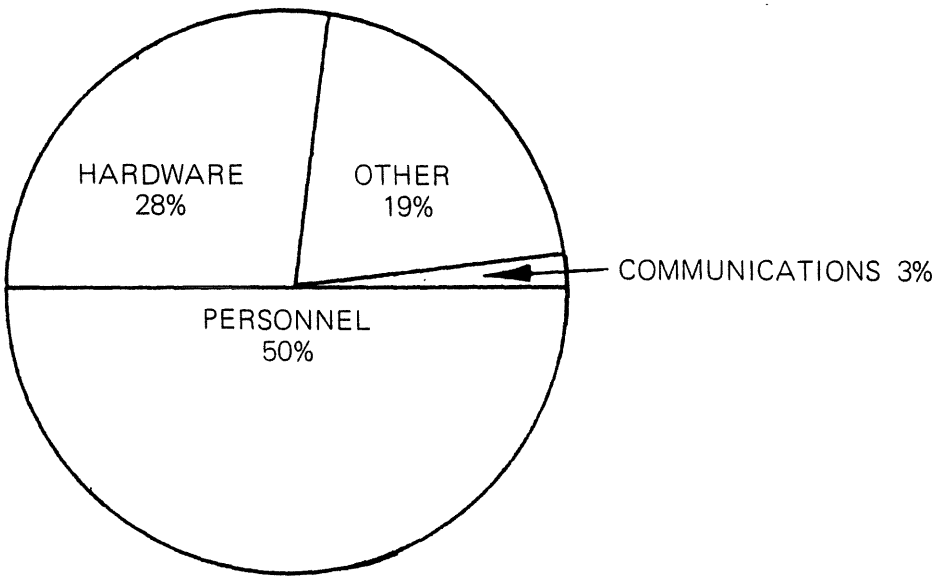
TOTAL EXPENDITURES BY ORGANIZATION



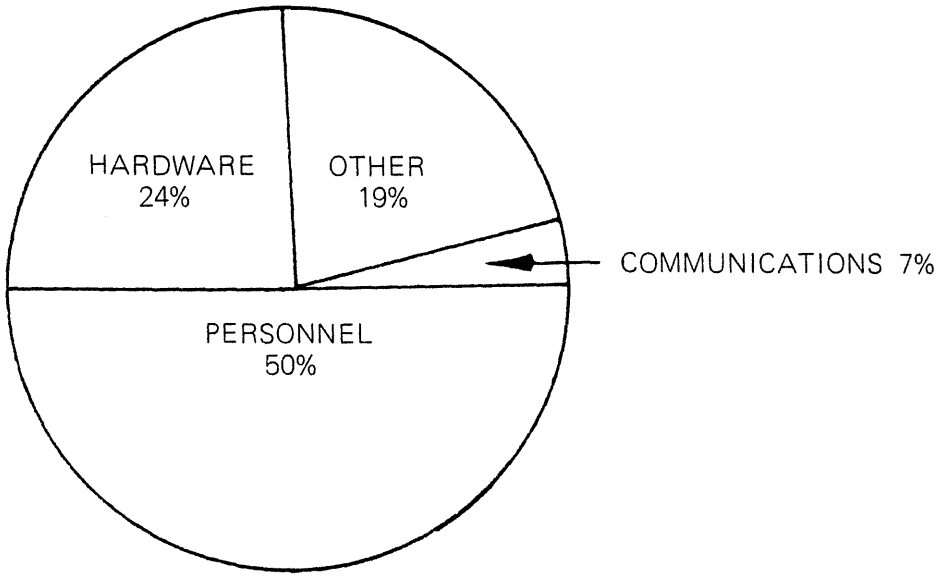
SOURCE: BIENNIAL COMPUTING PLAN FOR MECC 1980 - 81.

EXPENDITURES BY OBJECT

Exhibit 5



FY 1978 - $12,006,000



FY 1980 - $16,623,000

ESTIMATED SYSTEM DEVELOPMENT COSTS
INCURRED BY MECC-MIS ONLY

	ESV-FIN	ESV-PPS	ESV-SSS
Salaries & Contracts (Reference Exhibit 7)	$ 402,319	402,996	693,512
System Software & QA	105,548	105,548	140,730
Operations	40,010	40,010	53,347
Admin/Clerical	119,376	119,376	159,168
Other Hardware, Software, Rent	250,680	250,680	334,240
Total MECC Estimated System Costs*	$ 917,933	918,610	1,380,997

*Includes costs through June 30, 1979

NOTE:

The estimated costs do not include any costs incurred by a region or district.

MECC ESTIMATED SYSTEM COSTS FOR SALARIES AND CONTRACTS

ESV-FIN	
Needs Analysis	$ 67,023
Design and Development	121,234
Training and Implementation	43,376
Maintenance and Enhancements	170,686
Total ESV-FIN Salaries and Contracts*	$ 402,319
ESV-PPS	
Needs Analysis	120,128
Design and Development	178,600
Training and Implementation	58,646
Maintenance and Enhancements	45,622
Total ESV-PPS Salaries and Contracts*	$ 402,996
ESV-SSS	
Needs Analysis	$ 143,566
Design and Development	465,354
Training and Implementation	84,592
Maintenance and Enhancements	-0-
Total ESV-SSS Salaries and Contracts*	$ 693,512

*Includes costs through June 30, 1979

STATUS OF SURVEY RESPONSES

ESV REGION NUMBER	TOTAL NUMBER IN SURVEY	RESPONSES RECEIVED	RESPONSES NOT RETURNED
I	16 (-1)*	15	Bemidji
II	17 (-2)*	16	Proctor
III	17 (-1)*	13	Brainerd Little Falls Remer Taylors Falls
IV	16	11	Bird Island Fulda Madison Milroy Silver Lake
V	17 (-1)*	12	Arlington Austin Dodge Center Hayfield Freeborn
VI (METRO II)	7	7	
VII (TIES)	13 (-5)*	11	Centennial Wayzata
	103	85	
Executive Directors	7	7	
MECC	1	0	
SDE	1	0	
Review Committee: Lamont		1	

*TIES Districts. These districts do not use ESV-IS systems but operate with systems developed at TIES for administrative computing.

SURVEY PROCESS

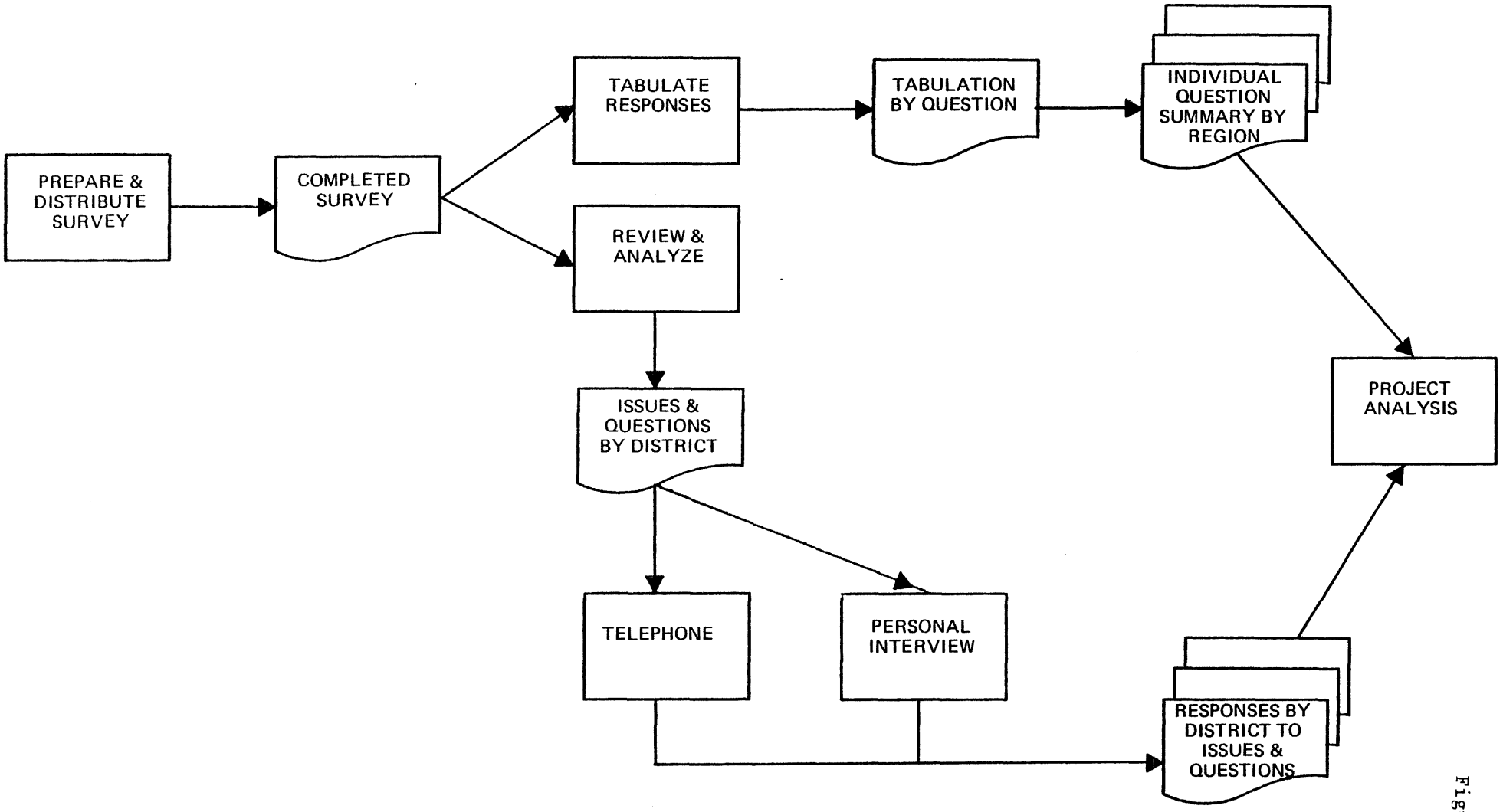


Figure 5

V. USER SURVEY RESULTS

SAMPLE OF 103 INDEPENDENT SCHOOL DISTRICTS AND ALL EXECUTIVE DIRECTORS

INTRODUCTION

The Request for Proposal identified tasks to be performed in conducting the evaluation which were to:

- consider the appropriateness and cost-effectiveness of the ESV-IS system on three levels: state, regional and local school district;
- visit each regional center, MECC, and SDE; and
- conduct site visits at selected school districts. The selection of district sites was to ensure a representative cross-section of districts was included.

PMM&Co. utilized a survey/questionnaire method as one of the methods to be used in collecting data from the many sources available and involved in this study. We followed the suggestion contained in the RFP for determining the sample of school districts to be surveyed with the questionnaire. A representative cross-section of school districts was identified for the survey distribution.

A description of the methodologies used in determining the school district sample selection, and for analysis of the completed survey responses follows. We have also included the directions for completing the questionnaire sent the surveyed school districts.

This section presents the results of the user survey completed by school districts. Eighty-five school districts returned the survey sent to 103 school districts, an 82.5 percent response. The facing page presents the responsiveness of districts surveyed. The Appendix D to this Section includes the survey sample of school districts surveyed. A copy of the survey questionnaire is included as Appendix E.

CAVEAT

PMM&CO. USED THIS SURVEY QUESTIONNAIRE AS A MEANS OF IDENTIFYING THE NATURE AND EXTENT OF USER UNDERSTANDING AND PERCEPTION EXISTING ABOUT ESV ADMINISTRATIVE COMPUTING. THE SURVEY RESULTS AND MANY USER COMMENTS ARE PRESENTED IN THIS SECTION. WE INTEND THIS SECTION TO ONLY SUMMARIZE THE RESPONSES TO THE SURVEY QUESTIONS WITHOUT ANY EXTENSIVE ANALYSIS. THE ANALYSIS OF THE RESPONSES ARE INCLUDED IN THE SECTIONS ADDRESSING THE SPECIFIC SUBJECT AREAS OF THE STUDY.

SURVEY METHODOLOGY

Methodology for Sample Size Determination

Determination of the sample size used in gathering information and data via the survey was based on the representative requirement and the work plan prepared by PMM&Co. for this project. This size was not statistically determined to ensure a specific confidence level, but was intended to solicit input from a representative sample of users. The results assisted us in responding to the questions in the RFP efficiently and effectively. We determined that, due to the size of the survey instrument and the number of questions contained in the RFP, a sample size of approximately 100 school districts was workable and an appropriate number. This represents slightly less than 25% of the school district population in the state.

Methodology for Sample Selection

Prior to identifying school districts which would be sent the survey instrument, we defined what variables must be addressed to ensure a representative sample has been selected. Given that there are 7 ESV Regions and 437 school districts in the state, it was important to know the number of school districts in each region. In addition, we identified four variables which we thought to be significant and were addressed in answering the representative sample issue, which included:

- user vs. nonuser;
- member vs. nonmember (depending upon what membership meant?);
- size of district: Small student population vs. large student population; and
- geographic location: rural vs. urban (metropolitan).

Having identified these four variables, we proceeded to stratify districts within each region, based on student enrollment, in five intervals as identified in the summary documents. Our objective was to array school districts in the sample based on (a) population, (b) geographic location within the region, and (c) user of ESV-IS system services. The summary document contains an analysis of school districts which are members/users of ESV-IS services, as well as identifying each of the three subsystems and those districts affiliated with TIES.

Analysis of Survey Results

The facing page, Figure 5, "Survey Process," illustrates the process which PMM&Co. used in tabulating, reviewing, and analyzing the individual responses on district-by-district basis. This illustration also identifies the necessary follow-up and summarizing that occurred in preparation for the project analysis phase. A series of notebooks have been prepared in which the survey results were compiled. The results were subdivided into the seven regions, with individual responses noted for each question within a single region.

Survey Questions

The survey was limited to the ESV-IS, the administrative information system for ESV, and the SDE-IS, the internal information system of the State Department of Education. Excluded from the scope of the study and this survey were the:

- Instructional Timesharing Services;
- Services to the University of Minnesota
- Services to the State University System; and
- Services to the Copmmunity College System.

Because of the desired comprehensiveness of the survey, PMM&Co. constructed general questions applicable to all potential respondents as well as very specific questions answerable by a limited number of potential respondents. Consequently, we made provision for the respondent to indicate that the question was not applicable or that a "Don't Know" response was appropriate.

REQUIREMENTS (Survey Section I)

This first section of the survey questionnaire asked the survey recipients for their perception of a series of statements addressed to system needs, user needs, governance issues, and basic requirements for the system.

FINDINGS

The respondents indicate that they have a tenuous working relationship with the current system. The technical aspects of the systems in use have not yet proven themselves to be adequate to a majority of the users. Some functions within the network are simply invisible, or not known at the local district level.

Some general observations can be made from the responses of the local school districts surveyed in this questionnaire:

- There is some consensus among the respondents that participation in the statewide system is essential, that the current joint powers agreement is adequate to govern the operation, and the original makeup of the districts and regions was logical and reasonable. However, the responses were not overwhelming, and is supported by an apparent general lack of knowledge among the individual school districts.

- Fewer than a majority of the respondents agreed their needs were adequately identified regarding software or their information needs were adequately being met.

- There is little information, or clear disagreement about how districts could transfer between regions, whether the MECC Facilities and Services Review Committee had performed its functions, or whether the ESV-IS system had met its objectives.

- Respondents felt the most ideal factors in determing the assignment or reassignment of districts to regions should be geographical proximity, cost indices that will maintain the lowest possible overhead, similarity of hub programs/technical needs, and size of student population to be served within the region.

Based upon the responses in the entire survey, there is no clear mandate from the local school districts that they are being adequately served by the systems now in place.

ANALYSIS (Note: Survey Question Reference in Parentheses)

Identification of User Needs (I.A.1)

Identification of user needs is a critical step in the development of an information system. In examining the responses to this question, there was a wide distribution of opinion within and among regions concerning the

user needs identification prior to the development of the systems software. Superintendents, or their designees, responding to this question, were slightly more positive, although not in the majority, that the needs of their districts were being adequately identified.

Compared on a regional basis, Region I showed a general satisfaction with its input into this user requirements process. One district noted that "general needs were outlined", but there was a "lack of coordination in the delivery of the software."

A much more evenly divided set of responses was obtained from Region II. Additional comments were provided which do have some significance. One district noted that no user needs were sought prior to implementing the interim package, which was of poor quality. Further, it was noted that the systems were designed for the State of Minnesota information needs, and the needs of the local school districts had second priority.

Region III respondents were evenly divided on this quesiton. Comments were provided that the needs were determined by the system developers, and that, during the development, a committee structure was used to identify needs. Since membership on this committee was limited, input from the individual school districts was also limited. Differences in the level of service needed by different sized school districts was not identified, and the perception was that design was for state reporting needs, not for local user needs.

Respondents from Region IV were quite dissatisfied with their level of input into the identification process. One district noted that they understood that only a large school model was developed for the finance system and that the model was not completely piloted before the region began bringing schools onto the system. This understanding was reinforced by the tedious detail needed to provide data input into the system. This detail level was not necessary in smaller schools which comprised the clear majority of the schools in Minnesota (nearly 75% with student enrollments less than 1,500). It was also noted that the design of ESV-PPS was insensitive to the needs of the small districts, which do dominate in this region.

A higher level of satisfaction was expressed in the responses from school districts in Region V. It was perceived, however, that the needs of large metropolitan school districts dominated over the needs of smaller districts. As was true with Region V, the respondents in Region VI were also in general agreement that user needs had been adequately identified prior to system development. One comment stated that METRO-II districts participated in the definition of the current systems and future needs in finance, payroll/personnel, and student accounting. However, it was pointed out that no regional or State staff attended these meetings, and they felt that their needs were not properly identified prior to this development. Another district noted that needs were identified, but they were not always included in the development of the systems software, particularly in the ESV-PPS system.

The degree of participation by districts in METRO-II varied depending upon each district's perception of the likely success of the ESV-IS concept, with their individual contributions made accordingly. Consequently,

some needs may not have been as carefully defined as they should have been to insure a successful implementation. Further, the process of reconciling often disparate needs presents a problem even under the best circumstances and always generates a dilemma of either attempting to satisfy all expressed needs or to produce a standard system which necessarily leaves some users dissatisfied. To some extent, ESV-IS development efforts tried to get a handle on both horns of the dilemma. This attempt to satisfy all the needs, however, led to an extended time line, particularly since additional needs tended to be voiced as the project progressed. This description from respondents in METRO-II does not deny the general perception expressed -- MECC is trying to address all needs.

The member districts of the TIES (Region VII) more strongly disagreed or expressed a lack of understanding as to the adequacy of user needs identification. It was pointed out that district participation by TIES member districts was almost nonexistent in the MECC development process. Even though some attempt was made to identify needs, the needs were not translated into any developmental activities. One district noted that the needs of each district in TIES were not identified in the beginning either. But the TIES developmental process has a mechanism for the conveyance of user requirements through the technical committee structure. It was suggested that very little contact was made with Region VII's districts and seemed to be that "if it fits people in METRO-II, it will work for all."

The general conclusion to this identification question would be that there was no strong agreement about the adequacy of the identification process, with a significant number of the user district respondents expressing disagreement or no knowlege. Giving users the opportunity for participation and expression of needs should be a strong consideration in seeking the user support and cooperation.

Total District Participation (I.A.2)

A majority of the respondents (58%) agreed that total district participation in the statewide system was essential for maximum effectiveness and operation of the system. Of the remaining respondents, 32% indicated slight to strong disagreement, and 10% had no response. The strongest support for this concept was expressed in Region II, V, VI (METRO-II), and VII (TIES).

The responses in Region I noted that some small districts are better off with manual services, which are cheaper and more efficient. One respondent noted that, for the very small user, the system becomes an additional cost in an already troubled budget. Respondents in Region II indicated that the maximum effectiveness of the system and the personnel occurs with the highest participation. Without this total participation, dual systems may result with no common data base. It was noted that districts which were forced to participate are a hindrance to the development of a region.

State cost-effectiveness does not necessarily apply to individual district cost-effectiveness or efficiency, was the response from one district in Region III. While a district should be a member of the region for state reporting purposes, all districts need not participate in all services. At

least one district questioned whether the concept of total district participation necessarily meant that it had to be delivered to the regional center. Participation in these regional centers in some cases limits the effectiveness of the school districts to secure services which are unique to that school district. Uniform reporting format is essential for MECC's effectiveness.

The greatest dissatisfaction with the idea of total district participation was expressed by the respondent school districts in Region IV. One district noted that the interpretation of maximum effectiveness in operation would be to make the local district workload easier to provide automated data handling for the local school district with a minimum of constraints, and at the same time to provide summary data to the state department. Again, it was noted that district should have the option of not participating in nonmandated programs such as PPS, and SSS.

Districts responding to this survey question in Region V expressed a more general agreement with the idea of total district participation. However, it was noted that the possibility for maximum effectiveness at the state level does not necessarily mean that the district-level needs will be met on a cost-effective basis. If the intent was to provide "immediate" access to comparable data, then total participation is a must. The response from Region VI members indicates that they are quite satisfied with the concept of total district participation. It was noted that "total participation from all members, including Minneapolis, would be necessary to insure that the cost to existing members of METRO-II would not become prohibitive or there would be a need for a greater State subsidy." Participation in ESV-IS may not be necessary if "a district can provide data to the State in machine-readable form using existing hardware in the school district." Surveyed school districts in Region VII more strongly agreed with the statement that total district participation is essential. The comment was provided that total district participation is essential because of the unique requirements within the district due to size of district and in-district use of data. Further, the TIES example of advisory committees, function committee, and needs identification process for priority setting should serve as an example of the type of participation needed. It was suggested that participation may be needed only to the degree required to meet State reporting requirements. This then would not require that all districts be "on the computer."

Some conclusions which can be drawn from these responses include the need to define what is meant by total participation and the perception that total participation is essential to minimize costs to individual school districts and to insure the uniformity of financial reporting.

Current ESV-IS Software (I.A.3, I.A.4)

Responses to the question of whether software developed for ESV-IS meets the needs of very large as well as small school districts had a wide distribution. Less than a majority of the respondents could agree that the current software developed by MECC met the needs of large and small school districts, as evidenced by the fact that 41% agreed with the statement and 28% disagreed. The remainder of the respondents, 31%, either didn't know or failed to respond to this question.

One district in Region I said that they did not need the sophisticated programs needed by large districts, but needed just a basic chart of accounts. Districts residing in Regions I, II and III responded more favorably to this issue. One response from Region II indicated that modifications will be required at the district level because of vast differences in district size and other factors. Responses from Region IV noted that the system was primarily designed to serve large school districts and was too complicated and provided many capabilities not needed by a small district. This same concern was expressed by one respondent in Region V who noted that this creates cumbersome procedures for the smaller, outstate district.

Responses from the surveyed districts in Region VI (METRO-II) included the comment that the data base fit all districts and reports could be tailored for each user. A concern was expressed that the present payroll/personnel system does not accommodate all the needs of a large district. Regarding the student system, it is noted that districts with several schools will have difficulty because processing handles only one school at a time. It was suggested that managing large urban school districts requires sophisticated management techniques which may well represent unnecessary systems overhead for a small district user. It was noted that MECC faces a real predicament as it confronts the request for enhancements from large and small school districts. The suggestion was made that there needs to be an equitable prioritizing mechanism and an enforceable mandate for standard procedures throughout the State.

Responses from Region VII indicated a general lack of understanding of ESV-IS. However, it was noted that large districts have more needs as well as unique needs. As was indicated for the TIES districts, the general lack of understanding of either the software or the ESV-IS system was evidenced by the many "don't know" responses or the failure to respond to this particular question. (Note: At the time of our survey, TIES districts were not using any components of the ESV-IS software.)

In general, the response to this question suggests that the development of software for ESV-IS must address the size difference of school districts and, to some extent, the geographic differences that do exist. Based on the response factor and the comments provided by the respondents, communications with local district users could be improved, enabling the user districts to have a better understanding of the current software for ESV-IS and how it will meet the needs of their districts.

Joint Powers Agreements (I.A.5a and 5b)

Joint powers agreements exist to govern the operation of five of the ESV Regions. There are two exceptions, with Region II existing as Central Minnesota Research Development Council, organized as a nonprofit corporation, and ESV Region IV existing as part of the Southwest and West Central Educational Cooperative Service Unit (ECSU), which is organized pursuant to the ECSU statute.

In responding to the question concerning the adequacy of these joint powers agreements or other legal arrangements to provide for sound management of the ESV resource, respondents were more positive toward the regional arrangements with the districts than toward the State/MECC joint powers agreement. In the latter case, there was more lack of understanding expressed in the responses, although those responding did express a positive response to the current State/MECC joint powers agreement and a belief that it provides for sound management. Regarding the current regions/districts joint powers agreements: 59% agreed that this arrangement for governing the ESV Region system was adequate for providing sound management; less than a majority, 44%, agreed the current State/MECC joint powers agreement was adequate to provide a sound management for MECC. There was evidence to suggest (36% no response rate) that the respondents lack the necessary understanding to properly evaluate the adequacy of the current State/MECC joint powers agreement.

Respondents from Region I noted that there was no provision for the transfer of districts within regions, when this transfer was logical. (PMM&Co. note: the proposed temporary rules by SDE in the fall of 1979 address this issue.) Concern was expressed that "the Board of Directors was made up of nonschool, noncomputer, non-data processing people" and hence does not work effectively. There was a further indication that there was insufficient expert review by the elected governing board which in effect isolates the directives of the districts. Many respondents indicated that there is a clear need for knowledgeable users to direct this endeavor. A response in Region II supported those previous remarks about governing boards consisting of lay members not making an efficient, well-managed operation.

One respondent in Region III indicated that the "regions are developing into another level of bureaucracy, and minimum services are being provided to the small districts at high costs." This latter concern was often expressed to PMM&Co. during personal interviews with school district officials in this Region.

The responses to these joint powers agreement questions, considering responses to many other questions throughout the survey, suggest that local districts are very interested in participating in the decision-making process and having a voice in their future as users of ESV-IS. When taken alone, the responses to these questions suggest stronger support for the joint powers agreements themselves as an adequate device for providing management to these respective operations. This would be consistent with our assessment that the districts are asking to be heard and are wanting an opportunity to participate in this process. There is nothing in the survey responses to suggest that the current seven-region arrangement has any particular bearing on this district desire to participate. Other questions and responses to them suggest that smaller regions operating with joint powers agreements pursuant to Minnesota statutes might be just as effective.

Independent ESV Regions (I.A.6)

The concept of an independent ESV Region with its joint powers agreement and governing board is generally considered valid under today's conditions by the majority of the respondents. Of the respondents to the survey question, 66% felt that the initial concept of an independent ESV Region

was still valid under present conditions. Fourteen percent did not agree, and the remaining 20% either did not know or failed to respond to the question.

The additional comments offered to this issue suggested that the regional concept must address the student population factor. One respondent in Region I indicated that they do not have a sufficient student base to afford an independent ESV Region, particularly in view of the declining enrollment.

Consistent with the conclusion provided to the preceding issue, the concept of independent ESV Regions seems to be consistent with the want of local school districts for the opportunity to participate in deciding its own future. Whether regions should exist as they now do with the same geographic boundaries has significance in certain parts of the State, but the real significance seems to be simply the opportunity for the user school districts to participate and not to be overlooked in the process.

Size and Number of Regions (I.A.7)

The responses to this question produced very little agreement about whether size and number of regions are logical and workable considering geographic conditions, school populations, number of districts, and computer hardware. A bare majority, 51%, were in agreement with the statement while 26% of the respondents did not agree, and the remaining 23% did not know or failed to respond.

The predominant comment from respondents in Region I was that the geography is too large in this region and distances are too great to be able to operate as a single region. One district suggested that four centers be set up in the state: two from metro regions, one for Mankato, and one for St. Cloud. Geography was again the subject of comments obtained from respondents in Region II. One district in that region suggested that the regional concept must entail a "main frame" in each region and possibly hub sites throughout the region. The hub site issue was supported by another district response. A response from this region also produced the comment that a region should be composed of no more than 50 school districts; similar comments were expressed by other school districts in response to other questions of this survey. The actual region size recommended was 50 or less school districts.

A response from Region III suggested that providing service is logistically difficult; that the transportation of data to 50 or 60 districts from one regional center is time-consuming and expensive. Further, all districts are forced into a process which does not allow for addressing individual needs.

It was suggested by school district Region IV that smaller cooperatives of 10 to 15 schools, such as the existing MASA-MSHSL districts, could provide more personal and faster processing. For regional centers to process 50-100 schools creates tremendous "peaks" and requires a large commitment of staff and equipment. The responses in Region V were evenly distributed, with a slight majority of respondents agreeing that the size and number of regions are logical and workable at present. In the METRO-II Region, the largest number of responses indicated "don't know" to this issue. Finally, the responses in Region VII (TIES) showed moderate agreement with the current arrangement. One district suggested that a region

should exist with some consideration to the size of the districts' student population because of the similarity in needs and quantity of needs. Geographical locations should be a consideration for telecommunications. The number of districts needs to be cut down for ease with payrolls and FBA (TIES' Financial Budgeting and Accounting system).

The conclusion to be drawn from these responses indicates districts have no overwhelming agreement with the current size and number of regions. Any organizational arrangement, or alterations of the current regional arrangements, would necessarily have to consider smaller regions comprised of districts with more similarity in size and needs. Geographical distances within a region would have to be a strong factor in organizing the state if only to address the staff travel time between the district and the regional center for providing of services. A suggestion was made to establish sites for more distributed processing throughout a region with the regional processing centers. The apparent central theme of all of these responses is the need for services to the local school districts, and any organizational arrangement must necessarily address that need.

Assignment of Districts to Regions (I.A.8a)

A majority of the respondents (56%) indicated that they did not know how the districts were assigned or whether, or how, they could transfer from one ESV Region to another. The remaining 44% were equally split between those agreeing that the procedures were clearly defined and followed, and those respondents who indicated knowing about the procedures but feeling that they were either not clear or not followed. Regions II and V provided the greatest positive response to this issue.

Several local school district respondents to the survey indicated their desire to change from their current ESV Region to an adjoining one. Reasons such as the regional center was closer or an individual district preference were not considered adequate to permit a transfer. One district in Region II noted that they do not want changes in the present organizational arrangement. They believed this would disrupt planning and also noted that "personalities rather than logic" might dictate a switch.

The temporary administrative rules prepared by SDE in the fall of 1979, which at the time of our review were prepared and the subject of a public hearing process, addressed the issue of regional assignment and transfer. Action by the 1979 Legislature provided the initial statutory language indicating how regions may be formed. Whether or not individual districts will agree with the results of implementation, the policy and the guidelines behind the creation of regions and transfers between regions will be undoubtedly be made more clear by this legislation.

Criteria for Assignment of Districts to ESV Region (I.A.8b)

The criteria for the assignment or reassignment of districts to an ESV Region, based on survey responses, are:

1. Proximity, or geographic;

2. Cost indices that will maintain the lowest possible overhead;

3. Programmatic or technical needs similarities; and

4. Number of pupils enrolled within the school districts within a region.

The remaining four criteria had lesser importance as evidenced by the weighting factors and in order were: similarity of community/district aspirations for children, legislative districts (political subdivisions), wealth of the district, and racial/ethnic similarities.

The significance of the first four priority criteria are further reinforced by the frequency with which they are referred to in the response to many of the other questions in the survey. An Executive Director noted that the latter four criteria are clearly inappropriate for making a decision on the assignment of districts inasmuch as they have nothing to do with the provision of data processing services and only serve to mislead policy makers when added to the already complex variables.

One district in Region III indicated the belief that districts should be allowed to purchase services from whomever they feel will provide the best service.

It is clear, when considering the responses to this question and to question I.A.7, that geographic factors must be considered when assigning districts to an ESV Region. The size and the traveling distances between the districts and the regional centers are examples of items which would have to be considered in this area. The cost indices criterion is consistent with the concerns of smaller districts, which comprise the majority of the school districts in Minnesota, as expressed in the responses to many of the other questions. They view the ESV-IS as an additional expense to their district, with the primary beneficiaries being SDE and the Legislature. The importance placed on programmatic and technical needs similarities is also consistent with the concerns expressed by the districts. It was suggested that districts with similar needs should be provided software and regional services compatible with the needs of these districts. The same point can be made for the responses of larger school districts, especially the metropolitan districts. We conclude that the current regional arrangement is not fully supported by the surveyed districts, except for METRO-II and certain members of TIES (Region VII).

Policies and Procedures for the ESV Region (I.A.9a)

The majority of the respondents (58%) felt that they could agree with the statement that the policies for the ESV Region were adequate for governing the region and member districts. Of the remaining 42%, 14% did not agree and 28% did not know or failed to respond to this issue.

Districts responding in Region I noted that regional employees do not appear well versed on either school accounting and data processing. It was noted that it is essential to have school board members, school superintendents and business managers on the regional governing boards. A total lay board is vulnerable to making poor decisions because of lack of experience or understanding of user needs and problems.

A district responding in Region VII (TIES) noted that "the kind of existing structure has too many service coordinator type people when our needs have changed over the years so we need more technical expertise such as systems analyst, programmer..."

Regional Organizational Structure (I.A.9b)

The majority of the respondents (57%) indicated that they thought the regional organization structure was adequate to fulfill the responsibilities of the region. Of the remaining respondents, 16% did not agree that the structures are adequate and another 27% did not know or failed to respond to the question.

One response from Region I indicated that it was essential to have school board members, school superintendents and business managers on the board because of their experience and understanding of user needs and problems. It was noted that, in Region II, a reorganization occurred recently which was specifically designed to meet the needs of user districts and more adequately discharge the region's responsibilities. A response in Region VI indicated that the adequacy of performing the responsibilities is affected by the frequent changes mandated by the legislature.

MECC Facilities and Services (I.A.10)

A clear majority (65%) indicated that they did not know if the MECC Facilities and Services Review Committee performed an objective and rigorous review function for the ESV-IS. Of the remaining respondents, 20% agreed with the statement about the objective and rigorous review function, and 15% indicated that they disagreed with the statement. One respondent indicated that the Committee is not impartial and certainly should not contain any Regional Executive Directors, as this is a direct conflict of interest. This comment was offered by at least six respondents. A respondent in Region III indicated that the Committee created unnecessary red tape and restricted the development of unique programs and services to individual school districts. It was pointed out that the committee is more involved in reviewing hardware acquisition requests than in software development matters.

The membership on the Committee is made up of representatives of all member systems of MECC: University of Minnesota, State College System, private colleges, State University System, and State Department of Education. The broad educational background of the membership should facilitate an objective review function. However, our review of one hardware proposal does not support that conclusion. The recent decision to permit hardware to be purchased by Region II was not, in our opinion, supported by adequate analysis, although the region was permitted to make the purchase.

Authority and Responsibilities for Staffing the ESV-IS (I.A.11)

The majority of respondents (64%) indicated that they did not know or disagreed with statements that authority and responsibilities for staffing the system between MECC and ESV Regions had been clearly defined, appropriately assigned, and adequately achieved.

It was noted by a respondent in Region I that the accounting coordinators (Regional Accounting Coordinators) are the most important staff in the region. They must be experienced in school finance and have superior communication capability.

The regional staff, as described by a respondent school district in Region IV, consists of individuals without background in computers or in school finance. Further, it was noted that the State personnel policies make it difficult for MECC to respond adequately and quickly to staff needs.

Responses from Region VI state that staffing is clearly inadequate if MECC is to be both a development and maintenance agency. MECC's performance has been affected by a fairly steady turnover of critical staff. Replacing these staff with personnel of equal experience is difficult. The State Department of Personnel's rules frustrate any attempt to make quick replacement and frequently screen out the best qualified by virtue of anarchistic salary ranges.

Computer Hardware in ESV Regions III, V, VI, and VIII (I.A.13)

The majority of respondents to this question (68%) either disagreed or didn't know/failed to respond to this issue. In addition, three of the seven Executive Directors expressed strong disagreement that the computer hardware in the host centers was adequate and met the needs of their district or region.

Respondents in Region I noted that priorities and waiting are too long in obtaining computer service from Region III. The response from districts in Region II also indicated a poor quality of output from Region III, or, as one district stated, they have encountered many delays in using Region III's hardware.

Disagreement with this question concerning adequacy of hardware was expressed by districts residing in Regions without computer centers (the responses were returned prior to the recent installation in Region II).

In Region VII, one district indicated that "the present performance of three to seven days to generate hard copy reports is inadequate" for their requirements. They also indicated that "seven days to generate payroll checks is not efficient."

Additional Hardware Capability in ESV Regions I, II and IV (I.A.14)

Of the responses from school districts in Region II, 42% of the respondents in the other six regions agreed that the installation of additional computer hardware in Regions I, II and IV should be withheld until additional information about user needs, software development, and implementation and related costs can be analyzed. Only 9% disagreed that such installations should be withheld, while the remaining 49% either didn't know or failed to respond. The responses from Region II, since a decision to install a B6800 had already been made at the time the survey was administered, indicated strong support for installing the additional computer hardware. In considering all responses to the survey, 38% agreed that installations of additional hardware should be withheld, 17% disagreed, and 45% had no opinion or failed to respond.

The responses of districts in Region I noted that there are many new possibilities with respect to methods and procedures to accomplish more cost-effective delivery of services. Another response indicated that it is

unreasonable to assume that these regions can afford this hardware, compounded by the fact that declining student populations are a problem. They suggest that St. Cloud and Mankato staff ought to be responsible to bring up all outside schools (i.e., out-state school districts) and have a broader plan for service.

Responses in Region II expressed concern about reevaluating this question again because it would destroy the credibility that Region II has with their present school districts. However, one school district indicated that a larger computer was needed so that all school districts can be placed on the statewide finance and payroll systems rather than being on the interim system (presumably the reference was to the hardware operated prior to the B6800).

One district responding in Region III stated that "we need to determine whether the system is really worth the cost and effort before we spend billions more on hardware." Another comment suggested microcomputers can meet the needs of most school districts, considering the example of Ortonville. They also note that the computer should not be purchased at a time when technology is changing.

Districts in Region IV indicated they need better service and that more workloads should be done by minicomputers. In addition, the response of a metropolitan school district was that no future purchases of computers should be permitted until the entire equipment acquisition policy is reevaluated.

Acquisition of Computer Hardware (I.A.15)

Agreement that the existence or planned acquisition of computer hardware in a school district should be evaluated as a viable data processing support option was found in 69% of the responses to this question. All regions strongly agree that the existence or planned acquisition of computer hardware should be evaluated as an option for the delivery of ESV information.

In Region I, one district indicated that it would seem to be cost-effective to continue to use present equipment in the districts. Another district stated that they have an AVTI with a Data 100 which could be used with the existing Burroughs equipment. Another district stated that the use of hub sites would permit one school to have equipment for input and output while sharing the costs with other schools. One response in Region II indicated that it may be necesary to put computer hardware in the school districts to speed up turnaround time. Another district indicated that it is not economically feasible for small districts to acquire computer hardware, while another noted that district needs must be considered. One response in Region III, while supporting the concept of evaluating the planned acquisitions as an alternative, strongly disagreed with this option if it were to be a stand-alone computer.

A response in Region IV indicated that it was appropriate to examine the use of microcomputers in school districts and further indicated that school districts should not be restricted to only one vendor. It was suggested that small computer equipment can serve the needs of small districts or groups of schools at a low cost compared to the acquisition of a B6800.

Responses from METRO II varied. One district indicated that all districts should belong to a region and that all hardware should be compatible for cost-effectiveness and efficiency, while another indicated that SDE/MECC should not be involved in this process of acquisition of hardware for a school district. One district indicated that any change at this time would place the whole regional plan in jeopardy and that the original plan did not provide for this possibility, so they understood the districts could no longer do their "own thing" with computers. Another district indicated that the acquisition of computer hardware for a school district must be considered as an alternative method of enabling districts to get their needs for processing information satisfied.

The comments suggest that the method/process for providing data processing should allow individual school districts to be involved in the determination of whether the actual processing should occur on their own hardware or on that at a regional center. There are very few responses which take issue with the State mandate for financial reporting and the specific requirements as to form and content. The issue with respect to hardware located within a single school district, although contrary to the original goals of the MECC concept, are offered by school districts as an alternative in seeking to obtain improved service and a faster response time.

Development of ESV Software Using Higher Level Languages (I.A.16)

Less than a majority, 44%, agreed that MECC should develop software using a higher level language which would be compatible across multiple vendor lines. Of the remaining responses, 15% did not agree and 41% did not know or failed to respond to the question.

In Region I, one district indicated that the State contract should be re-examined. Software should not be developed which only operates on one computer system, since this is a waste of money for the State. Another district indicated that there is a need to investigate interfacing AVTI computer capabilities, which could greatly enhance the delivery system across the state in terms of logistics and personnel.

In Region II, one district indicated that having software compatible across multiple vendor lines would improve competition. Users would therefore be in a better position to determine the vendor which gives the best service. Another response indicated that it is "beyond my comprehension that this was not the original concept." One response in Region III indicated that software should be developed which can be used across different hardware lines, since the development of the current software to run only on Burroughs equipment is creating a State-controlled monopoly on hardware. Another indicated that "the software which is compatible across multiple vendor lines is not technically feasible." One response in Region VI indicated that "the language used in this development, presumably the finance system, should minimize the conversion problems to another vendor."

Assuming that the use of programming language that is compatible across multiple vendor lines is technically feasible, this option should be explored. Assuming that the end results, especially the reports produced

by the finance system, comply with standards established for the systems, it would seem that the unaffiliated or the unhappy affiliated districts could have this concern resolved. Since some of the responses refer to the cost-effectiveness question again, if it can be shown that the use of multiple languages and hence multiple vendor hardware can produce the same results but adding additional cost which would have to be borne by the individual school districts across the state, an alternative could necessarily be explored.

STAFFING (Survey Section II)

FINDINGS

The responses were not overwhelmingly in support of the staff and staff services. Technical assistance and support in the regions is a problem area, especially in systems training and implementation. The incidence of unsatisfied needs occurs more frequently in the rural, smaller school districts.

ANALYSIS

SDE (II.A.1)

Respondents were evenly divided as to the adequacy of SDE staff size to the support requirements for the system. Region I noted that Region III staff was getting by because of superior personnel. But the long-range solution was to provide them with an adequate amount of personnel. It was noted that general support is needed for in-service of regional personnel, and there is a requirement for systems analysts who have comprehension of local operations.

Region IV noted that there are requirements for people who are trained in school finance and computer systems. The Executive Director of Region IV noted that there was a need for technical monitoring of MECC with a person who had knowledge of application requirements.

Region VI noted that there is a requirement for defining what charges and what the charter is for a total overview of the ESV-IS data processing. There is also a need for a willingness to enforce the rules and laws. Additionally, there is a need for a data base and state reporting requirement which includes all State, Federal and local requirements. This data base should encompass the full perspective of needs.

Region VII noted that there is a need for understanding of procedures, data needs, reporting alternatives at the district level. SDE seems only concerned about its data needs which are minor activities in overall school district management. Therefore, SDE does not represent district interests in providing input to MECC for software development.

MECC - MIS (II.A.2)

In general, respondents stated that there was an adequate MECC - MIS staff for development and operation requirements.

Region I noted a system requirement is the adaptation of software to all size districts. The skill required is a first-hand knowledge of public school business operations. Region II noted that there is a need for in-district consultants to assist in modifying the present accounting procedures to UFARS regulations before implementing the computer processing system. The staff skill required would be a school accounting background, ESV-IS training, and the ability to communicate with current district staffs.

Region III said that there is too much systems development which is required from the regional staff. Technical assistance is the staff skill really required.

The Executive Director for Region V stated that he believes that the programming staff at MECC was sufficient to support both maintenance and development needs. However, there is a need for continuity in programmer analysts and coordinator staffs to insure follow-through in the installation and maintenance of systems.

ESV Regional Technical Support (II.B)

This question elicited high levels of response. The predominant response was that the systems training and implementation were not being met. There was variation from region-to-region on this question. Regions comprising smaller districts are less able to address technical support requirements for their districts.

Region I noted that an excessive demand is placed on the ESV regional technical support staff because of the small districts without their own knowledgeable business officials. Other district responses were the need for staff knowledge and assistance in developing the chart of accounts, familiarity with school district administration, and help with report formats. One district suggested that inadequate funding exists for required support personnel to cover 99 schools in Region I and 85,000 students spread across one-quarter of the area of the state. One distinction Region II noted was that there is a need for more knowledge of school accounting and auditing procedures.

An outstate TIES school district stated there was a need for a capability to convert TIES data bases to the Regional data base when the district transfers. Knowledge of the system and local school district needs is the major staff skill required. School districts which have difficulty understanding computerized systems are left behind because of the load on personnel and the lack of funds for persons having expertise in data processing and accounting.

The Executive Director of Region IV noted that additional staff were required to meet the needs of very small districts (under 300 students).

ESV Regional Training (II.C.1)

Respondents feel that they are receiving sufficient training support from the ESV regional center. Region II and Region V appear to have less satisfaction with the sufficiency of the service.

A district in Region I noted that staff from ESV should visit individual schools to train local people who have no previous computer experience. One district in Region II noted that there was a need for better training sessions where the instructors had the ability to teach as well as the ability to use the systems.

Training support service is required in generating reports and in defining payroll actions. This type of skill requires an accountant's background.

Support in the student and payroll/personnel systems should be at a level enabling users to easily operate the system, according to a district in Region VI.

MECC ESV User and Technical Training (II.C.2)

Most respondents consider the user and technical training provided by MECC to be adequate. Region I believes that school district personnel should have received training away from all other assigned duties. Using local district information, they would try "dry runs" and come back to review them with their administrative personnel. The object would be to have well-trained staff before instituting the system. The Executive Director for Region II said that MECC had responded to his training and technical problems very well. According to the Executive Director of Region III, better documentation is needed to support user training.

One district in Region V said that more help was needed to understand the UFARS double entry accounting system.

COSTING (Survey Section III)

FINDINGS

Respondents do not agree with the per-student basis for changing user school districts. Also, the State subsidy must consider aditional factors other than the number of students in a region or district:

- size of region;
- number of districts in region;
- number of systems implemented; and
- geographical size of region.

The district respondents believe that the State must continue to subsidize the regions and districts for the uniform financial requirement.

District input into the budget and planning process is limited. Districts desire this input in the future.

ANALYSIS

ESV-IS Special Computer Programs for the District (III.A.1)

Twelve survey respondents in Regions II through VII had received special computer programs for their district. Regions IV and VI had the most respondents with the special programs. Six of the twelve districts did pay the cost of writing special ESV-IS computer programs. All respondents did receive an estimate of costs prior to completing the financial agreement. The experience of the respondents was mixed:

- Two respondents had actual costs which were greater than the estimated cost;
- Two respondents had costs which were equal to the estimated cost; and
- Three respondents had costs which were less than the estimated cost.

Six districts received their computer programs on schedule.

SDE Annual Support Aids to the Regional Centers (III.A.2)

Sixty-six respondents (79%) agreed that SDE should provide annual support aids to the regional ESV center and seven disagreed.

Region I noted that aid should be provided on a combination agency and student population formula. The Executive Director stated two factors should be considered: (1) the number of schools and (2) the size of the schools.

One district in Region II noted that population, geographic size, the number of districts currently using the software, the level of training at the districts, and the number of services to be furnished to the districts

by the region should be factors in the aid formula. The Executive Director suggested a formula with a base amount and additional funds based on the number of districts and student population.

Respondents in Region III provided the following suggestions: (a) support aid should be on a per-pupil basis, (b) support should be according to cost, (c) reimbursement should be for actual costs on a documented basis, and (d) support aid should be based on the number of districts, total enrollment, and the systems implemented.

Factors in an allocation formula recommended by a district in Region IV were (a) size and distances of the region, (b) experience of the district's staff, (c) the size of schools, and (d) the number of schools. According to a district in Region V, the annual support aid should, at a minimum, provide for the expense of gathering, maintaining and recording data for SDE requirements. Also, the calculation of aid should attempt to equalize cost within regions. The district noted that in the initial state-wide plan school districts were promised equal or better services at no increase in cost.

In Region VII, one district noted that reporting subsidies should be given for implementing the acquisition calendar. The subsidy would be based on quantities reported in each report (students, staff and dollars). The Executive Director noted that the annual support aid should be based on student population in school districts for which state reports are produced.

Equitability of State Aids (III.A.3)

A number of respondents in Region II and Region IV noted that state aids were not equitably distributed. Region IV noted that annual state support aid should be based on size, distance in region, experience of the district's staff, the size of the schools and the number of the schools. The Executive Director noted that state subsidies should be more sensitive to the number of districts served with a special subsidy for serving small districts.

One district in Region V suggested the possibility of equalizing charges on a per unit cost basis or a partial, direct aid payment to the districts rather than to the regions. This latter suggestion was supported by a district in Region VI. The district said aid should go directly to the local districts to maintain accountability.

In Region VII, one district said aid should be prorated based on regional budgets and the applications available to and used by member districts.

ESV Regional Annual Plan and Budget. (III.A.4a)

A slight majority (53%) of respondents indicated having input into the annual regional plan and budget. Negative responses about the process were noted in Regions I through IV.

One district indicated the budget for Region I was developed by the director and sanctioned by the Board. Local districts were not invited for their review and comments. Region II said that the plan and budget had been pretty much completed by the staff before the district had input.

According to one school district, an Executive Director established the budget which was approved by his board. Local districts had little input in preparing the center's budget.

Prior to 1976, a number of meetings were held with superintendents to get their input on the design of MIS. Since that time, one district indicated there has been little input.

Annual State Support Budget Request to SDE (III.A.4b)

Based on questionnaire responses, most of the input, 27% had any input, to the annual state budget request to SDE appears to come from Region VI. Regions I, II, III and VII do not appear to have much input to this process.

Role of SDE in the Annual Budget Planning Process (III.A.5a)

Most respondents (69%) don't understand the role of SDE in the annual budget planning process. An Executive Director stated that he did not understand this process. A district in Region III said that the process had never been communicated to the local school district. Region VII did not agree with SDE's role in this process.

Role of SDE in Biennial Budget Process (III.A.5b)

Most respondents (69%) don't understand the role of SDE in the process.

Regional Planning Process (III.A.6)

Most respondents (47%) don't know whether the ESV regional plan accurately and adequately represents the needs of the local school district. A greater number (78%) don't know about the accuracy and adequacy of the ESV regional plan for the region.

In Region I, one district noted that the regional planning process would be improved with better guidelines for ensuring local involvement. Region II's Executive Director stated that it was important to get the school districts more involved and knowledgeable about computers from an administrative and instructional standpoint. A Region III school district said it was important to demonstrate to the Legislature the indirect costs of the total plan so that they can judge whether the information is worth the cost. The Executive Director of Region III noted that the Region must have more input to the MECC priority setting process.

In Region IV, one district said that it was important to pilot a small district or a small group of districts, giving them adequate personal attention, and use this experience as a basis for developing a regional plan. The Executive Director of Region IV said that the regional plan does not adequately address the number of districts, geographical size, and the number of small districts served.

A district in Region V said that a balanced budget, permitting flexibility for other cost-effective services, with the option to join was important. Also, it was important to make MECC-SDE accountable for their

promises. A Region VI district said there was a need for more flexibility for districts with in-house MIS capabilities. The uncertainty of State funding was the greatest impediment to regional planning.

District Development of ESV-IS Type Programs (III.A.7a and 7b)

A small number of respondents indicated they would develop ESV-IS programs or subsystems for the district: 19% ESV-FIN, 20% ESV-PPS, and 18% ESV-SSS.

One district in Region IV would have used the presently existing Ortonville system. Another district noted that they would have purchased software from a private vendor, if permitted. A large district stated they had systems developed in all areas and had them prior to the ESV-IS.

MIS services, as they are presently provided by the ESV, are generally accepted by the local school districts, except for some dislike in Regions II, III, and IV.

ESV-IS Subsystems and Related Services (III.A.8a and 9b)

Respondents to the survey included: (a) sixteen ESV-FIN users, (b) fifteen ESV-PPS users, and (c) seven ESV-SSS users. After examining the costing responses for questions about services existing prior to MECC, PMM&Co. believes cost cannot be directly compared for an equal level of service with the new ESV-IS systems.

Twenty-two respondents noted that their districts did share computer systems with other school districts or organizations prior to MECC. The types of sharing arrangements were an AVTI, a commercial entity, and local government consortium.

Allocation of MECC's Total Annual Costs for ESV-IS Support (III.A.9a, 9b, and 9c)

Most respondents do not believe that MECC (MECC-MIS) costs should be allocated equally to SDE and the ESV Regions, but support a user-based cost allocation.

A Region I district said that equal allocation would be too costly for small school districts.

One district in Region II noted that "MECC was designed for internal audit control of school districts by the legislature. It is to provide the legislature with comparative information concerning the various districts. The present portion of the legislature's costs is $8 million for the biennium. The total legislative appropriation for education is over $2 billion. In effect, the legislature is spending less than one-half of 1% of the total appropriation for internal audit control of school districts."

According to one Region V district, "if total funding came from the Regions, perhaps MECC would be more responsive to the needs of the user." Another district stated that districts with in-house capability should be subsidized with available funds.

Most respondents noted that MECC should operate with a user charge/fee system. In Region II, it was noted that cost could become prohibitive to

local districts that are now under dollar shortages. School districts do not have the extra money; as MECC is a creation of the legislature, they should continue to pay their share of the cost. "If costs are shifted to the district, there will be a widespread feeling of having been lied to." "It would be poor to require districts to participate and then have the district charged for the service and not reimbursed by the State if only user fees were used."

Region III says that school districts should be allowed to voluntarily select services needed. The costs of the services should be supported by using districts. A school system with 50 to 75 employees does not need an expensive system. One district suggested an allocation basis where ESV aids go directly to the individual school districts as all other aid monies presently.

The ESV regional reporting subsidy formula lacks equitability according to 88% of the respondents. The most positive responses were in Region VI. In Region I, it was noted that a factor of servicing 99 schools, plus covering one-fourth of the state, is not adequately addressed in the ESV regional reporting subsidy formula. Size and number are not the only relevant criteria.

Region IV noted that the reporting subsidy is heavily biased on number of pupils, not the number of districts. Thus, a region with a heavy workload (large number of districts) but small enrolled student population is doubly penalized. One district in Region V said that the complexity of the training factor for a region that has a large number of districts must be considered.

Fee Equitability of Present ESV-IS Services (III.A.10)

Most respondents (57%) believe that current costs and fee structures for the regional ESV-IS services were equitable to the school district. Only in Region III and Region VII were there more than one "no response" among respondents. One district in Region I noted that fees should be based on a per service basis, not per student.

Integration of ESV-IS and SDE-IS Systems (III.A.11)

A large number of respondents (79%) were not familiar with plans to integrate and coordinate ESV-IS and SDE-IS systems. Of those who were familiar, 12% believed it was a realistic plan.

A district in Region III said that if SDE were able to "tap the information" contained at the regional level without district approval, the system was unrealistic. This district also noted that, if figures were obtained without some needed explanation, much misconception could be developed.

The Executive Director for Region VII said that "a single software plan is unworkable and philosophically should remain so."

OPERATIONS POLICY AND PROCEDURE REVIEW (Survey Section IV)

FINDINGS

PMM&Co. believes that this area of questions, because of the limited district responses, needs attention. User school districts have little knowledge of cost and budget and the systems development management process. Based on the few responses received, we recommend that local school districts participate in this systems development process.

ANALYSIS

Finance/Budget - Development (IV.A.1)

Throughout the user community, little knowledge exists of development costs of MECC-developed finance, payroll/personnel and student systems software. Despite a lack of direct knowledge of total development costs, many districts responded to questions about development costs and budget. A Region I district said there had been inadequate time, poor systems analysis, and incomplete data for the test criteria developed. One district in Region VII stated that, for all three systems, it had been too large a project to begin from scratch, and results were promised at too fast a rate. "The reason for development costs exceeding budget was that the system was not piloted," according to a Region IV district.

Finance/Budget - Maintenance and Enhancement (IV.A.2)

Two respondents, one from Region IV and one from Region V, were aware of the maintenance and enhancement costs on MECC-developed software. These respondents were unable to state whether the maintenance costs were within budget or exceeded budget for any of the functional systems.

Believing that maintenance and enhancement costs exceed budget, a respondent in Region I noted that changes to requirements definitions, changes to tests/acceptance criteria, and coding/programming changes were the primary reasons for budgetary overruns. One Region III district understands changes to requirements, definitions and changes to functional specifications were the reasons for costs exceeding budget.

A school district in Region I stated that the lack of a formal approval process for enhancements was the primary problem with the maintenance and enhancement phase. Failure to pilot the system contributed to maintenance and enhancement costs exceeding budget.

Finance/Budget - Management Process (IV.A.3)

School districts in Region I recommended the following changes in the management process to preclude problems of costs and budget: (a) modification of the program packages in each region should be done with authorization or specific analysis of statewide impact and (b) preparation and processing of payrolls in Region I when all the districts pay on the 30th of the month should be addressed in the planning process.

A Region II respondend suggested that all changes should be identified at the district level and forwarded through the regional center. Information about the management process used for development and maintenance was not communicated to local school districts according to one district in Region III.

A Region IV district stated that sufficient funds had not been allocated to MECC. Both the funds and the time lines should reflect a long-term commitment to ensure sufficient staff and development time.

One large district in Region VI stated that "district needs, regional needs, and SDE needs should be defined before the system(s) is designed. The process to be used to make changes and enhancements must be established prior to starting the project." Also, "the management process must be realistic when starting from scratch to do all things for all people," according to a TIES district.

Information System Standards Development (IV.B.1)

A number of respondents indicated having participated in the design or development of ESV-IS system. Moderate to minimal participation was noted by Regions III, IV and VI districts. Moderate participation in the development of the data requirements document was noted by Regions II, IV, VI and VII districts. Regions II, V, VI and VII had districts participate in the development of detailed systems specifications on a minimal to a moderate level.

In developing test criteria for the system, districts in Regions III, VI and VII participated on a moderate to minimal level of involvement. Region IV district noted moderate participation in the coding and programming of application software. Districts in Regions III, VI and VII participated at a minimal level for coding and programming.

Extensive participation in the implementation and training of users for the ESV-IS systems was noted in all Regions except I and VII.

District-Unique Software (IV.B.2a)

In examining the system development milestones for district-unique software, the major emphasis in the development of the system requirements is on the district level being responsible for that particular milestone. Regional responsibility for this milestone was supported in the outlying regions, with the metropolitan areas being heavily in favor of the district responsibility for developing system requirements.

Metropolitan districts are much in favor of the region being responsible for developing system functional specifications with outlying regions divided between leaving this responsibility with the region or with the district level.

Districts in the metropolitan regions and Regions I, II and III are in favor of the district developing the data requirements for the particular applications system. Regions IV and V districts specified that the State or the region should be responsible for this data requirement.

Metropolitan region districts note that the development of detailed system specifications should be with the region. Regions I, II and III

districts noted that there should be district responsibility for these specifications. The development of test and acceptance criteria is evenly divided between regional and district responsibility for all respondents.

The coding and programming of the application software is generally regarded to be a regional responsibility. However, Region VI had four respondents who noted this should be a district responsibility.

The responsibility for implementing a system is evenly divided between region and district. The metropolitan districts show a leaning towards regional responsibility, but there are a number of respondents in Region VI who desire this phase of the system development life cycle to be the responsibility of the district.

There is strong agreement that the responsibility for training a user on the system should rest with the region.

District-Unique Software - Proposed Responsibility (IV.B.2b)

Results for this question differ from the previous question, which asked which level of government is responsible for systems development. In the early systems development milestones, there is a marked increase in the desire to have greater district participation in the development of system requirements, system functional specifications and data requirements. As the system milestones progress to greater technical complexity, there is a shift to assign responsibility to the region. Therefore, the development of tests/acceptance criteria, the coding and programming of the system and application software is left as a regional responsibility. Toward the end of the system development life cycle, with the implementation and training aspects, the impetus is to have district responsibility.

In no region and at no time during the system development milestones is the state listed as the level of government which should be responsible for systems development of district-unique software.

ESV-IS Subsystems Development Responsibility (IV.B.3a and 3b)

Responses indicated State responsibility for the system development milestones. Few respondents note a great amount of control on the part of the local district in the development of feasibility studies, requirements documents or data requirements.

These results suggest that the controls on the development of systems are with the State, with some participation on the part of the region. Many respondents indicated that the systems have been reviewed and audited by the State and region. PMM&Co.'s examination of documentation on this process reveals that there have been no audits of MECC-developed ESV-IS subsystems.

When asked which level of government should control the development of ESV-IS subsystems, the results show a shift to an equal representation for State, regional and district in the early control areas for developing the feasibility study, the requirements document, and the data requirements.

In the development of system design specifications, respondents noted there should be controls exercised at the State and regional level. However, the development of system acceptance and test criteria is viewed as primarily a regional and district responsibility. The review and audit of the installed system appears to be evenly divided between the State and the region, with a large number of respondents noting that districts should participate and control this process.

Time Lines (IV.B.4)

The majority of respondents do not know if time lines are realistic. Of those responding either positively or negatively, most stated that time lines are not realistic.

For the State and MECC levels of government, the primary concern about time lines rests in the early phases of systems development: the feasibility study and the requirements document. Lack of staff appears to have been another impediment noted throughout all phases of the systems development life cycle. Concerns are centered primarily in the staffing and time areas of the implementation and training phases. A secondary time constraint occurs in the feasibility study and the development of system acceptance and test criteria. Inadequate staffing does not appear to have been a primary concern at the regional level.

For the district, the primary concern is the time constraint which occurs during implementation.

Project Controls (IV.B.5)

The Executive Director for Region V, the only respondent to comment on the status of project controls and system standards, responded that project controls had unknown effects on these systems standards:

- Auditability and integrity;
- System security;
- Consistent/reliable output; and
- Easy to maintain and flexible.

Installation Policy (IV.C.1)

A majority of the respondents did not know if there were any statewide policies in effect for the installation of software to maintain a single statewide system concept.

For application program maintenance, respondents were divided as to whether there was a statewide policy for the installation of this particular software for a single statewide system. It was, however, considered a desirable activity for the State.

The majority of the respondents noted that the State was involved in file maintenance procedures, and this was a desirable activity for the future.

Software standardization is considered to be in effect. This is a desired activity for the state. Statewide equipment standardization is considered in effect and desirable. Recovery processes are in effect for the installation of software, and these are considered desirable. However, a large number of respondents do note that they do not believe such standards are in existence.

Respondents are evenly divided as to whether the state does or does not have a policy in the security or privacy area. It is considered desirable to have this type of policy.

Installation Schedule (IV.C.2)

System acceptance tests for the ESV-IS system are considered to be realistic. A number of respondents noted that these acceptance tests were not attainable because of lack of staff or time. Respondents are equally divided concerning the implementation of the ESV-IS. Respondents noted time lines were not realistic or attainable. The primary reason was considered to be staff. Respondents are divided as to the realism of time lines established for the training of users in the operation of ESV-IS. The primary concern appears to be a lack of staff which is restricting this training effort.

Post implementation reviews of the installed ESV-IS system are considered to have realistic and attainable time lines. PMM&Co. notes that there are no published post-implementation review time lines for any ESV-IS systems.

One respondent noted that, whatever the time line, it is primarily dependent upon staff time and expertise, documentation and thoroughly tested software.

Maintenance/Enhancement (IV.D.1)

The present level of utilization of MECC assistance for ESV-IS subsystems is as follows:

- Moderate to heavy utilization of MECC assistance in the requirements definition phase;
- Heavy to moderate utilization of MECC assistance in the functional specifications;
- Heavy utilization of MECC assistance for detailed specifications;
- Heavy utilization of MECC assistance for the development of test and acceptance criteria;
- Heavy to moderate utilization of MECC assistance for the coding, programming and maintenance of the application software;

- Moderate utilization of MECC assistance for the implementation of the system; and

- Moderate to heavy utilization of MECC assistance in the training of users on the system.

When questioned concerning the maximum projected use in the future for MECC assistance for ESV-IS subsystems, response patterns changed. The primary differences are:

- Less reliance on MECC assistance during the implementation and training phases of the system development life cycle;

- Less reliance on MECC for assistance in maintenance/enhancement; and

- Less reliance on MECC for functional specifications.

Applicability of ESV Systems (IV.D.2a and 2b)

There were 42 ESV-FIN users responding to this survey, 27 ESV-PPS users and 7 ESV-SSS users.

ESV-FIN was considered to have a potential for use by other governmental users in the State of Minnesota on an extensive basis. When considering exportability of ESV-FIN to other states, there does appear to be the belief that there is considerable potential for this effort.

ESV-PPS is considered by users to be of some value to applications for other governmental users in the State of Minnesota. The exportability of this system is rated approximately equal to the ESV-FIN.

ESV-SSS is considered to have some or minimal use to Minnesota governmental users. The exportability of this system is considered to be less than the other ESV systems.

Documentation (IV.E.1)

Although the primary respondents to this question were the Executive Directors of the regions, there is an interesting pattern which develops. The primary documentation presently being used on a moderate to extensive basis is as follows:

- User manual;
- Data requirements; and
- Systems specifications.

When examining their future requirements for documentation, both the number of respondents and priorities change. The new pattern is:

- User manuals;
- Data requirements;
- Systems specifications; and
- Computer operations manual.

PMM&Co. notes that this computer operations manual is a need which has been previously identified in on-site visits. There is at present no computer operations manual for any ESV system.

Acquisition (IV.F.1 and 2)

Twenty-one respondents have been involved in computer hardware systems selection. Of these 21 respondents, there is a strong consistency concerning their answers. Consideration does appear to exist for the following:

- Expansion of existing equipment, memory, disk storage and communication processors;
- Adding a larger central processing unit; and
- Configuring multiple smaller computers together in a distributive network.

Twenty-nine respondents were familiar with the State of Minnesota procurement system. Of those with knowledge of the procurement system, there is a belief in the positive effect of state involvement in this procurement. Respondents believe that the state procurement system reduces the total cost, the incremental cost, results in competitive prices, meets user needs, provides information needed for a decision to buy, and is effective in the acquisition of large systems. There are delays noted by respondents in the acquisition of large systems.

For the regional level, state procurement appears to have positive effects on the previously noted areas. The only discrepancy which occurs is in the area of providing information needed to make a decision to buy and in the effectiveness in acquiring large systems.

For the district level of government, the Minnesota procurement system does result in delays in the acquisition of large systems. However, there is consensus concerning the positive impact of this procurement system in the other areas noted in the question.

Data Element Dictionary (IV.G.1)

For the ESV-FIN system, the present format of the data element dictionary meets some needs; however, it does require improvement. For the future, the picture is clouded, as respondents note equally that it meets needs, is unused, and meets some needs. The content of the ESV-FIN data element dictionary is rated equally between meeting some needs and meeting all needs. The content for the future for the ESV-FIN data element dictionary displays this same picture.

For the ESV-PPS system, the data element dictionary meets some needs but requires improvements in the format. For the future, the format of the PPS system data element dictionary will also require some improvement. The present content of the data element dictionary for the ESV-PPS system meets some needs but requires improvements. The requirements for the content in the future show this same pattern.

For the ESV-SSS data element dictionary, users note that it meets some needs but requires improvement in format and content. For the future, there does not appear to be much interest in the data element dictionary from a format or a content format.

Data Acquisition Calendar (IV.G.2)

The data acquisition calendar appears to meet the needs of most users throughout the regions. There are notations for some improvements on the data acquisition calendar. The present data acquisition calendar is merely a schedule of due dates on reports. It does not give any information regarding format of reports. An explanation of how each data element is used and the legal authority for the collection is needed. The document does not include all forms or requests for data. There should be some notation on the duration of the request. Furthermore, this calendar should describe SDE internal procedures. There are reports listed which are no longer used. There is the need for more clarity in special education reporting requirements.

ORGANIZATIONAL ANALYSIS (Survey Section V)

FINDINGS

Respondents are concerned about the lack of technical knowledge among board members and the need to improve the communication process. Systems newness and the learning required by district staff should be addressed.

ANALYSIS

ESV Region Formal Organizational Structure (V.A.1)

The majority of local school districts surveyed are familiar with the formal organizational structure of the ESV regions, as supported by the 54 percent of the survey responses indicating they were familiar. Generally, the strengths perceived in this formal organizational structure of the Region are identified with local control and the existence of a governing board which is representative of the member school districts in a particular region. There are differences when comparing region to region, and these differences can be found in the perceived ability of the administrator (Executive Director), the geographic size of a particular region, and communication difficulties. The survey asked respondents to identify weaknesses in this formal organization structure of each region. The major weaknesses can be identified with the following areas: board members who are lay people having little or no technical knowledge of computers and systems, concerns about regional staff support, and a certain frustration resulting from the desire to be somewhat autonomous from the state.

The respondents in Region I, familiar with the organizational structure of their region, have concerns about the organizational structure in terms of the geographic size of the region, and a history of difficulties occurring under the previous Executive Director. They expressed concern for the communication difficulties because of the large number of school districts located in one of the largest ESV Regions in the state.

As a result of a change in the Executive Director in Region II, the districts familiar with the organization find strength in the new director, the staff of the Region, described as knowledgeable and helpful, and a good regional governing board, which includes the traditional superintendents and school board members, but also business managers from the member districts. Two special concerns were voiced as weaknesses: (a) districts are unaware of the total cost of the administrative MIS on a regional/State level, and (b) lay people on the governing board don't understand the process. This latter item was previously described as a general weakness perceived by local school districts across the entire system.

In Region III, the number of districts responding with familiarity to the structure were equally split as with those who were not familiar. This is particularly significant, since this was one of the first regions formed outside of the metropolitan area. Again, the strengths and weaknesses are similar to those previously expressed and relate to the activities and understanding of board members, local control issues, and a need for more business manager type people on the board.

The responses in Regions IV and V show much more familiarity with the formal organizational structure of their respective regions, but do not provide any additional comments identifying new strengths or weaknesses other than those which have previously been described. One exception would be in the case of Region V, where some administrative difficulties were pointed out relating to planning, cash flow problems, and some staff limitations.

In the case of Region VI (METRO-II), member districts are very supportive of the Executive Director and refer to the existence of a strong governing board. Concern is expressed about the need for some organizational restructuring if additional school districts were to be added to this Region. We note the levels of the strengths and weaknesses vary according to our understanding of the degree of school district activity in this particular Region; that is, the most active districts are highly supportive.

In the TIES organization, Region VII, the survey respondents identify many strengths in the advisory committee structure, the user participation, and the services received from the organization. The weaknesses identified relate to the lack of flexibility in meeting unique needs of user districts and a perceived amount of excessive power available to the Executive Director. We perceive there is a good deal of esprit de corps among the member districts in this particular region, and the member districts are very familiar with the formal organization structure of this region.

If the TIES member districts are excluded, the level of member district familiarity in the remaining six regions, except for METRO II, is a very slight majority.

Organizational Structure of MECC (V.A.2)

Only 32 percent of the responding school districts were familiar with the formal organizational structure of MECC. One third of the member school districts responding from the Regions I-V were familiar with the MECC organizational structure, whereas the two metropolitan regions were split 50/50.

School districts have a perception that MECC has some direct linkage with SDE and that there is some lack of independence between those two organizations. There is a sense that MECC has many competent and technically sound people but suffers from having to hire persons under the state personnel system and attempting to develop a single system for the use of all school districts. TIES districts express some concern for not being able to adopt the TIES systems for use by districts throughout the state, rather than "duplicating" these systems. Except for the comments of the TIES members, the strengths and weaknesses described by the other six regions do not offer a mandate for any change or support of present strengths. Again,

the familiarity with the organization is an impediment to the districts' understanding of any strengths and weaknesses.

Recommendations for Improving your Organization (V.A.3)

Although this question was directed to regional and MECC personnel only, a few of the additional comments provided by surveyed districts do have some significance. Emphasizing the need for service to schools is a theme that is found in the few additional remarks, but there is a concern about dictating what service will be provided. A perception that the school district is the user of the system to which services and effort should be directed is an idea which is found in many of these responses.

Communications Process from User to MECC and Region (V.A.4)

It appears that direct communication is a function of the participation by the Superintendent or board member on a regional advisory body. Lesser active school districts communicate with the regional staff by telephone or letter. Need for better communications appears to be dependent on the frustration of the user in obtaining services or implementing the systems being developed. Satisfaction is also related to the degree of participation by the school district in the ESV-IS. Nonaffiliated school districts tend to have more complaints about the communications process than do those who were participating.

Communication from the user to the MECC organization appears to be, in most cases, very limited, if it exists at all. Communication flow seems to go from the user to the region and to MECC. It is not obvious from these remarks that the user district has any direct contact with MECC, but through the regional staff on behalf of the user district communicates with MECC.

Communications internal to the TIES organization appear to be very satisfactory. On the other hand, communications between TIES and other organizations in the ESV system appear to be difficult or not understood.

Communications Process from MECC and Region to the User District (V.A.5)

Except for the distribution of a regular newsletter, communications from MECC to the user district is nonexistent. Communications between the regions and the user school districts seems to be adequate. We suggest improvements so the user does have an opportunity to understand what is going on statewide and to receive policy from SDE. In communicating policy about ESV-IS, SDE should seek to gain the support of the user districts necessary to achieve the identified goals for the subsystems. The frequency and means of communicating to local districts need to be seriously considered.

The technical communication process from MECC down to the regions needs improvement. Specifically, there is a need to communicate upcoming enhancements to reach of the ESV-IS systems. Such communication would include changes to office procedure which would be necessitated from the

upcoming enhancement. Additionally, delivery times and proposed forms for input to the enhanced systems should be communicated to the region directly.

Specific Coordination Activities and Problems (V.A.6)

Generally, local school districts coordinate their activities through the regional centers to which they are affiliated. The coordination provided may be offered by the service coordinator for any of the subsystems or the regional director. The regional Executive Directors coordinate the users' activities, representing the local school districts, with SDE and MECC-MIS and other outside organizations, such as the legislature or legislators.

Coordination is accomplished through meetings, telephone calls, and personal visits by the support staff at the region. The problems encountered in the coordination relate largely to the unavailability of support persons when needed. The current status of the subsystems contributes to the need for more personal contact with the districts. Frustration arises when support people are unavailable. A few districts expressed concern about changing policy at the state level and not having that communicated to them. The TIES region has many similar problems in coordinating their activities among their member school districts.

Most respondents, 85 percent, who had no problems or did not respond to the question, had not encountered problems in coordinating activities within the ESV-IS system between MECC, the regions, and the user school district.

Kinds of Information Received from ESV-IS (V.A.7)

School districts (81%) responded by saying that the information received was inadequate and inappropriate. The kinds of information described included memos, newsletters, and budget documents. Except for TIES districts, districts in the other six regions did not identify the availability of user manuals or other systems documents. Additional instruction or individual assistance is obviously necessary in either understanding what information has been provided or to simply help the district do its job. Better budget information was also identified as a need. Because of the wide variety of responses to the question of what is needed, it is assumed that district staffs are very frustrated by the current state of the development, and hence there is no consistent mandate for specific needs other than just more help.

Types of Information to be Developed by User District for ESV-IS (V.A.8)

The user school districts are required to prepare annual budgets in the traditional reports for transmission to SDE. Other than these very traditional documents, no other responsibilities for development are placed on the districts.

Most Difficult Feature of your Work with this System (V.A.9)

Difficulty was expressed in many forms, but included the newness of the systems, a lack of knowledge or understanding about the system, people problems at the region and MECC, and a sense that the systems are not responsive to the users' needs. Many of the comments indicate the kinds of remarks one would expect to find in the development of a new system with which most users were unfamiliar. TIES member districts have concern about SDE mandates on that region which creates duplication and constant change.

APPENDIX D

ESV REGION I

School District	ISD	Student Population	User (U) Non user (NU)	Member (M) Nonmember (NM)
Ada	521	A	NU	NM
Alexandria	206	C	NU	M
Barnesville	146	B	U	M
Bemidji	31	C	NU*	NM*
Crookston	593	C	U	M
Detroit Lakes	22	C	U**	M
East Grand Forks	595	C	NU	M
Glenwood	612	B	NU	M
Hallock	351	A	NU	NM
Moorhead	152	D	U	M
New York Mills	553	A	NU	NM
Park Rapids	309	C	NU	M
Stephen	443	A	NU	M
Villard	615	A	NU	NM
Warroad	690	A	U	M
Wheaton	803	A	U	M

* TIES District **Receives Service from Region III

Student Population Code

A less than 1,000
B 1,001 to 2,000
C 2,001 to 5,000
D 5,001 to 10,000
E 10,001 to 20,000
F greater than 20,000

ESV REGION II

School District	ISD	Student Population	User (U) Non user (NU)	Member (M) Nonmember (NM)
Aitkin	1	B	NU	M
Babbitt	692	B	U	M
Biwabik	693	A	NU	M
Cloquet	94	C	NU	M
Coleraine	316	B	NU	M
Duluth	709	E	U	M
Ely	696	B	U	M
Floodwood	698	A	NU	M
Grand Rapids	318	D	U	M
Hibbing	701	C	NU	M
Hill City	2	A	U	M
International Falls	361	C	U	M
Lake Superior	381	C	U	M
Moose Lake	97	A	NU	M
Proctor	704	C	NU*	NM*
Tower-Soudan	708	A	U	M
Virginia	706	C	NU*	NM*

* TIES District

Student Population Code

A less than 1,000
B 1,001 to 2,000
C 2,001 to 5,000
D 5,001 to 10,000
E 10,001 to 20,000
F greater than 20,000

ESV REGION III

School District	ISD	Student Population	User(U) Non user(NU)	Member(M)** Nonmember(NM)
Annandale	876	B	NU	M
Brainerd	181	D	U	M
Browerville	787	A	U	M
Cambridge	911	C	U	M
Crosby-Ironton	182	B	U	M
Elk River	728	D	U	M
Little Falls	482	C	NU	M
Mora	332	B	U	M
Motley	483	A	U	M
Ogilivie	333	A	U	M
Remer	118	A	NU	M
St. Cloud	742	E	NU	M
Sandstone	576	A	NU	M
Sauk Centre	743	B	U	M
Staples	793	B	U	M
Taylors Falls	140	A	U	M
Buffalo	877	C	NU*	NM*

* TIES District

**All are members by reason of location in Region III. Under 1979 law and SDE rules, this does not constitute membership without some action by local school board!

Student Population Code

A less than 1,000
B 1,001 to 2,000
C 2,001 to 5,000
D 5,001 to 10,000
E 10,001 to 20,000
F greater than 20,000

ESV REGION IV

School District	1SD	Student Population	User(U) Non user(NU)	Member(M) Nonmember(NM)
Benson	777	B	U	M
Bird Island	646	A	NU	M
Cottonwood	412	A	NU	M
Fulva	505	A	U	M
Glencoe	422	B	NU	M
Hutchinson	423	C	U	M
Ivanhoe	403	A	U	M
Lamberton	633	A	NU	NM
Madison	377	A	U	M
Marshall	413	C	U	M
Milroy	635	A	NU	M
Ortonville	62	A	NM	M
Raymond	346	A	NU	M
Silver Lake	425	A	NU	NM
Slayton	504	B	U	M
Worthington	518	C	U	M

Student Population Code

A less than 1,000
B 1,001 to 2,000
C 2,001 to 5,000
D 5,001 to 10,000
E 10,001 to 20,000
F greater than 20,000

ESV REGION V

School District	ISD	Student Population	User(U) Non User(NU)	Member(M) Nonmember(NM)
Arlington	731	A	NU	NM
Austin	492	D	U	M
Blue Earth	216	B	U	M
Dodge Center	202	A	U	M
Faribault	656	C	U	M
Freeborn	244	A	NU	NM
Gaylord	732	A	U	M
Hayfield	203	B	NU	NM
Janesville	830	A	NU	NM
Lake City	813	B	U	M
New Ulm	88	C	NU	NM
Owatonna	761	C	NU*	NM*
Rochester	535	E	NU	NM
St. James	840	B	NU	NM
Waseca	829	C	U	M
West Concord	205	A	U	M
Winona	861	D	NU	NM

* TIES District

Student Population

A less than 1,000
B 1,001 to 2,000
C 2,001 to 5,000
D 5,001 to 10,000
E 10,001 to 20,000
F greater than 20,000

ESV REGION VI
(METRO II)

School District	ISD	Student Population	User Non User(NU)	Member(M) Nonmember(NM)
Mahtomedi	832	B	NU*	NM
Minneapolis	SP1	F	NU	NM
Mounds View	621	E	U	M
North St. Paul	622	E	U	M
Robbinsdale	281	F	U	M
St. Paul	625	F	U	M
South Washington County	833	E	U	M

* Pending TIES Membership

Student Population Code

A less than 1,000
B 1,001 to 2,000
C 2,001 to 5,000
D 5,001 to 10,000
E 10,001 to 20,000
F greater than 20,000

ESV REGION VII
(TIES)

School District	ISD	Student Population	User Non User(NU)	Member(M) Nonmember(NM)
Anoka	11	F	NU*	M*
Brooklyn Center	286	B	NU	NM
Burnsville	191	E	NU*	M*
Centennial (Circle Pines)	12	C	NU	NM
Golden Valley	275	B	NU*	M*
Hastings	200	C	NU*	M*
Lakeville	194	C	NU*	M*
Osseo	279	E	NU*	M*
Randolph	195	A	NU	NM
Roseville	623	D	NU*	M*
St. Louis Park	283	D	NU*	M*
South St. Paul	SP6	C	NU*	M*
Wayzata	284	D	NU*	M*

* Ties District, not using ESV-IS subsystems

Student Population Code

A less than 1,000
B 1,001 to 2,000
C 2,001 to 5,000
D 5,001 to 10,000
E 10,001 to 20,000
F greater than 20,000

APPENDIX E

PEAT, MARWICK, MITCHELL & CO.
1700 IDS CENTER
MINNEAPOLIS, MINNESOTA 55402

Dear Survey Participant:

Peat, Marwick, Mitchell & Co. (PMM&Co.) has been retained by the Office of Governor Quie to conduct an extensive study of the Minnesota Educational Computing Consortium (MECC), the Elementary-Secondary and Vocational (ESV) Regions, and the State Department of Education (SDE). The study is a broad review of the purposes and operation of the management information systems with a focus on how well the educational computing needs of the many users are being met.

In this survey instrument, we have used the abbreviation, MECC/Regional ESV/SDE MIS, to represent all of the educational management systems within the scope of this study. We recognize this does not represent any one system alone or presume that all MIS is really one entity.

An integral input to the study is information obtained from interested organizations about MECC/Regional ESV/SDE MIS. For that reason, we have prepared a survey to elicit your perceptions, knowledge, and understanding of the subject. Your responses are confidential and only PMM&Co. project personnel will have access to the information. Please complete the enclosed survey by October 5, 1979 and return it in the self-addressed envelope provided to:

Mr. T. N. Watson
Peat, Marwick, Mitchell & Co.
1700 IDS Center
Minneapolis, MN. 55402

After receipt of the completed surveys, personal and group interviews will be conducted with some portion of the group of respondents. These are tentatively scheduled for the weeks of October 8 and October 15, 1979.

We greatly appreciate your taking the time to provide PMM&Co. with your perceptions and information considering the time constraints involved. This input is an important portion of the data collection effort which is a crucial part of the study.

If you have any questions, please call Mr. Watson collect at 612-341-2222.

Very truly yours,

PEAT, MARWICK, MITCHELL & CO.

MECC/REGIONAL ESV/SDE MIS EVALUATION SURVEY

Peat, Marwick, Mitchell & Co.
1700 IDS Center
Minneapolis, MN. 55402
612-341-2222

GENERAL DIRECTIONS:

This is a CONFIDENTIAL survey about your perceptions, knowledge, and understanding of the MECC/Regional ESV/SDE MIS.

Because of the broad scope of the project, which explains the length of the survey instrument, your participation is important in PMM&Co. responding to the wide range of questions presented by the Governor's Office. Therefore, please answer the survey completely as it will serve as the basis for subsequent interviews by the PMM&Co. engagement team. All responses should be mailed directly to Mr. T. N. Watson, Minneapolis office of PMM&Co. in the enclosed self-addressed envelope:

Peat, Marwick, Mitchell & Co.
1700 IDS Center
Minneapolis, MN. 55402
Attn: Mr. T. N. Watson

Your completed survey should be returned no later than October 5, 1979 to enable us to schedule interviews and meet a rigorous timeline involved in this study. We realize the immediacy of the requested response and will appreciate your attention to this important request.

Thank you for your cooperation and assistance.

Your Name_____

Your Position
(Official Title)_____

Name of Your
Organization/Agency_____

Address_____

Date Survey Completed_____

* * * * *

If your organization is a school district:

- School District # _____
- ESV Region members ? ☐ Yes ☐ No If yes, Region #_____
- Date your district signed joint powers agreement _____
- ESV-IS user? ☐ Yes ☐ No

SPECIFIC DIRECTIONS FOR COMPLETING THE SURVEY

As an integral input to a wide range of questions the study must answer, this survey instrument has been designed to obtain information from all intersted organizations---users and non-users, members and non-members, urban and rural, and large and small. Because of the wide range of questions and the variety of interested organizations, a single comprehensive survey was constructed. The many questions to be answered have been assembled in five sections:

- Requirements
- Staffing
- Costing
- Operations, Policy and Procedure
- Organizational Structure.

The survey is limited to the ESV-IS, the administrative information system for ESV, and the SDE-IS, the internal information system of the State Department of Education. Excluded from the scope of the study and this survey are the:

- Instructional Timesharing Services
- Services to the University of Minnesota
- Services to the State University System
- Services to the Community College System.

Because of the desired comprehensiveness of the survey, PMM&Co. had to construct general questions applicable to all potential respondents as well as very specific questions answerable by a limited number of potential respondents. Consequently we have made provision for the respondent to indicate that the question is not applicable or that a "Don't Know" response is appropriate.

Further, employees with considerable data processing experience or other direct knowledge will be required to best respond to some questions. Many organizations do not have this expertise or knowledge, in which case, the appropriate response should be either a "Don't Know" or other not applicable response.

Finally, additional specific directions are provided in the heading to each section. Please review them carefully prior to attempting to respond to the questions in that section.

I. REQUIREMENTS

A. This section should be completed by all organizations asked to respond to this survey. Responses are desired from current ESV-IS users and non-users, ESV Region members and non-members, ESV Region Centers, MECC, and SDE.

In this section, a series of statements is shown. Place the LETTER that most closely matches your perception of each statement in the BOX Use only ONE LETTER (A through F) for each response.

Response Scale

A= I strongly agree with the statement
B= I moderately agree with the statement
C= I slightly agree with the statement
D= I slightly disagree with the statement
E= I moderately disagree with the statement
F= I strongly disagree with the statement
G= Not applicable/Don't know

Note: If your response is either A or F, please include a brief explanation in the space provided, on the reverse side of this page, or on an attached page.

* * * * * * * *

WHAT IS YOUR PERCEPTION OF EACH OF THE FOLLOWING STATEMENTS FROM THE PERSPECTIVE OF YOUR ORGANIZATION?

1. ☐ The needs of each user (district, ESV Region, and State) of the ESV-IS developed by MECC were adequately identified prior to the development of system software. If response is A or F, please explain. _____

2. ☐ The concept of total district participation in the ESV-IS system is essential for maximum effectiveness and operation of the system. If response is A or F, please explain. _____

3. ☐ The current software developed for ESV-IS meets the needs of very large as well as small school districts. If response is A or F, please explain. _____

4. ☐ Your information needs are now being adequately met by the ESV-IS software utilized by your district. If response is A or F, please explain. _____

5a. ☐ The current region/districts joint powers agreements governing the operation of the ESV Region system adequately provide sound management. If response is A or F, please explain. _____

5b. ☐ The current State/MECC joint powers agreement of MECC adequately provides sound management. If response is A or F, please explain. _____

6. ☐ The initial concept of an independent ESV region with it's own joint powers agreement and governing board is still valid under present conditions. If response is A or F, please explain. _____

7. ☐ The size and number of regions are logical and workable considering geographic conditions, school populations, number of districts, and computer hardware. If your response is D, E, or F, what is the most desirable size and composition of the ESV regions and regional boards? _____

8a. ☐ The procedures for assignment of districts to ESV regions and the transfer of districts from one ESV region to another are clearly defined and followed. If response is A or F, please explain. _____

_____

_____

_____

8b. Rank the items below that should be considered in the assignment or reassignment of districts to an ESV region. (For example, the most important item should be marked "1", and the second most important item, "2", etc.)

_____ number of pupils
_____ wealth of the district
_____ proximity (geographics)
_____ similarity of community/district aspirations for children
_____ racial/ethnic similarities
_____ programmatic/technical needs similarities
_____ cost indices that will maintain the lowest possible overhead
_____ Legislative districts (political subdivisions)

other (please cite) _____

_____

_____

_____

8c. ☐ No changes should be made in the policies/rules for the assignments of districts in your ESV region. If response is A or F, please explain. _____

_____

_____

_____

9a. ☐ The policies and procedures for your ESV region are adequate for governing the region and member districts. If response is A or F, please explain. _____

_____

_____

_____

9b. ☐ The regional organizational structure (responsibilities, positions and the relationships between them) is adequate to perform the responsibilities necessary to serve your region. If response is A or F, please explain. _____

_____

_____

_____

10. ☐ The MECC Facilities and Services Review Committee performs an objective and rigorous review function for the ESV-IS. If response is A or F, please explain. _____

11. ☐ The authority and responsibilities for staffing the ESV-IS system (MECC and the ESV Regions) have been clearly defined, appropriately assigned, and adequately achieved. If response is A or F, please explain. _____

12. ☐ (For SDE and MECC personnel only.) SDE and MECC have appropriate staff size to develop, implement, enhance and maintain SDE-IS software. If response is A or F, please explain. _____

13. ☐ The existence at this time of computer hardware in host ESV Regions III, V, VI, and VII is adequate and meets the needs of your district or agency. If response is A or F, please explain. _____

14. ☐ The installation of additional computer hardware capability in ESV Regions I, II, and IV should be withheld until additional information about user needs, software development and implementation, and related costs can be analyzed. If response is A or F, please explain. _____

15. ☐ The existence or planned acquisition of computer hardware in a school district be evaluated as a viable data processing support option for the delivery of ESV information? If response is A or F, please explain. _____

16. ☐ Software developed by MECC should be developed using a higher-level language which is compatible across multiple vendor lines? If response is A or F, please explain. _____

II. STAFFING

This section should be completed by all organizations asked to respond to this survey. Your response should be specific regarding the kind and nature of your requirements which are either satisfied or not satisfied.

A. General

1. For the ESV-IS, is the SDE staff size adequate to support the requirements for this system?

- ☐ All requirements met
- ☐ *Some requirements met
- ☐ *No requirements met
- ☐ Don't know

*Please list requirements which are not met by present SDE staff because of an inadequate number of available staff.

Requirements	Staff Skill Required	Staff Skill Not Available

2. For the ESV-IS, is the MECC-MIS staff size adequate to meet your requirements for development and operation of the system?

- ☐ All requirements met
- ☐ *Some requirements met
- ☐ *No requirements met
- ☐ Don't know

*Please list requirements which are not met by the present MECC ESV-IS support staff because of an inadequate number of available staff.

Requirements	Staff Skill Required	Staff Skill Not Available

B. Support Software

For the ESV-IS, is the ESV Regional technical support staff meeting the requirements of your region, such as for training and implementation assistance?

- ☐ All requirements met
- ☐ *Some requirements met
- ☐ *No requirements met
- ☐ Don't know

*Please list requirements which are not met by the present ESV Regional technical support staff.

Requirements for Technical Support	Staff Skill Required for Technical Support	Staff Skill Not Available

C. Training

1. As an ESV-IS user, do you receive sufficient training support from your ESV Regional Center?

- ☐ Sufficient user training support
- ☐ *Insufficient user training support
- ☐ *No user training support
- ☐ Don't know

*Please list training support services which are not sufficient or not available.

Training Support Service Required	Staff Skill Required to Support Training	Staff Skill Not Available

2. Is the ESV-IS user and technical training provided by MECC adequate for your ESV region and center?

- ☐ Adequate user and technical training
- ☐ *Inadequate user and technical training
- ☐ *No user and technical training
- ☐ Don't know

*Please list user and technical training services which are not sufficient or not available.

User and Technical Training Required	Staff User and Technical Training Skill Required	Staff Skill Not Available

3. (For MECC and SDE personnel only.) Is SDE-IS user and technical training adequately provided?

- ☐ Adequate user and technical training
- ☐ *Inadequate user and technical training
- ☐ *No user and technical training
- ☐ Don't know

*Please list user and technical training services which are not sufficient or not available.

User and Technical Training Required	Technical Training Required But Not Provided	Technical Training Provided But Not Adequate

III. COSTING

A. This section requires a knowledge of services and related costs provided to your school district or agency. All organizations should complete this section. If a question is not applicable to your organization, leave answer blank.

For this section, the term aids refers to the regional conversion and reporting subsidies.

1a. Has your school district obtained special computer ESV-IS programs for your district?
☐ Yes ☐ No ☐ Don't know

1b. If yes in 1a., has your school district helped pay for the cost of writing special computer ESV-IS programs?
☐ Yes ☐ No ☐ Don't know

- If yes, did you receive an estimate of the cost before agreeing to help pay the cost?
☐ Yes ☐ No ☐ Don't know

- Was the actual cost greater than/ equal to/ less than the estimated cost?
☐ Greater ☐ Equal ☐ Less ☐ Don't know

- Were the computer programs completed when scheduled?
☐ Yes ☐ No ☐ Don't know
If no, why not?

2. Should SDE provide annual support aids to the Regional ESV Centers? ☐ Yes ☐ No ☐ Don't know

If yes, how should the nature and amount of such aids be determined?

3. In addition to the user charges paid, does your district or ESV Region believe the annual state support aids beginning in FY 1980 are equitably provided to all ESV Regions?
☐ Yes ☐ No ☐ Don't know
If no, what changes should be made?

4a. Does your school district have an opportunity to provide input into the Regional ESV Center annual plan and budget.
aids budget request to SDE? ☐ Yes ☐ No ☐ Don't know

If no, what has been your role and experience?

4b. Does your school district or ESV Region have an opportunity to provide input into the annual state support ("regional subsidy") budget request to SDE?

☐ Yes ☐ No ☐ Don't know

5a. Does your school district or ESV Region understand and agree with the role of SDE in the annual budget planning process?

☐ Yes ☐ No ☐ Don't know

If no, why not?

5b. Does your school district or ESV Region understand and agree with the role of SDE in the biennial budget request for regional subsidies? ☐ Yes ☐ No ☐ Don't know

6a. Does the ESV Regional Plan accurately and adequately represent the needs of

your school district? ☐ Yes ☐ No ☐ Don't know

your ESV Region? ☐ Yes ☐ No ☐ Don't know

If no, why not?

6b. If you could improve the regional planning process, what would you do?

7a. Considering the ESV-IS programs and subsystems developed, would your school district have developed those programs and subsystems for itself?

	ESV-FIN	ESV-PPS	ESV-SSS
Yes	☐	☐	☐
No	☐	☐	☐
Don't know	☐	☐	☐

7b. Are MIS services readily accepted by your school distict as they are provided by the ESV Regions? ☐ Yes ☐ No

7c. Have any MIS services been tailored for your school district?

☐ Yes ☐ No

7d. What has been the direct cost to your district of services tailored for your school district?

8a. What ESV-IS subsystems and related services is your school district currently using?

- What is the annual cost of each to your school district?
  Regional fee?
  In-house costs?

8b. For each of the services identified in 8a:

- Were they provided by or to your school district prior to MECC?
  ☐ Yes ☐ No ☐ Don't know

- For each service received prior to MECC, what was the cost to your school district?

8c. Did your school district share computer systems with any other school districts or organizations prior to MECC?
☐ Yes ☐ No ☐ Don't know

If yes, which districts?

9a. If MECC received no State appropriation in the future, do you believe that MECC's total annual costs for ESV-IS support should be allocated equally to SDE and each ESV Region?
☐ Yes ☐ No ☐ Don't know

If no, why not?

What other allocation basis should be considered?

9b. Should MECC operate with a user charge/fee system?
☐ Yes ☐ No ☐ Don't know
If no, why not?

9c. Do you believe that the current Regional Reporting Subsidy Formula is equitable for your ESV Region.
equal basis? ☐ Yes ☐ No ☐ Don't know

If no, why not?

What other allocation basis should be considered?

10. Do you believe that the current costs and fee structures for Regional ESV-IS services are equitable to your school district?
☐ Yes ☐ No ☐ Don't know

If no, how do you think the costs to your school district could be made more equitable?

11. Are you familiar with any plans to integrate and coordinate the ESV-IS and SDE-IS system?

☐ *familiar
☐ not familiar

*If you are familiar, do you believe these plans are:

☐ realistic ☐ **not realistic

☐ cost effective ☐ **not cost effective

**Please explain if you feel the plans are <u>not</u> <u>realistic</u> and/or <u>not</u> <u>cost</u> <u>effective.</u>

IV. OPERATIONS POLICY AND PROCEDURE REVIEW

Answers to questions in this Section will require considerable data processing expertise. If you have this expertise in your organization, you can better answer these questions. If you don't have this expertise available, answer only those questions you can and indicate "don't know" for the others.

A. Finance/Budget

1. Does your district/region know the amount of the development costs of MECC-developed software in each functional area (ESV-FIN, ESV-PPS, ESV-SSS, and SDE-IS)? ☐ Yes ☐ No ☐ Don't know

1a. If you know these development costs, were they:

	ESV FIN	ESV-PPS	ESV-SSS	SDE-IS
within budget	☐	☐	☐	☐
exceeded budget	☐	☐	☐	☐
don't know	☐	☐	☐	☐

1b. If the development costs exceeded budget, what do you believe was the reason? (Check all responses that apply and provide any necessary explanation.)

Comments (Specify System)

☐ (1) project development time lines

☐ (2) requirements definition

☐ (3) functional specification

☐ (4) test/acceptance criteria

☐ (5) coding/programming the system

☐ (6) implementing the system

2. Does your district/region know the amount of maintenance and enhancement costs of MECC-developed software in each function area (ESV-FIN, ESV-PPS, ESV-SSS, and SDE-IS)?
☐ Yes ☐ No ☐ Don't know

2a. If you know these maintenance and enhancement costs, are they:

	ESV-FIN	ESV-PPS	ESV-SSS	SDE-IS
within budget	☐	☐	☐	☐
exceeded budget	☐	☐	☐	☐
don't know	☐	☐	☐	☐

2b. If the maintenance and enhancement costs exceed budget, what do you believe is the reason? (Check all responses that apply and provide any necessary explanation.)

Comments (Specify System)

- ☐ (1) maintenance and enhancement time lines
- ☐ (2) changes to requirements definition
- ☐ (3) changes to functional specification
- ☐ (4) changes to test/acceptance criteria
- ☐ (5) coding/programming changes to the system

3. What changes would you recommend in the management process to preclude the problems identified in 1b. and 2b. above for development, maintenance and enhancement of MECC-developed software? (Use space below for your response.)

B. Information System Standards Development

General

1. Has your organization been involved in the design or development of any ESV-IS or SDE-IS systems?
☐ Yes; ESV-IS ☐ Yes; SDE-IS ☐ No ☐ Don't know

1a. If yes, for either or both, in which of the following system development milestones did you assist the project development team?

System Development Milestones	Perceived Level of Involvement		
	Extensive	Moderate	Minimal
(1) Developed system requirements			
(2) Developed system functional specifications			
(3) Developed data requirements document			
(4) Developed detailed system specifications			
(5) Developed test criteria for system			
(6) Coded or programmed application software			
(7) Implemented system			
(8) Trained user on system			

(9) Other (please cite) _____

_____

_____

2a. For District unique software, what level of government is responsible for the following system development milestones?
Don't know ☐

System Development Milestones	Level of Government		
	State	Region	District
(1) Developing system requirements			
(2) Developing system functional specifications			
(3) Developing data requirements			
(4) Developing detailed system specifications			
(5) Testing acceptance criteria			
(6) Coding/programming application software			
(7) Implementing system			
(8) Training user on system			

(9) Other (please cite) _____

_____

_____

2b. For District unique software, what level of government should be responsible for the following system development milestones? ☐ Don't know

Systems Development Milestones	Level of Government		
	State	Region	District
(1) Develop system requirements			
(2) Develop system functional specifications			
(3) Develop data requirements			
(4) Develop detailed system specifications			
(5) Develop test/acceptance criteria			
(6) Develop code/program system			
(7) Code or program application software			
(8) Implement system			
(9) Train user on system			
(10) Other (please cite)			

3a. When ESV-IS subsystems are developed, what level of government controls this development? ☐ Don't know
Please note your response for State, Region and District in the development of systems:

Controls	Level of Government		
	State	Region	District
(1) Developed feasibility study			
(2) Developed requirements document			
(3) Developed data requirements			
(4) Developed system design specifications			
(5) Developed acceptance and test criteria			
(6) Reviewed and audited installed system			
(7) Other (please cite)			

5. For the ESV-IS, what is the status of project controls and system standards identified below as of the date of this survey. (Use key and make comments and when appropriate refer to subsystem in your response.) ☐ Don't know

Key:

PO = project control has a positive effect on system standards
UN = project control has an unknown effect on system standards
NE = project control has a negative effect on system standards
NO = project control has no effect on system standards
NG = no project control procedures are published or in use for this system standard.

SYSTEM STANDARDS	PROJECT CONTROLS: Feasibility Study of Proposed ESV Application	Requirements Document of Proposed ESV Application	System Design Specification	Acceptance Tests for ESV System
1. Enhance ESV-IS system auditability and integrity. -Defines flows of data -Defines transaction acceptance criteria -Defines data preparation controls.				
2. Improve ESV-IS system security -Control of system change application program/ operation system change -Control over error correction -Addresses threat areas- forms control, transaction acceptance criteria				
3. Provide consistent/reliable results through ESV-IS output -Regularized acceptance handling criteria for transaction -Credibility in system output				
4. Easy to maintain and flexible to accommodate a changing environment -Responds within legislated performance criteria for new system output.				

C. Installation

1. Statewide Policy

Are statewide policies in effect for the installation of software to maintain the single statewide system concept?
Please provide your answers in chart below. Don't know

Maintenance Policy Area	Yes	No	Desirable	Undesirable
(1) Application program maintenance				
(2) File maintenance procedures				
(3) Software standardization				
(4) Equipment standardization				
(5) Recovery processes				
(6) Security/privacy				
(7) Other (please cite)				

2. Schedule

Considering the time and resources it takes to implement systems in your region, are the time lines realistic or attainable for implementing software by the regions? Don't know
If not, insert reason using key below.

S = Staff, B = Budget, T = Time

	Realistic/ Attainable	Not Attainable	Reason Not Attainable
System acceptance/ test for ESV-IS			
Implementation of ESV-IS			
Training users in operation of ESV-IS			
Post-implementation review of the installed ESV-IS			

D. Maintenance/Enhancement

1. To what extent do you use MECC assistance for ESV-IS subsystems? Use the key below to identify the extent of current and projected utilization.

H = heavy utilization
M = moderate utilization
L = light utilization
N = no utilization

If no utilization, use the following reason codes:
S = staff restriction
B = budget restriction
T = time restriction
N/A = no applicability in my region/area.

Systems Standards	Present Level of Utilization	Max. Projected Utilization in Future
(1) Requirements definition		
(2) Functional specifications		
(3) Detailed specifications		
(4) Test criteria development		
(5) Acceptance criteria development		
(6) Code or programmed application software		
(7) Maintenance/enhancement		
(8) Implementation		
(9) Training		

2a. Are you an ESV-FIN user? Yes☐ No☐ If yes, how long? _____

Are you an ESV-PPS user? Yes☐ No☐ If yes, how long? _____

Are you an ESV-SSS user? Yes☐ No☐ If yes, how long? _____

2b. What potential do you believe these systems have for use by other governmental users (e.g., MN cities and counties and all government level in other states)?

E = extensive use
S = some use
M = minimal use
N = no use

	Minnesota	Other States
ESV-FIN		
ESV-PPS		
ESV-SSS		

E. Documentation

1. For the ESV-IS or SDE-IS (SDE answer only) systems, how useful is the documen- tation presently available to you and what is the desired usefulness of the documentation for maximum projected future use. Place the appropriate key (see below) for each informa- tion system.

   Ex = extremely - can be easily used by other regions and districts.
   Mo = moderately - can be used by other regions and districts with some modifications.
   Mi = minimally - can be used only with extensive modification.
   No = not - cannot be used by other regions and districts.

Documentation	ESV-IS Present	ESV-IS Future Usefulness Desired	(SDE answer only) SDE-IS Present	(SDE answer only) SDE-IS Future Usefulness Desired
(1) Feasibility/ cost benefit				
(2) Functional description				
(3) Data Requirements				
(4) System Specifications				
(5) User manuals				
(6) Computer operations manual				

F. Acquisition

1. Are you involved in computer hardware systems selection?
Yes No Dont' know

1a. If yes, for these hardware systems - what consideration is given to each item below at each level of government in upgrading hardware and selecting new computer equipment? Use the key below for your response.

R = routinely
S = seldom considered and implemented
N = never considered

Impact Area	Level of Government: State	Region	District
(1) Expand existing equipment memory, disk storage, and communication processors			
(2) Add a larger central processing unit			
(3) Configure multiple smaller computers together in a distributed network based on specific functions required. Link the units with communication equipment.			

2. Are you familiar with the State of Minnesota procurement system? *Yes No Don't know

*If you are familiar, does this procurement system result in any of the following (use key below):

D = delays in procurement
E = excessive paperwork or control
N = not applicable

Impact Area	Level of Government: State Yes	State No	Region Yes	Region No	District Yes	District No
(1) Reduce the total cost?						
(2) Reduce the incremental cost?						
(3) Result in competitive prices being developed?						
(4) Meet user needs?						
(5) Provide information needed to make a decision to buy?						
(6) Effectively acquire large systems?						

(7) Other (please cite) _____

G. Utilization

1. Considering the ESV-IS Data Element Dictionary, please rate the content and format for the following systems using the key below

M = meets all needs, requires no improvement
*U = unused, data dictionary not used
*N = meets some needs, but requires some improvement
*E = eliminate, the data dictionary is not used/useful
*D = don't know if needed

	Format		Content	
	Present Needs	Future Needs	Present Needs	Future Needs
ESV-FIN				
ESV-PPS				
ESV-SSS				

*Explanation of response U, N, E or D: _____

_____

_____

_____

2. Considering the Data Acquisition Calendar which is provided by SDE, please rate the format and content using the key below:

M = meets all needs
*I = needs improvement
*N = does not meet needs

	Rating
Format	☐
Content	☐

*If response is I or N, please explain. _____

_____

_____

_____

V. ORGANIZATIONAL STRUCTURE:

A. This section is designed to elicit information about the present organizational relationships. We are attempting to determine the present communication channels and are soliciting your suggestions for improvements to the organization and communications.

Any continuation comments should be made on reverse side; please refer to question number with continuation comment.

1. Are you familiar with the formal organizational structure of your ESV Region? ☐ Yes ☐ No

   If yes, please comment as to the strengths/weaknesses of this structure.

Strengths	Weaknesses

2. Are you familiar with the organizational structure of MECC?
   ☐ Yes ☐ No

   If yes, please comment as to the strengths/weaknesses of this structure.

Strengths	Weaknesses

3. (For regions and MECC personnel only.) Do you have any recommendations for improving your organization?
   ☐ Yes ☐ No If yes, please explain_____

4. Define and evaluate the communications process from your position to MECC, the Region, and the District(s).(give examples)_____

5. Define and evaluate the communications process from upper management levels of MECC, the Region, and the District(s) to your position.(give examples)_____

6. Specific coordination activities and problems:

   a. Relative to the ESV-IS, with which departments or functions must you coordinate your department/division/school district work?

   b. How do you accomplish this coordination?

   c. Do you ever encounter any problems in this coordination?
      ☐ Yes ☐ No

      If yes, please explain.

7. Describe the kinds of information you receive from ESV-IS or SDE-IS to aid you in making decisions.

   Is it adequate and appropriate? ☐ Yes ☐ No
   If no, what do you need to properly do your job?

8. Summarize the types of information you are responsible to develop for ESV-IS and SDE-IS for the use of others in the system.

9. Considering the entire ESV-IS, what, in your opinion is the most difficult feature of your work with this system?

THE FOLLOWING QUESTIONS ARE ADDRESSED TO MECC, ESV REGION, AND SDE RESPONDENTS ONLY:

10. Who is your immediate supervisor? _____

Title _____

11. Description of the duties of your positions. List the specific duties of your position in order of importance. If a job description exists for your position, please attach a copy in addition.

The general purpose of your work: _____

12. Has your job assignment changed significantly in the past twelve months? ☐ Yes ☐ No If so, please explain. _____

13. Define the degree of authority or responsibility you have in the organization regarding each of the following administrative activities:

a. Policy development _____

b. Program/Activity design and development _____

c. Personnel

- Hiring _____
- Assessing the performance effectiveness of any staff _____
- Termination _____
- Promotion _____
- Salary increases _____

d. Approval authority of the following:

- Budget development _____
- Budget modifications _____
- Any type of consultative or training services _____
- Equipment and capital purchases _____
- Payment of vendor invoices and claims _____

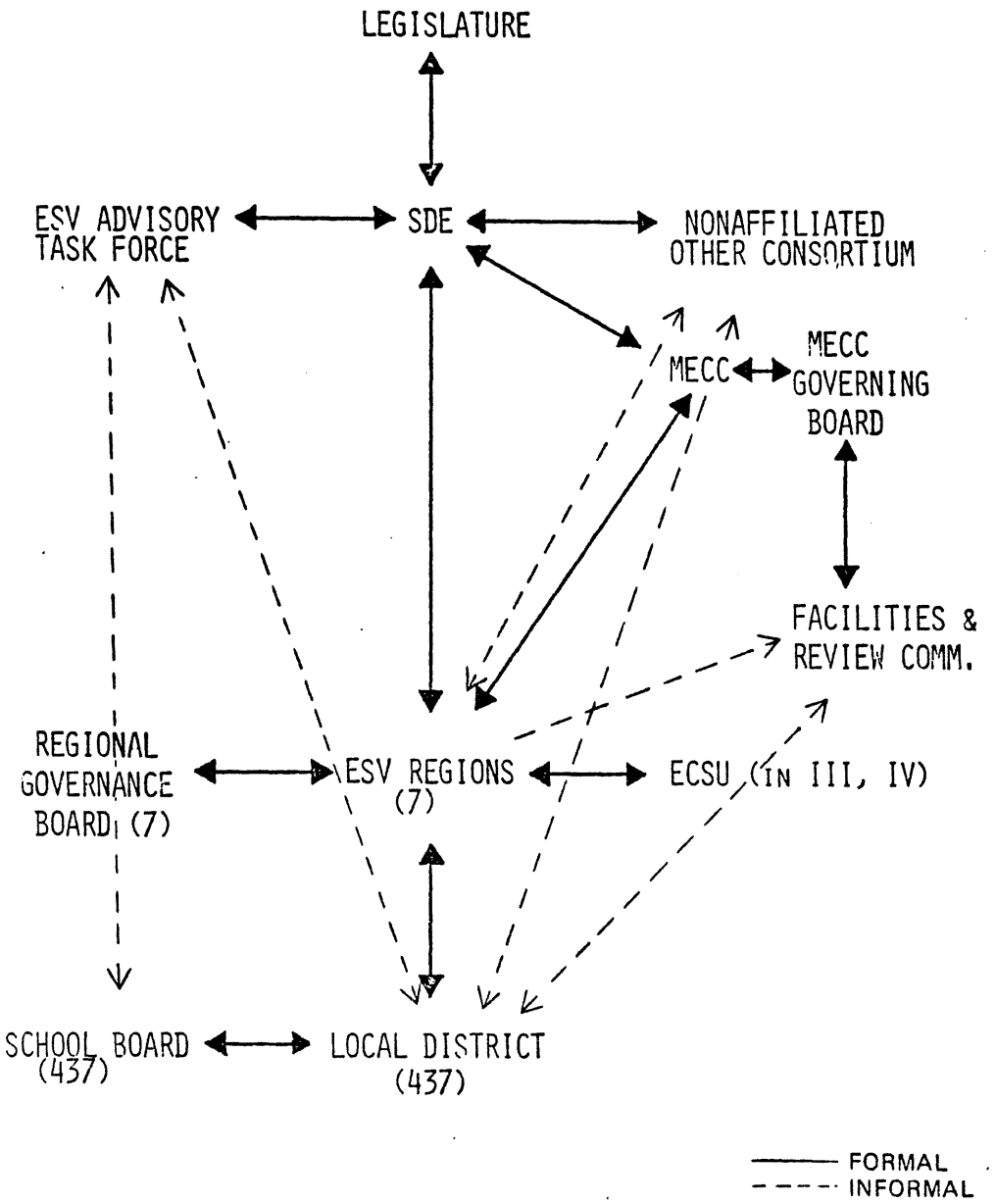
Comments: Please use reverse side for any additional comments you deem appropriate.

Thank you very much for completing the questionnaire.

PEAT, MARWICK, MITCHELL & CO.

Figure 6

PRESENT
ORGANIZATION



VI. BACKGROUND AND REQUIREMENTS ANALYSIS

The development of educational computing in Minnesota commenced in 1967 and was supported by several studies, reports, and actions, commenced in 1967. At that time, State educational leaders recognized the need to plan and coordinate educational activities because of the increased utilization of computers at every level of education. Although initial planning efforts were primarily within the individual education systems and institutions of education, several joint system activities began during the later 1960's and early 1970's. These early efforts were: TIES in 1967, Southern Minnesota School Computer Project (SMSCP) in 1968, and Minnesota Educational Regional Interactive Time Sharing System (MERITSS) in 1971. These activities placed Minnesota education in a position of leadership throughout the nation, with other states studying these Minnesota plans.

The concept of developing a statewide computer network commenced in 1970 when a statewide plan for computers and information systems in higher education was developed under the sponsorship of the Minnesota Higher Education Coordinating Commission and the Governor's Advisory Committee for State Information Systems. Those organizations produced one of the initial documents, used subsequently as a reference for future endeavors, entitled Computers and Information Systems in Higher Education, Part of Information Systems in the State of Minnesota 1970-1980 (1970). In late 1971, the Commissioner of Education established a task force to begin work on a comprehensive plan, similar to the 1970 effort, for the computer facilities required by elementary, secondary, and vocational schools throughout the state. Simultaneously, the Commissioner of Administration, operating under a mandate provided by Laws of Minnesota 1971, Chapter 918, established an ad hoc committee on computers in education to investigate ways of coordinating developments at the two levels of education: (1) elementary, secondary, and vocational education and (2) higher education.

Many events have occurred since those initial organizations were created in the late 1960's and early 1970's. The remainder of this report describes in chronological order those organizations, committees, task forces, and events, formed to contribute to the effort of developing planned and coordinated educational computing services. The facing page Figure 6, illustrates our understanding of the present "organization."

COMMITTEE FOR REGIONAL ELEMENTARY AND SECONDARY EDUCATION INFORMATION SYSTEM (CRESEIS) (1971)

The 1970 report entitled Computers and Information Systems in Higher Education, Part of Information Systems in the State of Minnesota 1970-1980 did not include plans for elementary, secondary and vocational (ESV) schools. As a result, the Commissioner of Education (Howard Casmey), in late 1971, established task forces to begin work on a similar comprehensive plan for the computer facilities required by the ESV schools throughout the state. The plan evolved out of the Committee Regional Elementary and Secondary Education Information System (CRESEIS) subcommittee reports. The three main components of the CRESEIS reports were recommended for developing and supporting:

1. Instructional Applications. Instructional applications refers to all applications of the computer as a means of instruction, as an object of instruction, and as part of the technology of which students should become aware.

2. Occupational Instruction Training. Occupational instruction training exists where occupational training in one or more of the business data processing fields is the major objective.

3. Administrative Applications. Administrative applications that could be performed by the computer were defined as financial accounting, student accounting, census, transportation, school lunch, attendance, grade reporting, inventory, personnel accounting, Federal reports, facilities accounting, scheduling, and management applications. The development of a uniform system of fiscal and pupil accounting was recommended.

The Commissioner of Education's plan encompassed the three main components previously outlined including instructional timesharing, occupational instruction, and administrative data processing. The administrative data processing needs of the ESV area were defined to include local school district management needs, State and other agency information requests, and Department of Education information requirements. Planning in this area directed efforts towards a common information system which could produce timely, comparable, and up-to-date information for those educational administrators and legislative committees who make management and policy decisions. As ESV plans were prepared, the Department of Education was directed to:

- Develop a master plan for all districts to follow;
- Establish a needs assessment procedure;
- Establish computer centers through which the school districts could obtain the necessary services cooperatively with other districts;
- Establish a permanent advisory committee to the Department to help review policy questions and alternatives;

- Provide leadership to assure that a uniform accounting system be established; and

- Develop internal systems to assure that requests for information from the school districts are carefully scrutinized in order to reduce the level of redundancy.

At about the same time that the Commissioner of Education's planning process for ESV was taking place, the Commissioner of Administration had established an ad hoc committee on computers in education.

AD HOC JOINT COMMITTEE ON COMPUTERS IN EDUCATION (1971-72)

The Committee, formed in 1971, met through the early part of 1972. In May 1972, the Committee reviewed a report, prepared by a task force, on a proposed organizational structure. The report offered guidelines for "a formal organization under the control of education to provide facilities to serve the computer needs defined by education available equally to all students in educational institutions in Minnesota, both public and private, on a least cost basis and at a standard cost." The membership on the Joint Committee included:

- Commissioner of Administration;

- Commissioner of Education;

- Chancellor of the State Junior College System;

- Executive Director of the Minnesota Higher Education Coordinating Commission (HECC);

- Exeutive Director of the Minnesota Private College Council;

- Vice-President for Academic Administration, University of Minnesota; and

- Chairman, State Information Services Advisory Council (SISAC).

The Joint Committee, in reviewing the report, endorsed it as a basis for more detailed planning and formed a Planning Task Force for Educational Computing Services to develop more specific functional and organizational plans than those recommended by the earlier task force contained in the May 1972 report.

GOVERNOR'S JOINT COMMITTEE ON COMPUTERS IN EDUCATION

This Committee was appointed by the Governor to implement plans for the fullest possible use of computers at all levels of education. The members of this Committee were the same nine members appointed to the Governor's Joint Committee formed in 1971. The charge of the Governor's Joint Committee to the planning task force, in asking for a detailed, specific plan for the organization of an educational computer service organization, requested that the task force address the:

- composition and role of the governing board;

- outline of the operating divisions of the organization;
- composition of the user advisory structure;
- required joint powers arrangements;
- required and desirable legislation;
- capitalization and funding of the organization;
- methods by which the service organization can assume ownership, control or operating responsibility for facilities already existing; and
- proposed articles of incorporation, charter and/or bylaws and other formal legal documents.

A time-phased plan and schedule for implementation of the operating organization and for assumption of the responsibility for services and facilities was also to be developed at this time. A report was prepared as a result of this effort which was entitled The "MECC" Report dated February 15, 1973. (Reference: A Proposed Educational Computing Services Organization: Its Facilities and Services.) This document appears to be the foundation upon which the MECC concept of organization was developed and has evolved. Attachment VI-1, included in The "MECC" Report, answers the question: what is the MECC concept?

REVIEW OF EVENTS AND OTHER ORGANIZATIONS (1967 - 1973)

During this time there were a notable number of intersystem and intrasystem computing activities occurring throughout the State of Minnesota. As a reference, intrasystem refers to activities between similar educational entities such as school districts, and intersystem arrangements occur between education systems such as a school district and a state college sharing the same facility or network. The most notable cooperative educational computing development in public school education is the Minnesota School District's Data Processing Joint Board (TIES Project) starting in 1967. This organization, an intrasystem regional cooperative serving the seven-county metropolitan area, was established under the Joint Powers Act of the State of Minnesota. TIES provides administrative and instructional services to many school districts in the metropolitan area and several out-state districts.

Another project was the Southern Minnesota School Computer Project (SMSCP), which started in 1968. This was an intersystem project involving school districts and Mankato State College for instructional computing services.

The Minnesota Educational Regional Interactive Time Sharing System (MERITSS), begun in 1971, was a system generally controlled by individual organizations of higher education under the operating management of the University of Minnesota. This system served all post secondary and vocational schools.

There were a number of other intersystem computing arrangements with school districts, state colleges, and area vocational-technical institutes

(AVTI's). In many cases they used computers at AVTI's to provide administrative data processing services to the school districts located within the area.

MINNESOTA EDUCATIONAL COMPUTING CONSORTIUM (MECC) (1973)

The MECC organization was formed effective July 1, 1973 as a result of the many planning efforts that had occurred for the last six years. The February 15, 1973 report, entitled The "MECC" Report, was the basis for the presentation to the 1973 Legislature and subsequent legislative support to form the MECC organization. This report was prepared during the summer of 1972 and reviewed by a Governor's Joint Committee in the fall of 1972, with the final report issued in February 1973. The MECC Board and Advisory Council was formed in June 1973 and began their activities officially on July 1, 1973. A report, entitled MECC Concept, Goals and Objectives, provides a detailed synopsis of the initial concept of the MECC organization. Attachment VI-2 explains how MECC was formed.

During the course of the next eight months, numerous events occurred as a part of the development of MECC and included:

August 1973	Acting Executive Director appointed.
September 1973	Began working with school districts on ESV administrative planning. Task force formed to develop state time-sharing computer specifications.
October 1973	Committees appointed to study elementary, secondary, and vocational administrative regions and MECC purchasing and personnel procedures.
November 1973	Regionalization recommendation approved.
December 1973	State time-sharing specifications approved and bids requested.
January 1974	Executive Director appointed. MECC site committee appointed. Request for legislation approved to permit MECC to sell computer services to private education on a real cost basis.
February 1974	Bids on state time-sharing specifications due February 19, 1974.

As previously indicated above, a regionalization plan was recommended and approved in November 1973. A description of that plan is included as Appendix D to the Minnesota Educational Computing Consortium "MECC" Report - 1974 (February 1974). That report identified seven administrative data processing regions to be established in the state. These regions would follow state planning development region boundaries with one or more of the state planning regions making up each of the data processing regions. The data processing regions, according to the report, were formed based on the following:

- geographic considerations;
- student population; and
- several other factors.

Following the creation of MECC as an organization in July 1973, and during a period of the next few months, MECC commenced development of the instructional timesharing system. We have been told that the choice to develop the instructional timesharing system was made largely because of its rather easy development compared to any of the contemplated administrative systems to be provided. During 1973, the instructional timesharing system was completed and the implementation commended.

EVENTS IN FALL 1974 - 1975

The Department of Education, MECC, and other interested persons and organizations commenced planning and activities related to the ESV interests. John Haugo (current Executive Director of MECC) was employed as a consultant with Educational Management Systems and was hired by SDE to work with MECC to develop the ESV-MIS system. The staffing needed for development included persons employed by MECC, up to 5 METRO II persons assigned to MECC, and up to 10 TIES staff assigned to MECC. From the fall of 1974 through spring of 1975, the mode of operation was planning for the development of this system. This planning process included the Department of Education, MECC, TIES, and other interested parties.

EVENTS IN 1975

MECC and SDE commenced a series of meetings in the spring 1975 with TIES management to determine the needs for the development of the ESV-MIS system. This effort commenced with the physical housing of the MIS staff at TIES in the spring 1975 through the spring 1976.

Executive Director Don Henderson resigned his position with MECC in July 1975. Dale LaFrenz was appointed acting Executive Director at that time and continued to serve in that capacity until January 1976.

A request for proposal (RFP) for the purchase of computer hardware was issued by MECC in September 1975. During the next few months, proposals from UNIVAC, IBM, Burroughs, and DEC were evaluated.

EVENTS IN 1976

John Haugo was hired as Executive Director of MECC. At that time, he identified two key issues which needed to be solved:

- Hardware; and
- Vendor supported software.

A Burroughs 1700 computer was installed in St. Cloud in May 1976. Following this initial installation, two additional Burroughs 1700 computers were installed (Duluth and Rochester).

EVENTS IN LATE 1976 TO PRESENT

During 1976-77, MECC continued development of the ESV-IS applications software in the finance, personnel/payroll, and student functional areas. In July 1976, a Burroughs 6700 computer was installed at MECC. The acceptance test was completed in August 1976.

The finance system development was completed. Robbinsdale school district was selected to pilot the system in the spring of 1977. The piloting effort was completed and the system released for use by school districts during the fiscal year 1978.

This period was highlighted by a series of events and concerns which could have an impact on the future of the ESV-IS system and organizational arrangement:

- questions by some of the larger school systems in Minnesota (e.g., Minneapolis, Rochester, St. Cloud) about MECC's.:

  cost effectiveness
  quality of software
  hardware purchase decisions
  technological obsolescence
  sensitivity and responsiveness to local user requirements and needs;

- a successful lawsuit initiated by the Minnesota Department of Education to prevent the Minneapolis School District from purchasing new hardware (Honeywell) and withdrawing from METRO II;

- the interest of the House of Representatives in educational computing, improved financial reporting by school districts, and computer hardware and software; and

- the increased state funding of school districts requiring improved accountability of school district officials and financial reporting to the legislature, Department of Education, and the general public.

SDE-MIS PLANS (1975)

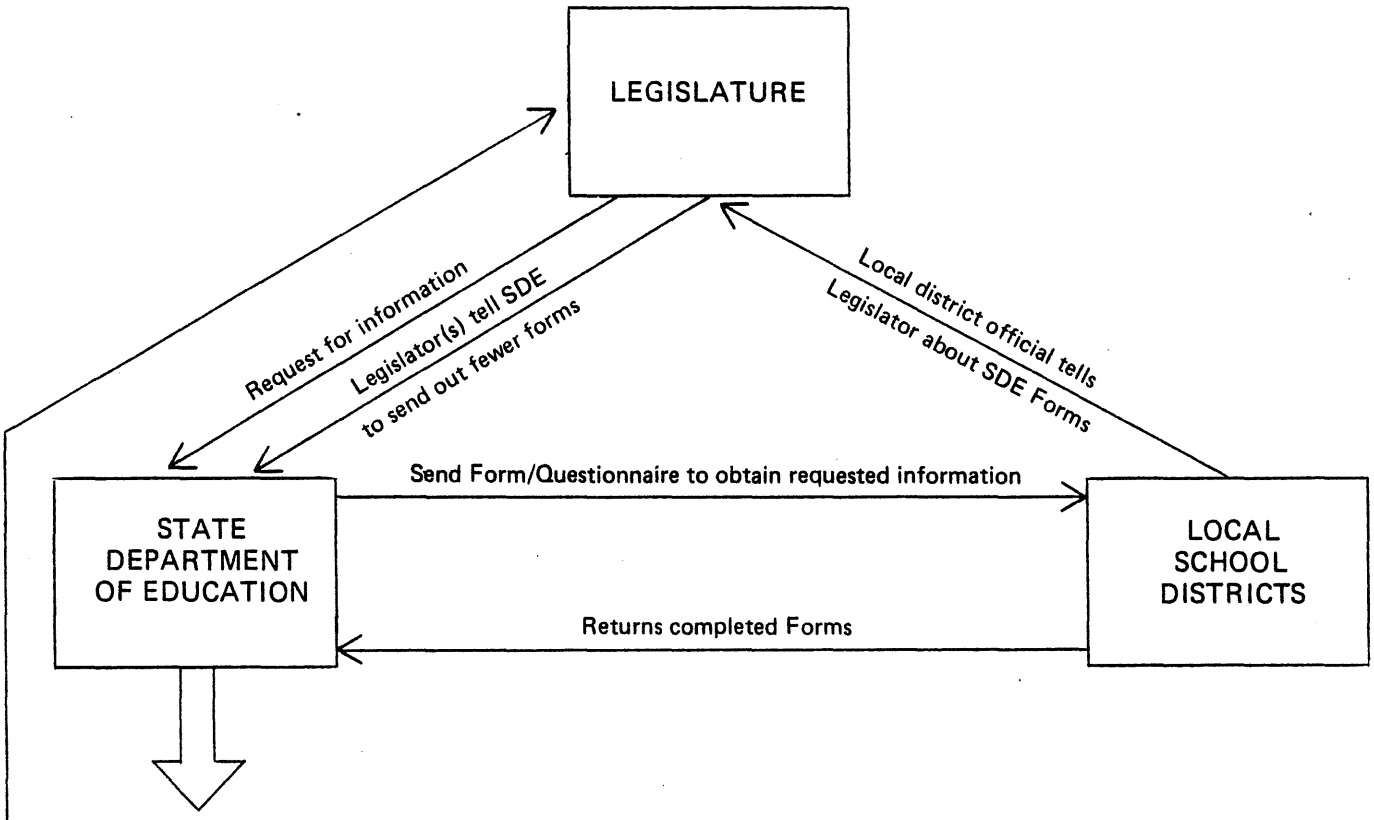
The implementation plan for the SDE Management Information System Development, dated July 15, 1975, states that SDE would use the data files from the regional centers on a timely basis in machine-readable format. "When the final SDE-MIS is operational, SDE indicates that practically no forms will be sent out to the school people in the fall when they are trying to get the school running."

Interviews with top administrators in SDE led PMM&Co. to believe that the development of the SDE-IS is being done to enable SDE to be responsive to the Legislature. The plans for the SDE-IS should satisfy the internal information needs of SDE and the external reporting from SDE to the Federal government or other entities. However, SDE's position is that this system is being developed to provide timely, accurate and adequate information to meet legislative needs.

Legislators do make many requests, not all of which can be answered with a management information system. As such, it will be difficult for SDE to be in a position to ever respond to each and every one of these requests using any system, including computer systems.

The exchange betwen personnel in the Executive and Legislative branches of government, particularly during legislative sessions, can often be characterized as a "master/servant" relationship. (See Figure 7.) Executive branch employees frequently believe they must be able to respond to every need and request, while it may be appropriate to tell the legislator or legislative staff that the information (a) is not immediately available from the management information system, (b) will be gathered manually to be supplied at some specified time in the future, or (c) is not available through manual or automated methods. It is our understanding that legislators, particularly those that are serving as chairpersons of education and appropriation-related committees, have not been asked by SDE to specifically identify the needs of Legislature and legislatures. PMM&Co. believes that these needs have to be defined and analyzed.

Figure 7



- SDE gathers information regularly needed by SDE and Legislature - i.e. multiple requests.

- SDE gathers special information never asked for again - i.e. one-time request.

FREQUENCY ?
VOLUME OF ACTIVITY ?
COST-EFFICIENCY ?
NECESSARY ?

OTHER GOVERNMENTAL ORGANIZATION ARRANGEMENTS

In trying to determine the precise arrangement and organization of the pieces which make up the entire MECC "system," we have determined that a number of organizations and arrangements exist which include not only school districts but also city and county organizations. Many organizations exist which districts can affiliate with and include:

- Cooperatives
  An association of school districts located within a lesser geographic area and apparently for instructional purposes.

- Association of Metropolitan School Districts (AMSD)

- Educational Cooperative Service Units (ECSU)

- Other organizations not related to administrative and data processing, such as Minnesota state high school league and special associations for vocational and special education.

These other organizational arrangements provide significant services to districts. For example, an out-state school district may very well be a member of an ESV region, and ECSU, and an area cooperative. For example, an ESV region was intended to serve administrative data processing purposes and supply services for automating accounting and managerial reporting. The ECSU was originally developed to enhance instruction for districts which would not be able to offer certain curriculum. Recently, the ECSU jurisdiction was expanded to include administrative services.

Similar to the organizations of school districts, there are organizations supplying services to city and county government throughout Minnesota. Counties in Minnesota have created two joint organizations for data processing reasons:

- Minnesota County Computer Consortium (MCCC); and
- Minnesota County Information System (MCIS).

The former organization, MCCC, is organized where individual counties own their own hardware, and the association contracts with a software vendor in St. Cloud to develop and maintain software which is operated by the member county. MCIS, an organization of six to eight counties in Minnesota without their own hardware, contracts for services with Blandon Paper Company in Grand Rapids. There is a consortium in Rochester consisting of the school district, city, and county and share common hardware and software. This arrangement has some proven qualities.

WHAT IS THE MECC CONCEPT?

The MECC concept can best be stated as a goal whereby the educational computing needs of education in Minnesota will be coordinated through MECC and will be addressed and solved by the State's educators. This means that, as a problem is identified in one educational system, the problem solution may be obtained by using the expertise from the other educational systems within the state. The process of solution will be tempered by two basic concepts within the general MECC concept:

- The computer utility concept, and
- The equal opportunity concept. This type of cooperation and solution of educational computing problems is what MECC is all about.

This type of cooperation and solution of educational computing problems is what MECC is really all about.

The basic objectives which are being used as a guide for the MECC organization are to:

- Coordinate educational computing in the State of Minnesota.
- Streamline the procedures in obtaining this type of service for the educational user.
- Maintain the educational computing plan agreed to by the educational systems when they adopted the MECC proposal.

These basic objectives were to be met by the MECC staff, board and advisory council utilizing the following basic guidelines:

- The educational users, along with the central offices (Department of Education, State College Board, etc.) determine the user needs.
- The user and user central office receive the money appropriation and determine the expenditure to be made in trying to meet the identified needs.
- MECC, the user, and the user system will determine the best alternative solution in meeting the needs within the dollars available.

MECC becomes involved at the last guideline to make sure the three objectives, coordinate, streamline, and maintain, are met.