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REPORT TO THE STATE OF MINNESOTA OFFICE OF THE GOVERNOR EVALUATION OF ESV-IS and SDE-IS RESPONSES TO THE REQUEST FOR PROPOSAL QUESTIONS

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REPORT TO THE STATE OF MINNESOTA OFFICE OF THE GOVERNOR - - EVALUATION OF THE ESV-IS AND THE SDE - IS Responses to the Request for Proposal questions - January 1980

"Gov shall retain a consultant to evaluate the de velopment of the regional management informatic system by MECC for the regional managment information centers"(Appropriated $100,000 for study) report to Hse and Senate Ecucation, Hse Appropriation and Senate Finance committees. report due April 1, 1980

In]/]4/80 cover letter--this is the final rpt.

REPORT TO STATE OF MINNESOTA,
OFFICE OF THE GOVERNOR

EVALUATION OF ESV-IS & SDE-IS

Responses to the
Request for Proposal Questions

Peat, Marwick, Mitchell & Co.

Certified Public Accountants

1700 IDS Center
Minneapolis, Minnesota 55402

January 14, 1980

Mr. Robert G. Renner
Governor's Office
130 State Capitol
St. Paul, Minnesota 55155

Dear Mr. Renner:

Peat, Marwick, Mitchell & Co. (PMM&Co.) is pleased to present our 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. Our workplan was designed to gather and analyze information related to ESV-IS, MECC, the ESV Regions, and SDE-IS. This final report follows the format of the RFP questions, which were organized into seven major areas:

- Comparison of centralized systems and decentralized systems (A.1);
- State level funding and organization (A.2);
- Formation, function, and structure of regional centers (B.1);
- Assignment of districts to regions (B.2);
- Procurement of hardware (C);
- Development and maintenance of software (D.1); and
- Implementation of software (D.2).

A SECOND REPORT

PMM&Co. is preparing a second report of the results of the evaluation. The second report will include sections on the following subject areas:

- Organization;
- Staffing;

- Financial analysis;
- Data center reviews;
- Application software analysis; and
- Background of systems.

Although it is based on the same analyses as our responses to the RFP questions, and contains much the same material, we believe that we can more directly address the many subject areas with this second report, which was not required by the terms of our contract.

This second report should be issued in the next two weeks.

CONCLUDING COMMENT

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. However, we believe that many critical issues exist which should be addressed in the near-term future of these systems. Our recommendations, supported by analysis and findings, are provided for each question in this report.

The recommendations should be reviewed as opportunities for improvement rather than as an indication or evaluation of the overall performance of any organizational unit. We believe there is a need for improvement through modifications, minor adjustments, and new and better management control. This report and the second report address these opportunities.

* * * * *

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.

TABLE OF CONTENTS

		Page
A.1	Comparison of Centralized Systems and Decentralized Systems.....	1
A.2	State Level Funding and Organization.....	19
B.1	Formation, Function and Structure of Regional Centers.....	41
B.2	Assignment of Districts to Regions.....	65
C	Procurement of Hardware.....	74
D.1	Development and Maintenance of Software.....	90
D.2	Implementation of Software.....	110

A.1 Comparison of Centralized Systems and Decentralized Systems

TASK AREA: A.1 Comparison of Centralized Systems and Decentralized Systems

EVALUATION QUESTIONS:

1. Is the concept of development and maintenance of common statewide software cost-effective for school districts, the State, and other intergovernmental consortia?

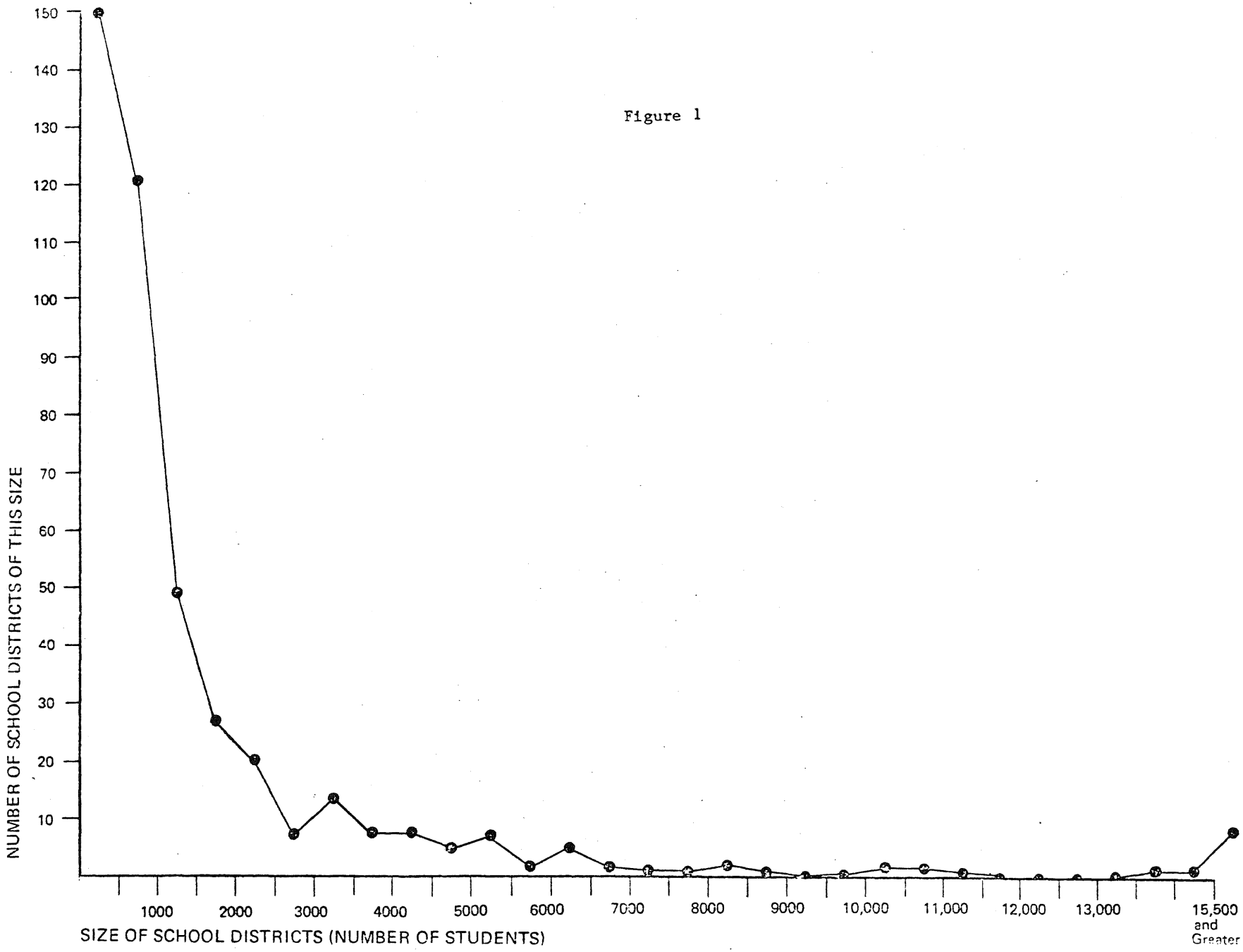
FINDINGS

Because this is a public sector business, the persons responsible for this statewide system must continually consider ways of delivering the services in the most cost-effective manner. Although the cost information is not available at this level of detail, this question, about whether such development and maintenance is truly cost-effective, is answered based on experience and technical knowledge about automated computer systems. To obtain the needed financial information, improved accounting practices must be employed to permit costs to be accounted for and reported on a functional or programmatic basis.

The early reports and planning documents presented, as a potential benefit, the cost-effectiveness of developing and maintaining common statewide software. Specifically, the following items were offered in support of the consortium and the administrative management information system, ESV-IS:

- "Economies of scale may be achieved by enabling a number of users to access fewer, but more powerful, computer and information systems." (The "MECC" Report, February 15, 1973.)
- "Economies may be realized by minimizing duplication of systems development in computer programming efforts." (The "MECC" Report, February 15, 1973.)
- "There will be one consolidated MIS software system developed to accomodate school district, Department of Education, and legislative needs." ("MECC Update", September 1974.)

Figure 1


NUMBER OF SCHOOL DISTRICTS OF THIS SIZE
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
1000
2000
3000
4000
5000
6000
7000
8000
9000
10,000
11,000
12,000
13,000
15,500
and
Greater
SIZE OF SCHOOL DISTRICTS (NUMBER OF STUDENTS)

- "One of the major advantages of the ESV-MIS development is the capability of providing data processing administrative services to local school districts at significantly reduced costs. These cost reductions are able to be provided by the use of the regional cooperative data processing centers which eliminate the duplication of hardware, software, development, etc., at school district." (Minnesota Educational Data Processing to 1980, October 1974.)

PMM&Co.'s examination of the goals which were established for the ESV-MIS system did not reveal any goal which specifically addressed cost-effectiveness to any one district. In examining this question, it is important to keep in mind the sharp stratification between different sizes of districts (see Fig. 1 on facing page). This stratification of district size has a significant impact on the effectiveness of a single software solution for the entire state. We believe that the present ESV-IS system is not effective:

- For the small district because (a) clerical operation overhead has not been reduced; (b) data processing experience requirements are large; and (c) operational value for the district is minimal;

- For the large district because specific needs of school management are not addressed as presently operating; and

- For the regional processing center because these centers incur a considerable overhead burden in support of smaller districts in the state.

We believe it is important for the state to foster and maintain participation of all school districts to:

- Improve the accuracy of financial and performance data provided by the district to the state;

- Improve the dialogue between the district and the state to improve the software product provided the district; and

- Spread the overhead cost of developing and maintaining software systems.

RECOMMENDATION

Common statewide software should be available which is stratified according to the type of user. If software were to be available which could be custom-tailored according to district need, such software should exhibit three levels of complexity:

- a simple, "bare bones" software which would be supported on microcomputer systems for districts less than 2,000 students; (referred to as small districts);

- the full ESV-IS system, as presently designed, to service the needs of districts between 2,000 and 20,000 students; (referred to as intermediate districts); and

- the customized ESV-IS software which would be addressed to the needs of districts above 20,000 students (referred to as large districts).

These stratifications should not be considered as exact, hard parameters. Each school district situation should be carefully analyzed, using the stratification as a guide. Changes in a district's needs and student enrollment necessitate that the parameters be flexible.

Using these three levels of stratification, the State would be able to address the needs of school districts, State and other intergovernmental consortia in a more cost-effective manner. As presently designed, ESV-IS is not cost-effective for the entire state or for all school districts.

PMM&Co.'s experience suggests that common statewide software is not cost-effective if the objective is to provide a single solution to the specific applications area, i.e., finance, payroll/personnel, and student. If the State were to provide a range of software to meet the differing needs of school districts, such a stratification of applications, we believe, would be cost-effective.

TASK AREA: A.1 Comparison of Centralized Systems and Decentralized Systems

EVALUATION QUESTIONS:

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?

FINDINGS

PMM&Co. will answer this cost-effectiveness question in two parts. The first section deals with the Burroughs contract and the second concerns operations at the regional centers.

Burroughs Contract

The present Burroughs contract has resulted in substantial financial advantage to the State. The installment purchase arrangement with a 40.9% discount from the standard book price in effect for the Burroughs hardware and software is extremely competitive. Strictly on the basis of this contract, the concept of a regional host computer center should be cost-effective. Although the State has substantial discount on the installment purchase of hardware, there is no price protection for maintenance on that hardware.

We believe that the State has limited its options on acquiring hardware. There is no option for straight leases, or installment purchases for periods other than 7 years. We do not believe that this arrangement is cost-effective when considering all school districts in the state. The size distribution of school districts is, in our opinion, a major factor in reducing the optimality of the regional host computer center concept. We believe that this arrangement is not cost-effective to support geographically dispersed small districts.

A plan was identified for the establishment of a distributed processing network in the State's original request for proposal for the ESV-IS system, which resulted in the Burroughs' hardware and software contract. At present, this distributed network is not in effect. The Burroughs

B1800 processers, which are located away from the regional host center, are capable of operating with the Burroughs data base management system and the ESV-IS application systems. Burroughs does not, at the present, support a fully distributed network where files and data can be transmitted from the outlying B1800 site to the regional B6800 site. In meetings with Burroughs, PMM&Co. has learned that this type of communication link between the B6800 and the B1800 should be supported in December 1980.

Region III has developed software for use with the B80 minicomputer system. This system is now acting as a remote job entry terminal for the B6800 in St. Cloud. At present, there is no scheduled release date for support of this B80 or B90 system in a distributed network. Burroughs network architecture (BNA) will permit program and file sharing between computer systems, but will not allow automatic down-line loading of data bases. Thus, BNA is not capable of a full distributed network in which files and data could be transmitted from the outlying sites to regional sites, or vice versa. To perform automatic down-line loading of data bases, particularly between different families of computers, such as the B80 and the B1800, would require a conversion program with one or both of the computer systems to effect this internal translation. This conversion program is not available from Burroughs.

Another aspect of the cost-effectiveness question, relating to Burroughs, concerns the State's relationship with this vendor. In a number of instances, there have been cases where responses by the vendor to system outages were not consistent with service levels desired by the State. PMM&Co. recommends that MECC and the regions should join together and deal with Burroughs as a single entity on common problems. Efforts are beginning with the sharing of technical information between regional centers and MECC. Such efforts should be extended to include this area of vendor management.

Operations and Regional Centers

The second part of the answer to this question concerns the cost-effectiveness of the regional center operations. To answer this question fully, accounting and financial record keeping should be available which would separately identify costs associated with data processing and data storage. This type of cost information has not been made available to PMM&Co. Even though we do not have this cost information, we believe we can answer the question from an effectiveness standpoint. In response to our survey document, many districts in each region expressed concern that information about the extent and nature of user needs has not been identified. They believe that this process is important and should be conducted prior to installing any additional computer hardware equipment in the region. Further, software development and implementation questions should be analyzed and the cost implications of additional hardware should be determined before any additional hardware is installed.

The computer resources management review conducted by PMM&Co. at each of the regional data centers demonstrated to us that substantial progress needs to be made by the data centers in the management of the computer resource. Specifically, consumption of the computer resource needs to be measured and recorded by district and by application (ESV-FIN, ESV-PPS, and ESV-SSS). With this detailed processing consumption information available, decisions can be made at the regional centers as to a logical process for

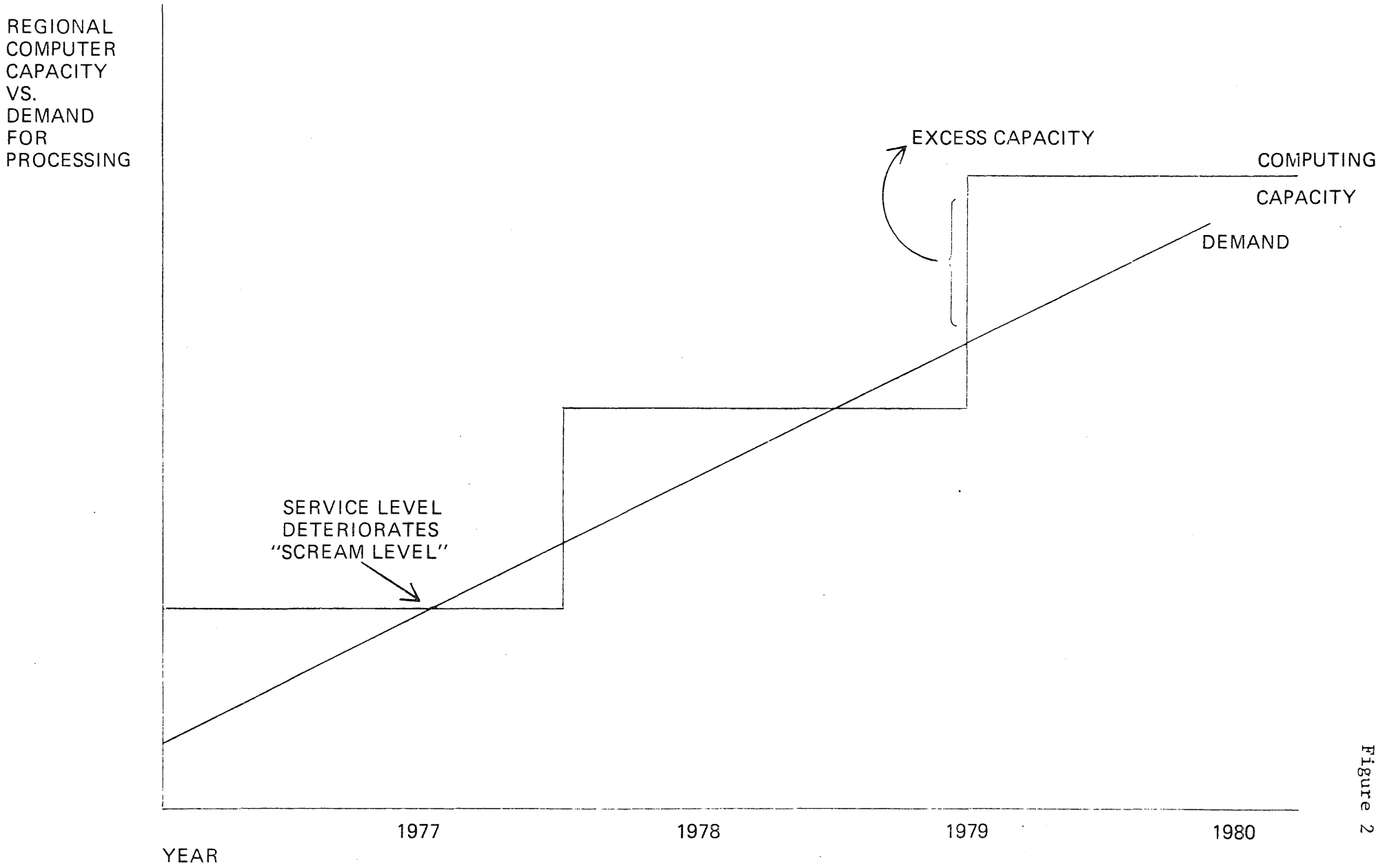

REGIONAL
COMPUTER
CAPACITY
VS.
DEMAND
FOR
PROCESSING
EXCESS CAPACITY
COMPUTING
CAPACITY
DEMAND
SERVICE LEVEL
DETERIORATES
"SCREAM LEVEL"
1977
1978
1979
1980
YEAR

Figure 2

expanding hardware capabilities. A staged growth pattern for the regional center would be the result of this logical process. Such a staged growth plan would include the use of:

- manual reporting which was UFARS compatible for very small districts;
- microcomputer systems for small districts for UFARS reporting; and
- distributed processing alternatives as district size and computer use grew.

A staged growth approach delivered by the regional computer center to the district would foster participation in the consortium and give districts and the center a greater number of options for meeting statewide reporting requirement. By using microcomputer systems, out-state regions would be able to postpone expansion of the regional computer center until sufficient user demand had been generated. This staging of computer growth is a more cost effective application of regional processing resources. On the facing page, Figure 2 illustrates the process.

This should allow the State to maintain more cost-effective delivery of service to districts.

PMM&Co. does not believe that the execution of the concept of regional host centers is totally effective for the State. We believe that attempting to provide the ESV-IS, as presently configured, to small districts is not cost-effective. Further, we do not believe the ESV-IS systems, as presently configured, meet the needs of large districts. Finally, the present regional processing center approach does not link other governmental consortia into this network. For instance, Rochester and St. Cloud are examples of districts which combine their data processing with other governmental entities. The present regional host center concept does not address this issue. Rather, PMM&Co. believes that regional centers are interested in supplanting these other governmental arrangements for sharing of computer systems. Therefore, when considered with the entire state, this regional processing plan is not cost-effective.

RECOMMENDATIONS

PMM&Co. recommends the following actions:

- Regional centers immediately begin to measure the consumption of processing resources at their centers and report this processing consumption by district and by application;
- MECC should begin a computer performance evaluation section which would support regional centers in the analysis of the information resulting from the measurement of resource consumption;

- Further expansion of regional processing centers should be coordinated through the proposed ESV Planning and Control group. (Further explanation in B.1(5).) Such coordination would include descriptions of alternatives, costing of those alternatives, and approval of the least-cost option to the district, region, and the State; and

- As part of a processing resource planning responsibility for MECC, examinations should be made of opportunities to share processing resources with other governmental entities. Third party assistance should be enlisted initially due to staff shortages at MECC.

PMM&Co. does not believe that the current regional host computer arrangement is the most effective for data processing. We believe that these centers are not operating consistent with the original statewide goals for Elementary, Secondary and Vocational Education as interpreted by the State Department of Education. We believe that greater coordination of the delivery of these regional processing services is an important step in the achievement of cost-effective data processing for the State.

The Burroughs master contract with the State expires in 1983. The State should begin to evaluate its options for future contracts using the following strategies for acquisition:

- installment purchase with optional year periods;

- straight lease;

- options to sublease State hardware under a lease/purchase contract; and

- linking lease and maintenance contracts.

A full cost analysis must be conducted to ensure that flexible cost-effective data processing is delivered to the State.

TASK AREA: A.1 Comparison of Centralized Systems and Decentralized Systems

EVALUATION QUESTIONS:

3. Should district-unique software be developed by districts and regions, or developed at the State level?

FINDINGS

Based on the individual district responses to the survey questionnaire, 71% of the respondents indicated that their districts had not been involved in the design or development of the two MIS systems -- ESV-IS and SDE-IS. The level of involvement of those participating was perceived to be somewhat moderate to minimal and more heavily concentrated in the area of developing system performance guidelines, functional specifications, and system implementation plans. Further, respondent districts were uncertain as to the level of government responsible for the different systems development milestones. The perception of respondents, remembering that only 14% of the responding districts have been involved and are located in the metropolitan area, was that districts were more heavily involved in the front-end of developing systems and that the regions were more heavily involved in developing detailed specifications, testing, programming, implementing and training the user on the systems. Respondents indicated that local school districts should be more heavily responsible for developing systems requirements, functional specifications, and data requirements, while the regions should be more responsible for developing detailed systems specifications, test/acceptance criteria, code/program system, code or program application software, implementation and training the user on the system.

PMM&Co. concludes that districts are not desirous of being highly involved with developing district-unique software, but they do want to have the opportunity to be involved in the development at the early stages of

the cycle. This is very consistent with the level of participation that the districts have requested in regard to many other issues which have been addressed by this study. There is a slight modification to this response when dealing with the metropolitan school districts, who desire to do more of their own system development work for themselves.

RECOMMENDATIONS

District-unique software should be developed by districts and regions which have the expertise and resource to do so because:

- developers of the system would be closer to the end-users and more sensitive to their needs;
- decentralized development would be more responsive since the development would not have to be queued with the needs of the rest of the state; and
- MECC would not have to maintain a large development staff to meet unplanned peaks in development requests.

However, there should be controls and standards for decentralized development, and most importantly, the proposed ESV Planning and Control Group must determine that the need for software is district-unique.

The types of controls and standards which should be in effect for software which has been developed by the district should be as follows:

- those programs of a nonrecurring nature need only be kept as a program listing;
- those programs which are to be run on a recurring nature, but are simple changes to reports, should be given as program listings to MECC; and
- those district developments which have application across a number of districts, and which are broader in nature, such as the Ortonville model, should be documented according to statewide standards.

The documentation for microcomputer application system should include, in addition to program listings, flow charts of system operations, operator instructions, and user documentation.

Acting as a repository of this district- and regional-developed software, MECC-MIS could tailor and amend the software such that a standard product could be sent out to the individual school districts requesting the product. For users of the ESV-IS systems, such changes would come during the release of a new generation of ESV-IS software. For users of software developed for microcomputer systems, they would receive a full set of user documentation and run information upon request to their region.

TASK AREA: A.1 Comparison of Centralized Systems and Decentralized Systems

EVALUATION QUESTIONS:

4. Have the regional centers given adequate consideration in their plans and in development to date to methods for distributed processing? If not, what specific changes should be made in those plans and developments? What should be the place of satellite computers, microcomputers and Burroughs Network Architecture?

FINDINGS

No. Some regional centers have not given adequate consideration in their plans for the development of distributed processing. TIES has established objectives for applications of distributed systems in their long-range plan. This plan calls for the use of distributed systems for data entry, editing, report generation, and the maintenance of small, district-unique files, as well as a feasibility study of data-base down-loading. TIES is presently studying the applications of the B80-B90 for this purpose.

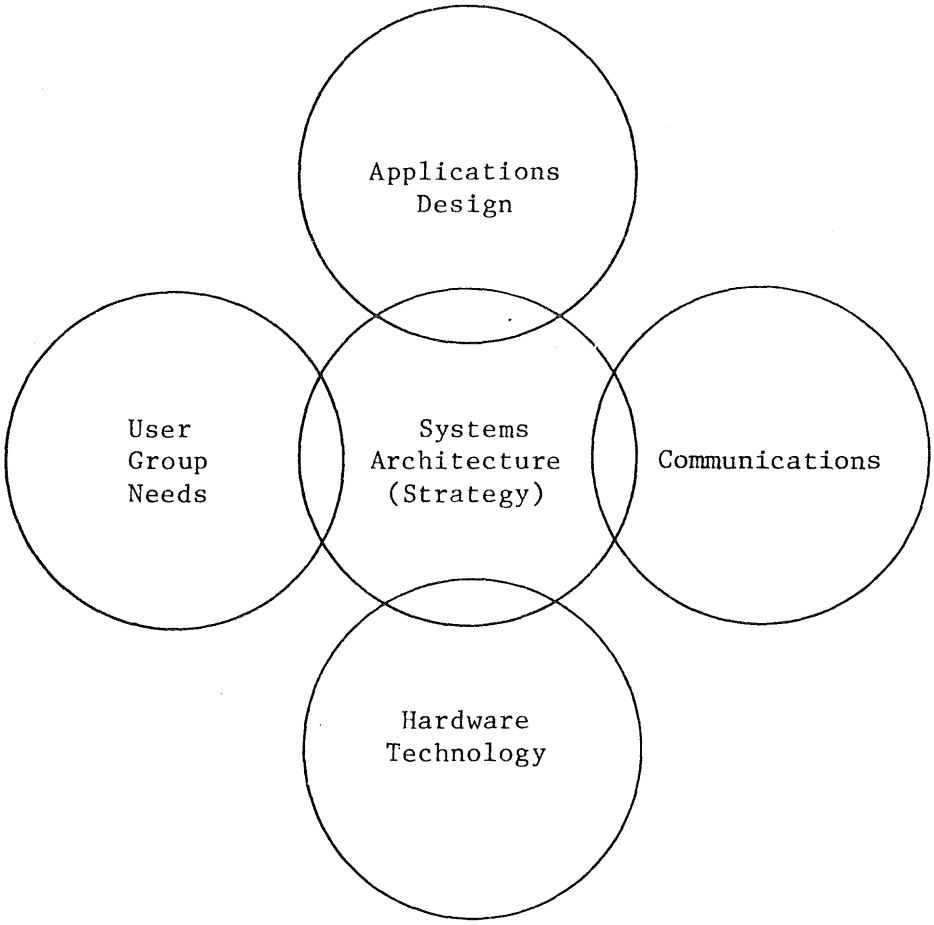
Region III has initiated use of the B80 as a remote job entry terminal. Region III has developed software for this machine to permit it to be used as a data entry device. MECC has not addressed the need for distributed processing in a long-range plan. At present, MECC is unable, due to staffing constraints, to respond to pressure from the regions for the use of the B80. B80's are being procured by Region III, rather than through the statewide contract with MECC. Such an extensive acquisition program is not consistent with statewide requirements for the purchase of hardware under the Facilities and Services Review Committee.

RECOMMENDATIONS

To objectively answer the need for distributed processing in the statewide system, it is necessary for the ESV Planning and Control to conduct overall processing resource planning. This planning should include threshholds for the computation of:

- number of students which can be supported per central processing unit, such as the B6800;

Figure 3


Applications
Design
User
Group
Needs
Systems
Architecture
(Strategy)
Communications
Hardware
Technology

- number of students per application type (FIN, PPS, SSS) which can be supported per central processing unit, such as the B6800; and

- performance monitoring of each central processing unit.

With a plan for processing resource consumption, it will be possible for the State to identify which regions will require more extensive use of the distributed processing concept (or microcomputer system). We believe that regions with small, geographically dispensed districts should evaluate the cost of delivering ESV-IS service via microcomputers. The communication costs of servicing districts at extensive distances from the regional center must be evaluated prior to installation or purchase of communication equipment or lines.

The role of a microcomputer in the overall statewide processing plan has not been addressed. Ortonville has developed a finance and payroll personnel system which can operate on a microcomputer. MECC should examine this software with the objective of making a standard statewide package available for these microcomputer systems. These systems should be considered a viable alternative to establishing communications networks with the resulting complications and costs for the regional processing center.

The proposed ESV Planning and Control group should assume a leadership role as the system architect for the delivery of statewide software to the district. Such a role should include the following:

- assessment of user group needs;
- design of application systems;
- assessment of communication requirements; and
- assessment of technical hardware considerations.

Such a systems architectural role is illustrated in Figure 3 on the facing page. It can be seen from examining this diagram that the central link for the entire process is the systems architecture plan. Without concentration on the implications of each of the component elements, networks can be developed, hardware can be acquired, and systems can be designed which do not fit together into a coherent and cost-effective package.

TASK AREA: A.1 Comparison of Centralized Systems and Decentralized Systems

EVALUATION QUESTIONS:

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? What are the preferable alternatives?

FINDINGS

No. The scope of the system as presently developed and planned is not likely to be optimal for the next five years. The major constraint that the State of Minnesota is encountering with this development process is that the plan for implementation of the ESV-IS systems does not fully support user requirements. As such, it is difficult to enlist the support of users and the commitment of users.

The most coherent discussion of the scope of the ESV-IS system occurs in the RFP which was written in 1975 for the initial procurement of hardware and software. This document specifies the use of distributed processing combined with a delivery system through the region.

The geographical dispersion of small independent school districts of 1,000 and below militates against a regional processing system. The support of these smaller districts will result in extensive communication networks and the costs for the delivery of that network service.

RECOMMENDATIONS

The strategy for dealing with the issue of centralized versus decentralized systems should be developed based on a recognition of user needs. The needs of the user community differ based on the size of the district in terms of numbers of students:

- small districts (below 2,000) which are not in close proximity to regional centers;

- intermediate districts (2,000 to 20,000 students) which are in close proximity to regional centers; and

- large metropolitan districts.

The small districts may best have their needs served by the use of microcomputer technology as applied to small business systems. These systems could transmit summary data on an as-needed basis to the regional centers. Such reporting might be monthly, or yearly. Transmission could be via printed output, floppy disk, or dial-up communication to the regional center.

The intermediate districts are to be best served by the current development methodologies and strategies. The large districts have needs which are unique and must be met by customized development of software and customized approaches to systems development. Such approaches would use the present ESV-IS as a point of departure.

The continuing reduction of cost in microcomputer technology and the increase in cost of telecommunications support as a portion of the overall data processing budget are two of the governing technological changes over the next five years. These trends favor the use of the microcomputers in remote districts. The important effort in ensuring both optimal delivery of data processing service and receipt of accurate and timely reporting data is the systems architecture plan.

A consideration for this plan is a review of state of the art technology. Technological advances should not be implemented solely for the sake of remaining state-of-the-art. Like other development efforts, use of new technological advances should be considered only if they are the best means of satisfying user needs.

TASK AREA: A.1 Comparison of Centralized Systems and Decentralized Systems

EVALUATION QUESTIONS:

6. What costs, benefits and trade-offs would be attached to further decentralization of governance, operation or development?

FINDINGS

The decentralization of governance, operation, or development issue revolves around three questions:

- should MECC decide this issue concerning ESV-IS?
- should the regions decide this issue concerning ESV-IS?
- should SDE decide this issue concerning ESV-IS?

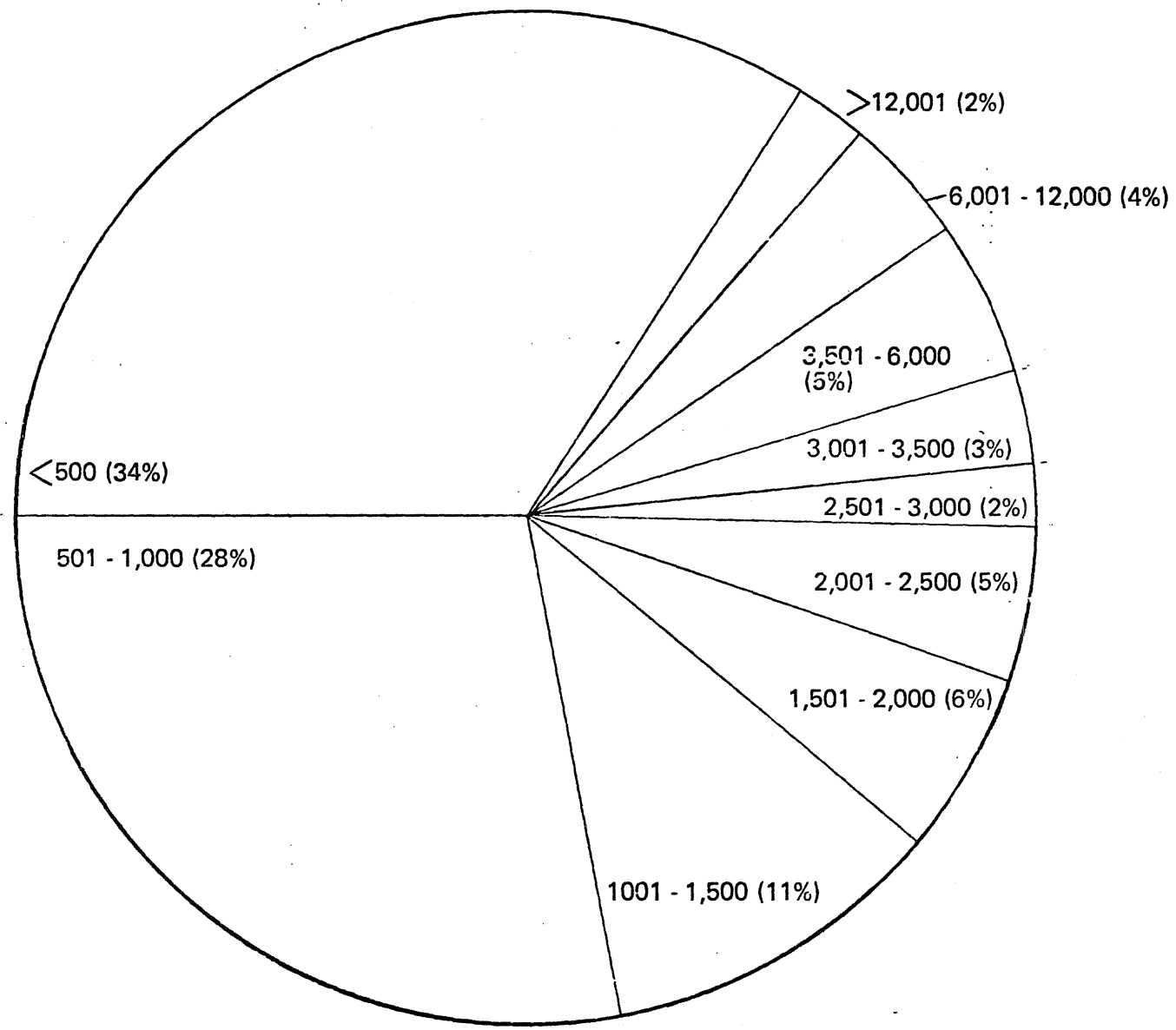
GOVERNANCE

Based upon PMM&Co.'s examination of the number of committees and structure surrounding the MECC process, it is our observation that further decentralization of the government would be deleterious. At present there are a considerable number of communication links, and these links further convolute the communications process for what essentially is a business enterprise. As such, this complicated communications net increases the cost and increases development times in bringing systems to a fully implemented status. In question B1(5) we present our recommendations on organization for governance.

OPERATION

Further, decentralization of operation can be examined from two viewpoints:

- survey results indicate that operations should be close to the districts; and



DISTRIBUTION OF SCHOOL DISTRICTS
BY STUDENT POPULATION

Figure 4

- decentralized operations are more difficult to control.

In examining this question, PMM&Co. has observed that the state has a significant stratification of independent school districts. There are 79% which are below 2,000 students; there are 18% which are in the range of 2,000 to 20,000; and there are 1% which are above that 20,000 student level. PMM&Co. believes that the following stratifications can be useful in addressing the operational questions for the ESV-IS (Figure 4 on the facing page).

- small districts below 2,000 students;
- intermediate districts between 2,000 and 20,000 students; and
- large districts above 20,000 students.

Our observations on these distributions follows in the next paragraph.

Small Districts (Below 2,000 Students)

For the smaller district, application of a statewide ESV-IS system is not cost-effective. The overhead involved in training all of these districts, the support which is required for districts which have little data processing expertise, and the complication involved in running the ESV-IS systems, precludes these smaller districts from being able to fully utilize all the capabilities of these ESV-IS systems.

PMM&Co. believes that districts below 2,000 students can be subdivided as follows:

- School districts below 1,000 students; and
- School districts between 1,000 and 2,000 students.

For districts below 1,000 students we recommend that: (a) manual reporting be considered as an initial option; and (b) microcomputer versions of ESV-IS software be considered as a subsequent option. Regional processing centers should work with their small districts to ensure the most effective option is considered.

For districts between 1,000 and 2,000 students we recommend that: (a) microcomputer versions of ESV-IS systems be considered as an initial option; and (b) present ESV-IS be considered as a subsequent option. Regional centers should balance the demands upon their central processing resource with the application of microcomputer versions of ESV-IS to these small districts. Such systems are an attractive method of eliminating communcation cost from the regional center to geographically remote districts. If there are districts between 1,000 and 2,000 students near the regional center, these districts would be attractive candidates for implementation of the present ESV-IS systems.

Intermediate Districts (2,000 to 20,000 Students)

The second grouping of independent school districts ranges between 2,000 and 20,000 students.

School districts with between 2,000 and 20,000 students are typically within proximity of the regional processing center. PMM&Co. believes these districts are good candidates for application of the ESV-IS software.

RECOMMENDED STRATIFICATION LEVELS FOR DEVELOPMENT and OPERATION

SCHOOL DISTRICT SIZE	PERCENTAGE OF DISTRICTS	RECOMMENDED PROCESSING APPROACH	COORDINATING AGENCY	RECOMMENDED SOFTWARE APPROACH	RESULTANT SOFTWARE SYSTEM
SMALL * (Less than 2,000 Students)	79%	MICROCOMPUTERS	ESV PLANNING AND CONTROL	STANDARD SOFTWARE FOR MICROS - APPLE II - PET • MECC DEVELOPED • MECC MONITORED/CONTROLLED IN-HOUSE CONTRACT	STANDARD ESV-IS SOFTWARE APPLIED ACROSS A NUMBER OF VENDOR LINES
INTERMEDIATE (2,000 to 20,000 Students)	18%	REGIONAL PROCESSING CENTERS		• MECC DEVELOPED REGIONAL/DISTRICT UNIQUE REPORTS	STANDARD ESV-IS SOFTWARE
LARGE (Greater than 20,000 Students)	3%	REGIONAL PROCESSING/ IN-HOUSE OPTION		CUSTOMIZED ESV-IS SOFTWARE FOR DISTRICTS • MECC DEVELOPED • MECC MONITORED/CONTROLLED IN-HOUSE CONTRACT	CUSTOMIZED ESV-IS SOFTWARE FOR DISTRICT - UNIQUE APPLICATION

THERE IS NO SIMULTANEOUS EQUATION TO SOLVE THE TOTAL SYSTEM!

REGIONAL CENTERS SHOULD WORK WITH SCHOOL DISTRICTS TO DETERMINE BEST SOLUTION

* A manual reporting option should exist for these school districts. The manually prepared report should be delivered to the regional center for data entry in the regional ESV-FIN.

Figure 5

Large Districts (Greater than 20,000 Students)

For the largest districts, over 20,000 students, the ESV-IS software may, or may not, be appropriate. These districts have specific requirements and needs which may be out of the mainstream of ESV-IS. That is, in PMM&Co.'s opinion, the ESV-IS is most effective for those districts between 2,000 and 20,000 students. Above those levels, specific district requirements can frequently take precedence. The addressing of these specific types of needs in the ESV-IS system has complicated the design of the ESV-IS systems. This has reduced the effectiveness of these systems and made operations less effective for the districts between 2,000 and 20,000 students.

DEVELOPMENT

PMM&Co. believes that such stratification is helpful in a discussion of the development requirements for the ESV-IS systems. That is, for districts which are below 1,000 students, we do not think it is cost-effective to address these districts' needs with a regionalized processing center. For districts in the 1,000 to 2,000 range, PMM&Co. believes it would be appropriate to address these needs using software systems which have been developed, such as the Ortonville microcomputer system (student population 1978-79 = 944). Such systems, as developed at Ortonville, are simple to use for the district, provide simple audit trails for transactions, and can be adapted to the reporting requirements for UFARS. They represent a significant opportunity for the state to take advantage of this type of technology. Using this Ortonville model as a departure point, MECC could provide standardized software for these microcomputer systems. The district would be responsible for the purchase of the equipment, and MECC could supply the applications programs. Using this approach, it should be possible to both extend the audience for MECC- developed ESV-IS systems and to reduce the per-pupil cost to the state of delivering the service.

RECOMMENDATIONS

As a method of illustrating the logic process for this analysis, we have constructed Figure 5 on the facing page. We show MECC ESV-MIS as the coordinating agency for software solutions to user needs:

- The creation of software for small districts could occur by (a) MECC ESV-MIS developing these systems, or

  (b) MECC ESV-MIS monitoring and controlling the development of these systems at the district/region or by contractors and vendors.

- The use of present ESV-IS software for intermediate districts between 2,000 and 20,000 students. District unique reporting requirements could be met by regional data processing.

- The use of customized ESV-IS software for large districts over 20,000 students. This customizing would be under MECC ESV-MIS control or monitoring and would affect the integrity of standard data element definitions at data base architecture. This ESV-IS version could be developed by (a) MECC ESV-MIS under contract to the requesting district, (b) vendors under contract by the requesting district and monitored by MECC ESV-MIS, (c) district pesonnel monitored by MECC ESV-MIS, or (d) a region at the request of districts monitored by MECC ESV-MIS.

In PMM&Co.'s opinion, the creativity which has been displayed on the part of Ortonville and other independent school districts should not be ignored. Such creativity could be harnessed by MECC to further refine and develop systems which could be shared throughout the state. These systems, which are developed close to the user, have significant advantages in that they are typically quite easy to operate and are responsive to the smaller district. In PMM&Co.'s opinion, the Ortonville system addresses the needs of the school district below 2,000 students, especially those with 1,000 to 2,000 students. Because these systems do address those needs, those districts are willing to use and operate these systems.

If the goals of uniform reporting are to be met for the State of Minnesota, it will be necessary to supply systems which directly meet the needs of the independent school districts. Without user involvement at this level, without regularized use of these systems, and without the full support of the independent school district, the goals of uniform reporting will not be met.

A.2 State Level Funding and Organization

TASK AREA: A.2 State Level Funding and Organization

EVALUATION QUESTIONS:

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?

FINDINGS

The data element dictionary the State Department of Education is charged to develop is not in existence. It is projected for production in January 1980. We have, therefore, examined the technical products in use in Regions. There are currently three data dictionaries/directories (DD) in use, or use is contemplated:

- SDE-IS uses the Minnesota Education Data Information Directory (MEDID);
- MECC uses a system developed on a CDC Cyber 2000 computer and converted to Burroughs by MECC; and
- MECC and TIES are evaluating the use of Burroughs new data dictionary that was included with Burroughs B6800 Release 3.1.

There are two broad purposes for which the State is using these data dictionaries:

- forms control (primarily SDE); and
- software control (primarily MECC and the ESV Regions).

There does not appear to be a coordination among the various groups to develop or to acquire a data dictionary to handle all needs. Ideally, a data dictionary/directory should provide definition of, and cross-references between, the following:

- data elements
- data bases (data sets)
- forms
- reports
- transactions
- programs
- systems

Although none of the current three packages provide all of these features, PMM&Co. evaluated the capabilities of the three data dictionaries/directories:

- MECC's Data Dictionary provides significant data element definition capabilities, but lacks support for cross-referencing and other definition;

- Burroughs B6800 Release 3.1 Data Dictionary provides very good cross-referencing capabilities between programs (the cross-reference can be dynamically maintained by the compiler), but lacks definition and cross-referencing capabilities for other definitions;

- MEDID appears to be geared towards forms control. It provides extensive definition capabilities for inputs (forms), data description and output and cross-references among them. However, it does not cross-reference data elements to computer-oriented items such as programs or systems.

A decision should be made as to whether the State can/should centralize the data definition activities of SDE and ESV. This appears to be a good time to perform such an evaluation since MECC and TIES are considering conversion to use of Burroughs B6800 Release 3.1 Data Dictionary. PMM&Co. recommends action be taken by the State to complete the standard definition of data elements and to link these data elements with application software utilizing standard definitions.

TASK AREA: A.2 State Level Funding and Organization

EVALUATION QUESTIONS:

2. Is the format and content of the data acquisition calendar which is to be provided by SDE appropriate?

FINDINGS

Users who have seen the data acquisition calendar (50% of the questionnaire respondents had not seen it, or did not know what it was) responded that it has:

- given them an appreciation of the total amount of data collection which takes place;
- helped them evaluate the reasonableness of the time lines for reports from their own perspective; and
- caused them to question whether there is redundant data collection.

While these may not have been the results anticipated when the calendar was developed, we believe that they indicate that the calendar serves a useful purpose. Some of the prevalent concerns about the calendar are that it doesn't indicate:

- why the data is collected;
- who is responsible for completing the form; and
- what discontinued forms could be dropped.

These concerns do not address the quality of the acquisition calendar as a calendar. What they indicate is that there is a need for information about forms and data in addition to a calendar.

RECOMMENDATIONS

PMM&Co. recommends the State complete the definition of data elements and complete the needs analysis at SDE with the objective of using the standard data elements throughout the Department. Such efforts would help to complete the further automation of the reporting process from the districts to SDE.

TASK AREA: A.2 State Level Funding and Organization

EVALUATION QUESTIONS:

3. What changes, if any, in procedures should SDE adopt which prescribe the criteria for approval of regional plans and budgets?

FINDINGS

It is important to understand the history of how regional plans and budgets were approved prior to July 1, 1979. School districts were required to receive approval from the State Department of Education prior to expending funds for computerization of administration or instruction. The Department was to consider the request using the following as criteria:

- the state plan prepared by the Commissioner of Administration;
- policies and programs of the Intergovernmental Information Systems Advisory Council; and
- cost-effectiveness considerations of the department (SDE).

By the 1979 Laws, Section 16.93 was amended to permit a school district to expend funds for computerization only after a regional management information center, of which the district is a member, submits and obtains approval of an annual plan and budget. Further, every school district shall become a member of a regional management information center. The next part of the new law (Subd.3) states that no regional information center may expend funds for computer activities unless it files an annual plan and budget for its activities with the Department of Education and receives approval of the plan and budget from the Department of Education.

As a result of this change, SDE commenced the review of plans and budgets for fiscal year 1980. For fiscal year 1979, and evidently for the

years prior, MECC reviewed the annual plan and budget. Since SDE transferred the regional subsidy appropriation to MECC, the review by MECC of the regional plan and budget was consistent and allowed MECC to allocate the subsidy to the regions.

Our review and analysis indicates that Section 16.93 was not complied with prior to the 1979 amendment. The three criteria specified in that section of law were not used in reviewing or approving the expenditure of funds for computerization by school districts. ESV Regions submitted annual plans and budgets to SDE on behalf of their member school districts. Our analysis indicates that this effort merely compiled annual information for reporting to the legislature. While this section of law suggests that SDE is to exercise some control over the spending of funds by local school districts, there is no indication that reviews of these annual plans and budgets were made for that purpose. Because SDE approves the annual plan and budget, PMM&Co. believes that SDE also has the responsibility for managing and controlling the spending of all funds, local and state, for the utilization of computers in education.

As a result of the 1979 amendments, the responsibility of SDE and the State Board of Education for the review and approval of annual plans and budgets on behalf of local school districts remains essentially unchanged, with the exception that every school district must become a member of a region. The region still must file an annual plan and budget, and the Department must approve that same document. The criteria for approving the creation of a region and the plan and budget of the region were expanded to include the following criteria:

- "the provisions of the state computing plan adopted by the State Board of Education;
- the cost-effectiveness of the center and its plan and budget;
- the effect on existing regional management information centers;
- the ability of the center, in a timely manner, to provide information, required by the annual data acquisition calendar or by the rules of the State Board of Education, on computer tape which is machine-readable, using the software designed by the Department of Education;
- the ability of the center, within 15 calendar days, to respond to requests for information based on the data elements in the data element dictionary and on computer tape, which is machine-readable using the software designed by the Department of Education; and
- the ability of the center to operate the uniform financial accounting system using multidimensional accounts and records, as required by the uniform financial accounting and reporting

standards for Minnesota school districts adopted by the State Board pursuant to Sections 121.90 to 121.92." (Source: Laws of Minnesota, 1979, Chapter 334, Article VI, Section 1, Subd. 3)

User Responses

Based on the responses from local school districts to the survey instrument, the majority of them (53%) felt they had an opportunity to provide input into the annual plan and budget for their respective regions. However, only 27% of the school district responses indicated that they had an opportunity to provide input into the budget request for the regional subsidy. Of the remaining respondents, 49% either didn't know or failed to respond and an additional 24% indicated that they did not have an opportunity for such input. It is crucial for the accomplishment of the ultimate goal of school district participation in ESV-IS that districts have an opportunity for input and participation in the annual plans and budgets. The statutory language in Section 16.93 suggests that school districts have that opportunity and that SDE is responsible for insuring that the regional centers give its member districts the opportunity to fully participate in the systems and in the planning process.

In responding to additional questions about district understanding of the role of SDE in the annual budget planning process and the biennial budget process, the majority of respondents (69%) did not know or did not respond to the question and only 19% were aware and understood the role. This is an area where significant improvement can be made and permit local school districts to participate and provide input in the process. Their understanding of the process would be an asset.

RECOMMENDATIONS

The only obvious change which needs to take place is for SDE to review the regional plans and budgets and to fulfill its responsibility consistent with the goals and objectives for the ESV-IS and the founding philosophy of the entire MECC concept. Without SDE fulfilling this responsibility for review, the original concern for the proliferation of computer hardware and software will not be maintained.

To summarize, SDE needs to recognize its responsibilities by law for the control and management of the ESV-IS. Local school districts must be given an opportunity for input and participation in the planning and budgeting process. Gaining and maintaining acceptance on the part of the school districts for the statewide ESV systems is a critical issue for success. Increasing the district's level of understanding through participation in this process can only work to the advantage of SDE and MECC in implementing the ESV systems.

TASK AREA: A.2 State Level Funding and Organization

EVALUATION QUESTIONS:

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?

FINDINGS

With the exception of METRO II and TIES, the SDE, through legislative appropriation, has provided funding to the regions since the inception of the regional centers. Initial funds were provided for start-up costs, including leasing facilities and hardware, and employment of administrative staff. During the biennium 1978-79, state funds were provided to support the cost of telecommunications, State department reporting and district conversions. We will discuss: (a) telecommunications; (b) regional reporting subsidy; (c) original subsidy calculations; (d) current regional subsidy formula; and (e) conversion subsidy.

MIS-Telecommunications

Management information services are provided to local school districts through a host computer located at a regional site. Linkage between the school district and the host computer site is made by local and long-distance telephone lines using modems and multiplexers which translate and re-transmit the data from computer terminals located in the school district through telephone lines to the computer processor. These telecommunications costs are supported by state funds in order to ensure equal access to the regional computer, regardless of school district size or geographic location. Local school districts have not had to pay for the cost of telecommunication services, except at TIES.

Regional Reporting Subsidy

A legislative mandate requires school districts to submit an annual financial report to the State Department of Education pursuant to a set of uniform accounting and reporting standards. SDE has developed a multi-dimensional account structure as a feature of UFARS, which, because of the complexity, requires computer assistance. The UFARS accounting and financial reporting has the objective of providing financial information about public schools not previously available to policy makers and their constituents at local or state levels.

PMM&Co. believes that in most small school districts (less than 1,000 students), the ESV-IS system would be more costly than conventional, manual accounting systems. It is SDE's position that the State should provide some financial assistance to support this mandate. A major purpose of the reporting subsidy is to provide an incentive to districts to adopt the entire statewide system (i.e., ESV-IS). Through the reporting subsidy, the State is paying to ensure that it gets information which is timely, accurate, and appropriate to making public education policy in the State of Minnesota.

Current Regional Subsidy Formula

Prior to FY1980, the amount of the regional reporting subsidy was determined through a negotiation process by SDE with the Regions. The actual allocation of the subsidy, following the legislative decision on the amount of appropriations for this purpose, was determined based on the judgment of MECC and SDE. Beginning with FY1980, an effort was made to determine the minimum requirements in each functional service area to meet the operational and data processing requirements for the member school districts. Five basic functions were identified as essential for the effective operation of a regional center: Regional Management, Financial System Coordination, Personnel Payroll System Coordination, Student System Coordination, and Regional Accounting (UFARS) Coordination.

The implementation of these functions necessitates that each region have sufficient staff and resources in each of these functional areas to provide training and assistance to school districts. The basic support in each function, which would accommodate a student enrollment of 50,000 or less, was estimated to cost $190,000. This was established as the basic subsidy for each region. As the student population in any region exceeded 50,000, the regional subsidy would be increased in proportion to the number of students exceeding the 50,000 enrollment base. The formula used to calculate each regional subsidy, commencing with FY1980, was the following:

$$S = B + \$2\ (E + S + V - 50{,}000)$$

where:

S = subsidy
B = Base of $190,000
E = Total elementary student population
S = Total secondary student population
V = Post secondary vocational student population

Original Subsidy Calculation Proposal

During the three years prior to FY1980, SDE staff presented a series of proposals for determining an equitable distribution for conversion and on-going subsidy to the regions. In a memorandum dated September 20, 1976, SDE proposed that the regional subsidy be considered as part of a total conversion of school districts to the ESV-IS information system. The three variables considered in this subsidy were:

- number of students;
- number of employees; and
- number of schools.

SDE developed a Conversion Factor which reflects the effort required to convert individual school districts throughout the state. The equation was the following:

$$\text{Conversion Factor} = \frac{\text{Number of Students}}{\text{Number of Employees}} \times (\text{Number of Schools})$$

The actual conversion subsidy would be a direct reimbursement of all costs expended, subject to a maximum, because of the finite amount of appropriation made by the legislature.

The recommendation further suggested that three factors would be used to determine the maximum subsidy for each district in the state, including the following:

1. District Administrative Process Subsidy

   This is the part of the total conversion subsidy specific to the effort associated with conversion of a district's administrative processes to the ESV-IS. SDE's recommendation for the calculation of this part of the subsidy maximum is:

   District Administration Subsidy = $150 x District Conversion Factor

2. District Data Subsidy

   This part of the total conversion subsidy is based upon the number of data items required by the ESV-IS for a particular district. These data items are identified, with subsidy amount, in the following general groupings:

   A. Number of students - $.50 per student

   B. Number of certificated employees - $1.00 per employee

   C. Number of noncertificated employees - $.50 per employee

   D. Number of schools - $100.00 per school

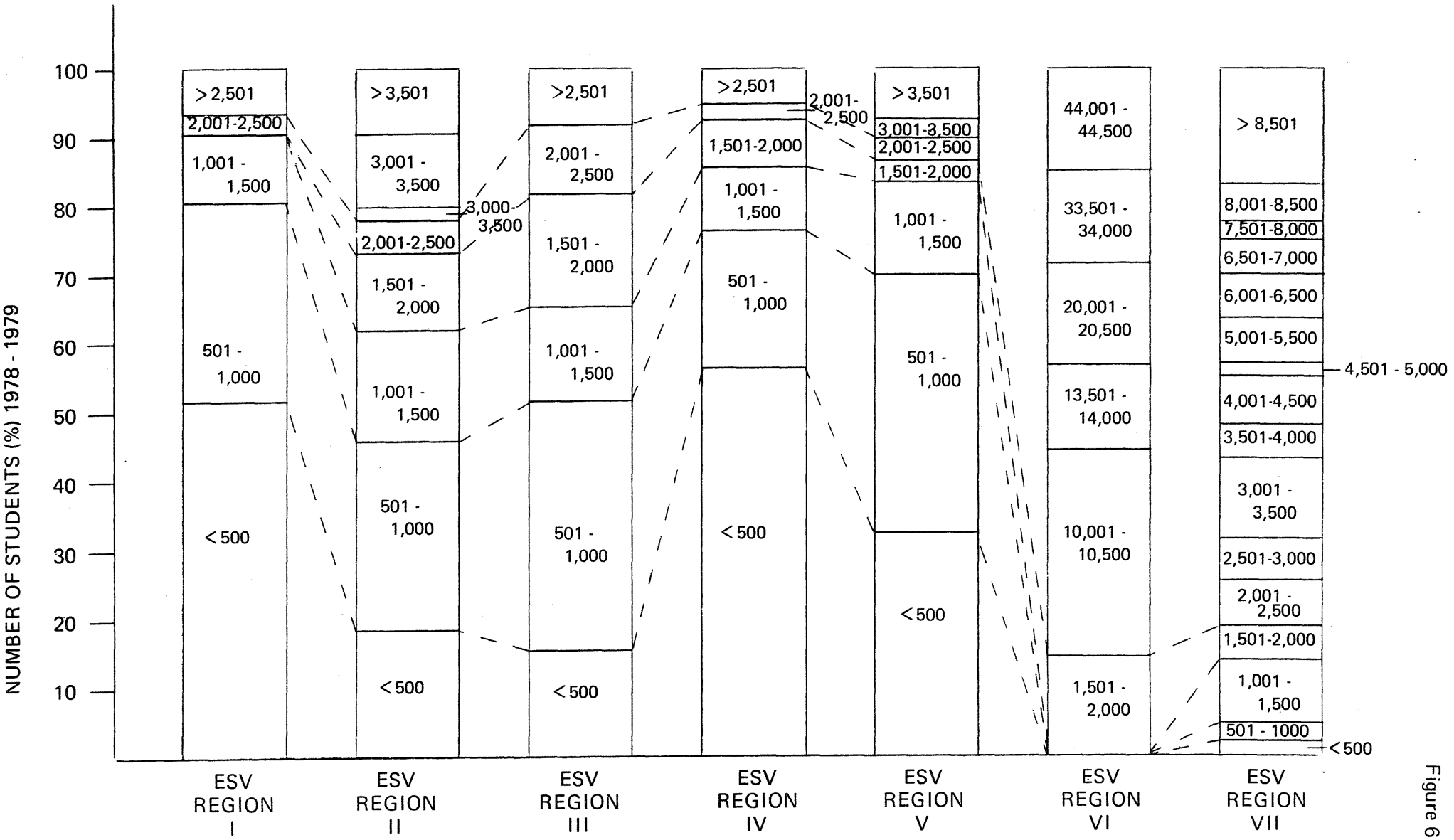

NUMBER OF STUDENTS (%) 1978 - 1979
100
90
80
70
60
50
40
30
20
10
ESV REGION I
>2,501
2,001-2,500
1,001 - 1,500
501 - 1,000
<500
ESV REGION II
>3,501
3,001 - 3,500
2,001-2,500
1,501 - 2,000
1,001 - 1,500
501 - 1,000
<500
3,000-3,500
ESV REGION III
>2,501
2,001 - 2,500
1,501 - 2,000
1,001 - 1,500
501 - 1,000
<500
ESV REGION IV
>2,501
1,501-2,000
1,001 - 1,500
501 - 1,000
<500
2,001-2,500
ESV REGION V
>3,501
3,001-3,500
2,001-2,500
1,501-2,000
1,001 - 1,500
501 - 1,000
<500
ESV REGION VI
44,001 - 44,500
33,501 - 34,000
20,001 - 20,500
13,501 - 14,000
10,001 - 10,500
1,501 - 2,000
ESV REGION VII
> 8,501
8,001-8,500
7,501-8,000
6,501-7,000
6,001-6,500
5,001-5,500
4,501 - 5,000
4,001-4,500
3,501-4,000
3,001 - 3,500
2,501-3,000
2,001 - 2,500
1,501-2,000
1,001 - 1,500
501 - 1000
<500

Figure 6

3. Regional Subsidy

Regional Subsidy = $50 x District Conversion Factor

Conversion Subsidy

The cost to school districts of converting from an existing manual or automated reporting system to the ESV-IS was estimated to require about three months of effort for each application to be converted. State financial assistance would be provided based on 20¢ per student per month per application. In addition, there are the costs associated with conversion that are uniform regardless of student population. Such costs include staff time to train bookkeepers, office personnel, and entry operators in the use of new systems. Travel time and costs related to operating dual systems during conversion are abnormal costs. To compensate districts for this cost, SDE proposed payments to each region in the amount of $1,000 per application converted in each district.

PMM&CO. CONCLUSION

Local school district responses to questions on the subject of subsidies indicate the number of school districts located in a particular region should be considered in determining the amount of regional subsidies. Regions I, IV, and V have a majority of their member school districts with student enrollments of less than 1,000 students (Figure 6 on the facing page). At the same time, these three regions also have the largest number of school districts geographically located within their respective regions. These two factors should be considered in determining the amount of support required to assist the region in providing services to the districts located there. Using the student population as a base for support is not adequate. The geographic size of individual regions are different. These differences have implications in the amount of operating expenses required to provide the services to the member districts in those regions. For example, Region I, which is the largest geographic region in the state, has 21.5% of all school districts in Minnesota while having only approximately 10.6% of the entire state's student enrollment.

RECOMMENDATIONS

While the original subsidy proposal was not adopted and the current subsidy formula was initiated in FY 1980, PMM&Co. believes that any future formula used to determine the amounts of regional support grants provided by SDE must consider the following factors:

- the number of districts in a region;
- the size of the districts in a region;
- the total student enrollment of an individual region relative to total student enrollment in the state;
- the number of districts implementing, or which have implemented, the mandatory ESV-FIN system;

- the level of financial support from the SDE for the two voluntary systems, ESV-PPS and ESV-SSS;

- the geographic size of an individual region, or a student density factor (number of students per square mile), relative to all regions in the state;

- a standard for the required regional support staff expressed as a ratio of support staff per district; and

- a standard overhead cost for operating a regional data center.

Developing a formula including these factors will require the judgment of SDE to determine the relative weight of any factor, or variable, in such a formula.

We recommend future subsidy formulas be developed by SDE which reflect these variables.

TASK AREA: A.2 State Level Funding and Organization

EVALUATION QUESTIONS:

5. Is the State Department of Education - Information System (SDE-IS) being developed according to appropriate system standards and project controls?

FINDING

The SDE MIS group is not making use of the State mandated system development documentation and methodology, PRIDE. The SDE-IS development group functions in a service-oriented role rather than a product-oriented system development role. That is, most of their effort appears to be in the development of one-time information requests. In this environment, a formal development methodology is generally not required, as most report requests are turned around within 24 hours.

RECOMMENDATION

The primary information user of the SDE-IS is the State Legislature. In the absence of complaints about service, and based on PMM&Co. discussions with legislators and their staffs, we believe that the SDE-IS is a functional system. We believe that SDE should contract with MECC-MIS to document the present SDE-IS. Such work by MECC-MIS would give MECC-MIS some understanding of this system and reduce the exposure of the State in relying on a single contractor.

This approach would have the advantage of preparing the state for the possibility of more frequent reporting, or a shift to more production-oriented reporting.

TASK AREA: A.2 State Level Funding and Organization

EVALUATION QUESTIONS:

6. Are the information needs of other Divisions of SDE, and other state and Federal agencies, being addressed in the development of the software?

FINDINGS

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.

RECOMMENDATIONS

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 can 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.

TASK AREA: A.2 State Level Funding and Organization

EVALUATION QUESTIONS:

7. Does SDE have the appropriate staffing level, organization, experience and qualifications to develop and operate the SDE-IS?

FINDINGS

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

PMM&Co. observes that it is unlikely that the State will be able to attract the calibre 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.

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.

TASK AREA: A.2 State Level Funding and Organization

EVALUATION QUESTIONS:

8. Are the plans to interface ESV-IS and SDE-IS cost-effective?

FINDINGS

ESV-IS and SDE-IS are currently interfaced in two ways:

- operational data from the ESV-IS is dumped to tape and then reduced to statistical-type data and loaded into the District MIS database (SDEDB); and
- data is keyed from financial reports and entered into SDEDB.

The completion of the conversions to the UFARS blue manual will permit automation of the financial reporting interface. However, the cost-effectiveness of automating this portion of the interface is primarily influenced by the timing of the information cycle. As PMM&Co. understands it, the financial reporting data is passed from the regions to SDE only on an annual basis.

RECOMMENDATIONS

The cost-effectiveness of an automated interface to support annual reporting is not obvious. The State's Financial Information System (FIN) can produce the data required for the financial report. School districts provide an average of approximately 300 items of annual financial data. Approximately 130,000 transactions (300 items x 432 districts) need to be keyed annually. Additionally, there is the cost of the manual effort in data control of the forms and transactions. The cost of this total effort has been computed by PMM&Co. to be approximately $10,000/year.

A tape interface would eliminate the manual handling costs and reduce the likelihood of missing or mis-keyed data. Given an annual update cycle, the cost difference between a tape or manual interface would be marginal (assuming 1 tape per region). However, an increased update frequency would favor the tape interface approach.

If the reporting cycle were changed to monthly, the tape interface used for loading operational data from the ESV data bases into the SDEDB data base would be cost-effective. However, these interfaces are all in one direction: district to region and region to state. Thus, the operational data derived from the ESV data bases is reduced to statistical data for the SDE data base, which is an MIS-data base.

The results of this reduction are not made available to the districts by SDE. We believe this feedback is warranted and the data could be made available at the region for district inquiry.

TASK AREA: A.2 State Level Funding and Organization

EVALUATION QUESTIONS:

9. What is the most cost-effective hardware arrangement for providing computer services to SDE?

FINDINGS

The most cost-effective hardware arrangement for providing computer services to SDE must have these two attributes:

- operate a DMS II data base management system; and
- compatible with Burroughs tape formats for annual reporting.

The construction of the SDE-IS has made use of a data base management system. Therefore, whatever computer is selected for the operation of the SDE-IS, it is imperative that this system have installed the DMS II data base management system. This requirement precludes using anything but Burroughs computer equipment without converting to another data base system, an expensive proposition.

RECOMMENDATIONS

The requirement for annual financial reporting, and the possibility of the state requesting even more frequent reporting than annual, necessitates the use of computer equipment which is compatible with the Burroughs tape systems. The state could utilize a service bureau to provide the necessary tape-to-tape conversion for systems which are not compatible with Burroughs. As a matter of practicality, the number of these tape conversions should be minimized, or handled by the district directly.

It is our understanding that SDE uses one of the B6800 computers located at METRO II, where their use now consumes less than 25% of the available processor time on that B6800. Because SDE does not have available operators or operations areas for another computer system, it is PMM&Co.'s recommendation that SDE continue to utilize the B6800 processor located at METRO II.

At such time in the future as processing loads at METRO II progress to the point where an additional processor is required, distributed processing from the B6800 to the B1800 should be available from Burroughs. (This capability is to be delivered by Burroughs in December 1980.) Such distribution of processing should help to reduce capacity requirements at the central site, METRO II. This solution will necessitate SDE: (a) hiring operations personnel to support the B1800 processor, (b) construction of space, and (c) utilities support for the processor.

B.1 Formation, Function and Structure of Regional Centers

TASK AREA: B.1 Formation, Function and Structure of Regional Centers

EVALUATION QUESTIONS:

1. Is the concept of independent regions with their own governing boards still valid?

FINDINGS

The present concept of independent regions with their own governing boards is a valid concept for the ESV regions. PMM&Co. believes that the regional concept as presently executed has validity in providing assistance and data processing service to districts within a narrow geographical area. The philosophy of extending this service using extensive communications links is not the most cost-effective method to service small districts which are geographically remote from the regional processing center. As in A1(6), we believe there are levels of support to these smaller, geographically remote districts that should be considered by the regional center.

The response to the user survey indicated that 66 percent of the responding school districts agreed that the "initial" concept of independent ESV Regions operating under joint powers agreements and independent governing boards was valid. School districts perceive the need for local control and representation in the advisory and policy-making process.

RECOMMENDATIONS

PMM&Co. strongly encourages the opportunity for participation by local school districts. We believe the "need for local control" issue is the local school districts' response to SDE and the Legislature. Additional mandates, directions, or dependence on SDE exceeding present levels are not desired.

Local districts need to be heard and given the opportunity to express needs and satisfaction. At the same time, SDE and the Legislature have needs to be satisfied. In our opinion, cooperative organizational arrangement with stronger school district participation in advisory capacities can provide a satisfactory solution.

PMM&Co. recommends establishing, at each regional center, user groups in the functional areas of finance, payroll/personnel and student. Such a structure has been of direct benefit to a number of regions and provides a ritualized method of communicating district needs for enhancement and modification of ESV systems.

These functional committees would send representatives to the Advisory Committee of the proposed ESV Planning and Control group. This group would be responsible for prioritizing modifications and enhancements to ESV systems and communicating these "marching orders" to the proposed MECC ESV-MIS. (Reference B.1(5).)

TASK AREA: B.1 Formation, Function and Structure of Regional Centers

EVALUATION QUESTIONS:

2. Does each region have adequate policies and procedures for governing their organization?

FINDINGS

A majority (58%) of the respondents agreed with the statement in the survey instrument that the policies and procedures for their ESV Region were adequate for member districts governing the region. Of the remaining respondents, 14% did not agree with the statement about the adequacy of the policies and procedures and 28% did not know, or failed to respond, to this question.

We reviewed the policies and procedure manuals of the ESV Regions and found they were prepared following a format, established first at TIES, and subsequently by MECC, for the MECC Governing Board. Each region has policies and procedures for governing their organization. PMM&Co.'s examination of these documents shows us that they are adequate for the governance of a regional processing center.

RECOMMENDATIONS

In PMM&Co.'s opinion, adequate policies and procedures for governance exist. We observed that the formal communication links between MECC and the regions must be improved.

The areas of formal communication which PMM&Co. recommends strengthening are (Reference proposed organization, B.1(5)):

- The use of a proposed Technical Forum for such topics as:
  - Data center management
  - Data center security and backup
  - Burroughs' efficiencies
  - Communication net management
  - Lessons learned.

- The formal control of vendor relations, with regular reporting of system outages in each region and a formal MECC-directed response to the vendor.

- The use of formal user committees at the regional level in the functional areas of finance, payroll/personnel and student. Results of these functional committees would be communicated to the proposed ESV Planning and Control Advisory Committee.

- The use of the Advisory Committee of the proposed ESV Planning and Control group which would take recommendations from each of the functional committees and give an overall priority to MECC-MIS for development, enhancement, or modification of ESV-IS Systems.

We believe that the implementation of this approach to formal communication will help to ensure that regional efforts and expertise are shared, with the objective of delivering cost-effective services to the districts and the State. We do not recommend changes in the governance procedures at regions.

TASK AREA: B.1 Formation, Function and Structure of Regional Centers

EVALUATION QUESTIONS:

3. Does each region have sufficient technical staff to support the operational responsibilities of the center?

FINDINGS

Regions have sufficient technical staff to support the operational responsibilities of the center.

Region III has two systems programmers who are responsible for:

- implementing and maintaining all application and operating systems;
- developing Burroughs B80 software and implementing requirements for the General Mills-provided tape management system;
- measuring system performance, tuning system, and planning system capacity planning;
- planning and implementing data communications, based on the available statewide telecommunications network;
- performing data communications trouble shooting; and
- providing support and assistance to operations.

Region V is utilizing a staff of three systems programmers to perform essentially the same activities as noted for Region III. The staff is comprised of a supervisor, an operating systems specialist, and an

application support software specialist. The Region V systems programmers do not normally undertake significant application software development projects. However, they, like their Region III counterparts, are involved in data communications network planning.

METRO II has a data base administrator with two systems support specialists, who are senior analysts, capable of handling the operational support for the ESV-IS system through a remote job entry site.

TIES has operations and input/output control together under a manager of operations. He is responsible for service on the system. TIES also has a data base administrator and four systems support staff.

MECC-MIS has a facilities manager with two trainees available. A systems software manager with two analysts and programmers is assigned. This team is capable of managing the major operational questions on the larger Burroughs computer equipment.

RECOMMENDATION

PMM&Co. sees sufficient technical staff for the operation of regional centers. Survey responses show that users of ESV-IS in these regions have experienced problems in obtaining answers to technical data processing questions for application system.

We believe sufficient technical expertise does exist. In Regions I and IV, without a processing center, and Region II, with a new processing center, we recommend the position descriptions in use at Regions III and V be used as models. These position descriptions define a useful set of skill requirements for these service and processing coordinators positions. These descriptions stress technical expertise and should help regional centers in defining their personnel requirements, including personnel with adequate financial and data processing expertise.

TASK AREA: B.1 Formation, Function and Structure of Regional Centers

EVALUATION QUESTIONS:

4. Does each region have sufficient user training staff to support the user services of their center?

FINDINGS

Based on the survey responses, the local school districts believe that technical support staff has generally not met the requirements of the regions for training and implementation assistance. About one-third of the districts (34%) agreed that all training requirements were being met by its regional staff. It is significant that 44% of the districts returning this survey either didn't know, or failed to respond to this question. There was variation from region to region on the question. Smaller districts have their training requirements responded to less effectively than larger districts.

Survey respondents were concerned with the technical ability of the accounting coordinator, who in certain regions evidently lacks knowledge of school accounting and auditing procedures and may be unfamiliar with local school district operations. This is a critical area for (a) districts having processing problems, or (b) districts with the need to learn the ESV-FIN system. To effectively gain their support and continued use of these systems will necessitate expertise at the region in school business operations.

Useful Approaches to Support

Regions III and V have established ratios for service coordinators and processing coordinators for each of the ESV-IS systems. These ratios have worked out to approximately one service coordinator for every 30 districts

and one processing coordinator for every 20 districts for the ESV-FIN system. The ESV-PPS system has a ratio of approximately one coordinator to every 10 districts.

Region II has a support staff capable of handling the number of districts in the region. This region has an advantage in not having as many school districts assigned. METRO II and TIES have a sufficient number of user training staff to support user services at their centers. TIES could lose some of its out-state districts, and this loss could reduce its training requirements in those out-state areas.

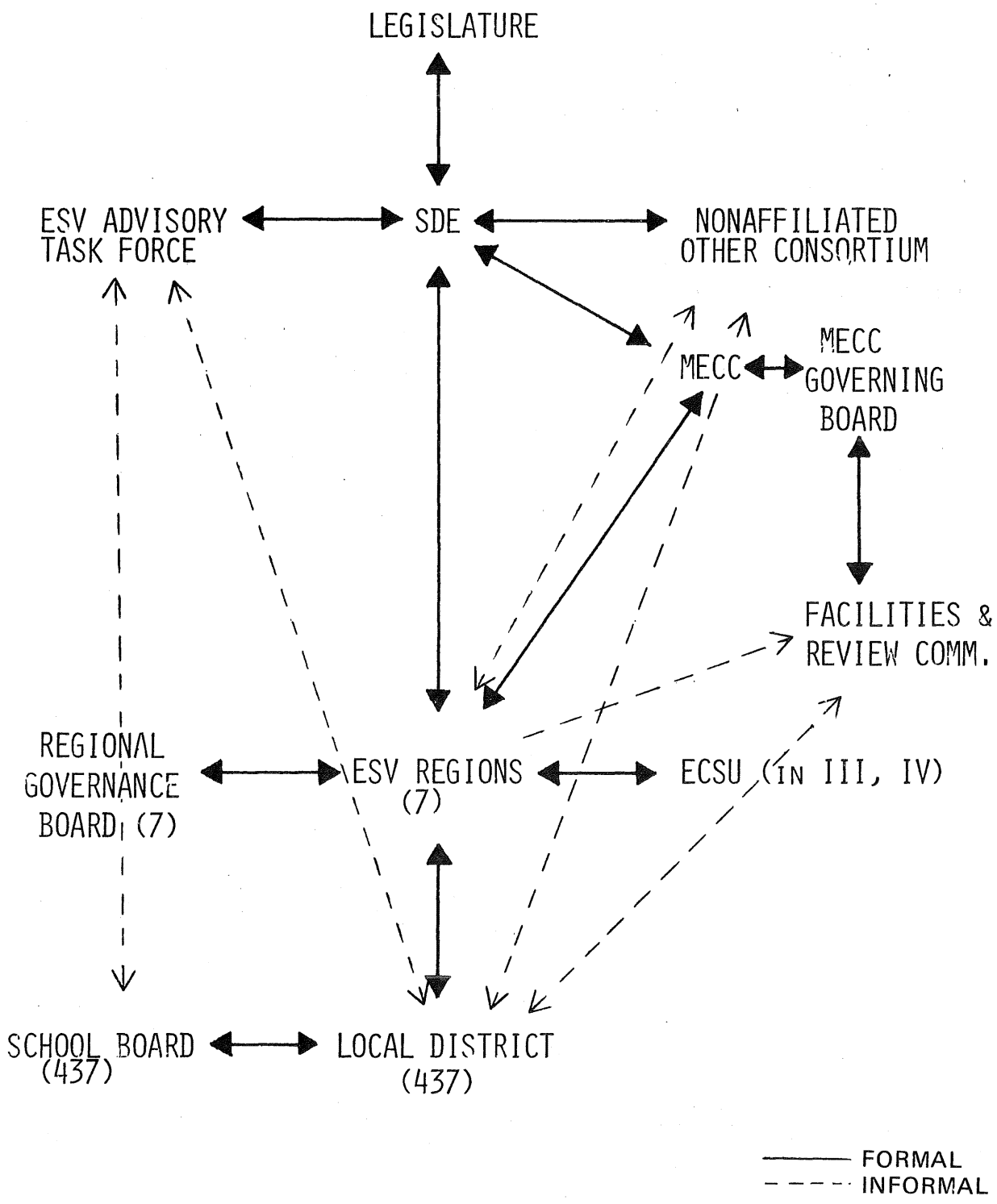
Certain districts throughout the state note that lack of funds creates the situation where adequate technical support staff is not available from the regions. Training support is not the problem, but rather other technical assistance is lacking.

RECOMMENDATIONS

PMM&Co. recommends continued use by the regions of these support ratios. Further, Regions I, II and IV should consider adopting this approach to computing support "loads."

We found the lack of data processing expertise by the functional coordinators is the primary problem. This expertise will help the coordinators while they provide field support of ESV-IS application systems. A second problem is a lack of financial expertise for those coordinators charged with support of ESV-FIN. A lack of knowledge in finance has direct impact on the credibility of these support personnel before business managers in the school district.

PRESENT ORGANIZATION



TASK AREA: B.1 Formation, Function and Structure of Regional Centers

EVALUATION QUESTIONS:

5. Are the authorities and responsibilities clearly defined, appropriately assigned and adequately achieved?

FINDINGS

According to the survey responses, only 36% of the school district agree 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 have expressed concern about the poor and nonexistent communication channels which offer some explanation for this lack of agreement. The lack of understanding of clear responsibility and authority and a limited or nonexistent form of communication may be contributing to those feelings.

Based on responses to a series of staffing questions in the user survey, PMM&Co. believes there is a need to define the charter for ESV-IS data processing. Responses to these questions also pointed out that there are varying responsibilities in each of the regions among service persons employed. In the area of training, some dissatisfaction has been expressed with the level of training support available to the schools in Regions II and V. This may be the result of persons not being available exclusively for training purposes or not having sufficient training expertise.

The response to the series of questions dealing with operations policy and procedure, in particular finance and budget, included the following suggestions for change:

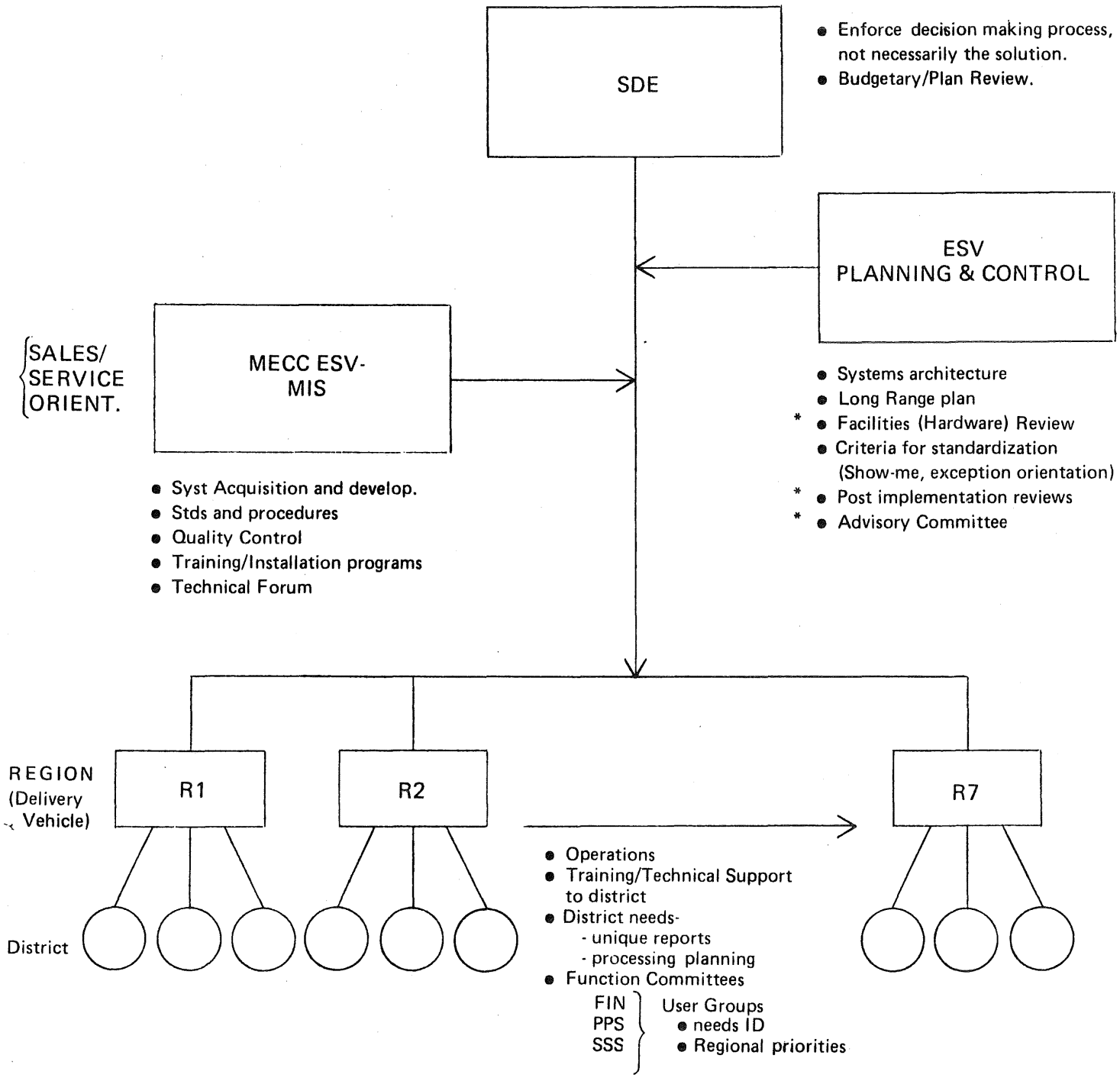
- All changes should be identified at the district level and forwarded through the regional center; and
- The needs of districts, regions and SDE should be clearly defined before designing a system(s).

RECOMMENDATIONS

We have diagrammed the present organizational structure. It appears as Figure 7 on the facing page. In this diagram we have also overlaid the communications channels between and among the participants.

Figure 8

PROPOSED ORGANIZATION



MECC ESV-MIS

Technical Expertise Group - Recommend to larger managerial council.

- 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 the present organization structure lacks the following:

- a planning and control mechanism for the MECC organization;
- a priority setting mechanism for enhancement and modification of ESV systems; and
- a technical expertise group to provide a forum for exchange of technical information.

To address these issues, PMM&Co. proposes an organization structure which replaces the current organization structure and has the following attributes (see Figure 8).

- An ESV Planning and Control group which would be responsible for ESV systems architecture and long-range planning;
- An Advisory Committee composed of regional representatives and chaired by SDE, to provide priorities for enhancement and modifications of ESV systems; and
- A Technical Forum to provide a mechanism for sharing experiences in data center management, Burroughs' performance and communications network management.

For further discussion of the proposed organization structure, please refer to the other PMM&Co. final report, section entitled "Organization and Staffing."

TASK AREA: B.1 Formation, Function and Structure of Regional Centers

EVALUATION QUESTIONS:

6. Is the structure of joint powers agreements adequate to govern the organization?

FINDINGS

MECC was formed by a joint powers agreement among these educational systems: the University of Minnesota, the Community College System, the State University System, the Department of Administration, and the Department of Education. The regional joint powers agreements generally contain the same basic items and were prepared following the original joint powers agreement forming the MECC organization. (TIES existed prior to MECC.)

A review of the joint powers agreements creating MECC and the agreements between member school districts creating ESV Regions indicates that they have very similar contents. MECC and ESV Regions I, II and V - VII were organized under provisions of Minnesota Statutes, Section 471.59, the Joint Powers Agreement Provision. ESV Region III exists as a nonprofit corporation, Central Minnesota Educational Research and Development Council, with slightly different bylaws and agreements, but does contain the major elements of the other regions. ESV Region IV does not exist as a separate entity but is a part of the Southwest and West Central ECSU. The bylaws/joint powers agreements contain basic items (articles) such as: organization and procedures, duties of officers, fiscal year, audits, amendments, governance board, withdrawal, dissolution, and fiscal management.

These joint powers agreements contain basic standard contractual language between parties to the agreement forming the MECC and regional

organizations. Our review looked at the comprehensive nature of the agreements and could find no major omissions.

Joint powers agreements result from a provision in the Minnesota Statutes, Chapter 471.59, which permit organizations to be formed based on contracts between the various members of the newly formed organization. It does provide a flexible governmental structure. A newly enacted law is not necessary for each new governmental organization.

RECOMMENDATIONS

We believe that local district influence in the decision-making of regions must be maintained. To ensure effective delivery of data services to the district, the regions must maintain direct ties to the local district.

To ensure a coherent and cohesive functioning of all regional centers within the state, we recommend that the State Department of Education exercise its control function over regional plans and budgets.

Such a review by SDE would consider the use of alternative solutions for delivery of service to the district:

- manual reporting for extremely small (below 500), remote districts;
- microcomputer systems for small (below 2,000) districts; and
- microcomputers for postponing the purchase of additional regional center hardware.

SDE should look for a comprehensive and logical plan from the regions which was consistent with ESV Planning and Control (a) systems architecture, (b) long-range plan, and (c) criteria for standardization.

TASK AREA: B.1 Formation, Function and Structure of Regional Centers

EVALUATION QUESTIONS:

7. Is the organizational structure of each region appropriate to perform the responsibilities of the region?

FINDINGS

A majority of the respondents to the user survey (57%) indicated that the regional organizational structure was adequate to perform the responsibilities necessary to serve their region. Of the remaining responses, 27% either didn't know or did not respond to the survey question on this subject.

RECOMMENDATIONS

PMM&Co. concludes from this response, together with the responses to B.1(1) and B.1(5), that most regional organizational structures are appropriate as long as the local districts have the opportunity to participate. The organizational structure of the region is appropriate where districts receive adequate services from the region or where the district is represented on the regional board and functional committees. Our examination of regional organization shows them to be logically configured, adequately staffed for present requirements, and capable of supporting their districts.

TASK AREA: B.1 Formation, Function and Structure of Regional Centers

EVALUATION QUESTIONS:

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?

FINDINGS

PMM&Co. believes that the size of the regional board should be related to the number of school districts in the region. Regions with more districts should have larger boards than the smaller regions. However, we believe that the most workable size is in the range of 10 to 15 members. Regions composed of large numbers of districts and larger boards should consider holding annual or semiannual board meetings for their member districts. The "day to day" governance of this larger region should be conducted by a 10 to 15 person executive committee of board members.

RECOMMENDATIONS

We reviewed the composition of skills and experience of the regional boards. The board of Region II includes school district business managers and school board members with data processing skills, in addition to superintendents and other school board members. The TIES bylaws allow a member school district to appoint a "lay" community resident to the Joint Board. The TIES Joint Board and the Executive Committee have nonschool persons with private sector business or data processing backgrounds. PMM&Co. recommends that, through the election process, boards should include data processing and business people from the region. This arrangement has the advantage of having board members with business and data processing knowledge and skills and school administration knowledge and skills.

We believe that simple representation is important, but it can create a meeting atmosphere which is not conducive for productivity when the number of members extends beyond 10-15. We recommend the use of an Executive Committee of the Board when the number of Board members exceeds 15.

TASK AREA: B.1 Formation, Function and Structure of Regional Centers

EVALUATION QUESTIONS:

9. Does each region have an equitable school district fee structure?

FINDINGS

The fee structures, whether equitable or not, are not equal among the seven regions. Although the fee structures are not equal, a majority of the respondents to the survey (57%) believe the current costs and fee structures for the regional ESV-IS services were equitable to the individual school district. Survey responses suggested fees should be based on variables other than only the number of students. The fee structure should consider the number of districts in a particular region and the number of systems/services being provided.

PMM&Co. discovered the following differences in the fee structures among the regions:

- Regions I - IV, and TIES charge on a per student basis (TIES's long-range plan calls for a study of fee structure);
- METRO II presently bills on a per student basis but is converting to a cost-sharing fee structure with 10% actual costing being billed in 1980; and
- Region V bills on resource consumption. The actual consumption is allocated using a billing process which also allocates overhead cost to districts based on resources consumed.

RECOMMENDATIONS

PMM&Co. recommends users in all regions be informed of consumption of the regional processing resource. Information should be provided concerning:

- Central processing unit (CPU);
- Input/output time;
- Print time;
- Storage costs;
- Keypunch, or other services; and
- Staff support.

Such information should be provided on each application system used by the district. The report should be in dollars and could, depending upon regional policy, be recorded against a budgeted figure agreed upon in advance by the district.

With this approach, districts should know the assigned costs of processing. Amounts of state subsidy which offset district obligations could then be displayed, with a final figure for the amount the district owes to the regions. Included in the report should be staff costs for support. Such information would require that the region have a manpower accounting system such as TIES has installed. For example:

DISTRICT Y

	January	February	March	(Less) Quarterly State Subsidy	Amount Due Region
ESV-FIN					
CPU	$ 500	450	600		
I/O	20	75	100		
Print	100	100	75		
Storage	100	100	100		
Keypunch	25	25	25		
Staff Support	100	100	100		
Total (month)	845	850	1,000		
Total (quarter)	$		2,695	(1,000)	1,695

From this cost information, districts can compute direct cost for supporting each pupil in their district. If the district has nonpublic enrollment, the cost of data processing for this enrollment can be calculated as a percentage of total students supported at the regional center.

TASK AREA: B.1 Formation, Function and Structure of Regional Centers

EVALUATION QUESTIONS:

10. Should there be a common fee structure across the entire state?

FINDINGS

An early planning report prepared by the Task Force on Education Information Systems and Computerization (May 1972) identified a basic goal for the MECC concept including that services should be provided at a standard cost. Another early document, The "MECC" Report dated February 1973, refers to a uniform cost to the user. At the present time, there is not a consistent pattern between regions; however, rates are consistently applied within each region.

Most respondents noted that regions should operate with a user charge/fee system (40% compared to 25% disagreeing and 35% not knowing or not responding). However, the majority of the respondent school districts (57%) believed that the current costs and fee structures for the regional services are equitable to their school district. These districts have a greater concern about the possibility of a reduction in the state subsidy which would shift the financial burden to the local school district. Any change to reduce the subsidy would, based on information presented to PMM&Co., be met with heavy challenge.

RECOMMENDATIONS

An alternative to the present fee/charge system would be to have individual school districts charged totally for the proportionate cost to them as a user of the ESV systems. ESV-FIN will be mandated by the new temporary rules on July 1, 1980. PMM&Co. believes it would be reasonable for

the state to subsidize the costs to the individual district through a regional subsidy to produce this mandated information and data. The other two subsystems, ESV-PPS and ESV-SSS, are voluntary. The district can make the appropriate business decision as to the relative costs and benefits of using the ESV-PPS and ESV-SSS, or using other services.

As noted in B.1(9), PMM&Co. recommends that whatever the fee structure, regions should report actual consumption of their processing resource to member districts.

PMM&Co. believes that a common fee structure throughout the state is not a workable alternative, as it will reduce the incentive of regions to deliver service in the most cost-effective manner to their districts. We therefore recommend that rates be set by the regions, and that regions report actual cost to the district. Such costs will, we believe, be different because each region has different characteristics, such as geographical distance, district size, and composition. The state subsidy formula is the logical vehicle to offset great disparities in regional costs. Such offset would be warranted for regions with many small, geographically remote districts.

TASK AREA: B.1 Formation, Function and Structure of Regional Centers

EVALUATION QUESTIONS:

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?

FINDINGS

There is very little information contained in the responses from the local school districts to suggest any mandate for a change in the basis for the fee structures. Single references are made to establishing fees on a per service basis and on a basis which would consider the voluntary nature of the services of the ESV-PPS and ESV-SSS subsystems. Greater concern is expressed over the state subsidy formula than the user fee area.

There are two aspects to this question:

- computer operations cost accounting; and
- computer operations charge-back.

Computer Operations Cost Accounting

A computer operations cost accounting system should identify costs related to resource utilization by users such as CPU, peripheral, tape and disk mount, storage requirements, and other services. This data may or may not be used to charge back to end users, depending upon the organizational philosophy. The benefits of such an approach are that data processing services costs are fairly attributed to the actual user and management can focus on the true costs of all services provided by data processing.

Computer Operation Charge-back

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. Except for Region V, comprehensive cost accounting systems are not being employed in any of the installations to determine actual resources consumed by the 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 be able to charge about 10% of the actual usage, and the balance will be on a per-student charge basis. TIES has identified in its long-range plan an objective of studying the current fee structure.

In fiscal 1979/80, new costing and billing procedures were established for Region V. These procedures are designed to encourage membership in the cooperative. A sliding membership fee was established which encouraged early affiliation with the cooperative. Service fees are based on the district categories (I - IV):

- Category I - greater than 7,000 students;
- Category II - 2,000 to 7,000 students;
- Category III - 950 to 2,000 students; and
- Category IV - not more than 950 students.

In addition to the district category, specific service is received and billed. These services are:

- administrative;
- financial;
- payroll;
- student; and
- other.

Computer usage fees for processing for input/output, lines printed and disk storage are based on actual use and are offset against the quarterly fee assessed to the member. Region V uses Burroughs' LOGGER output to account for consumption of these resources.

Service fees follow a declining schedule for each category of membership from the highest to the lowest category. Computer usage fees follow the same pattern. The objective of this fee structure is to encourage smaller districts to affiliate; however, they still must cover the cost of administrative overhead which is necessary to support the large number of small districts in this region.

RECOMMENDATIONS

PMM&Co. supports the user fee structure concept because it provides the individual school district with cost information. The user charge in each school district presently is determined by taking the difference

between the budgeted expenditures annually and the amount of the state subsidy for the region and prorating that difference over the number of districts in the region. Such an approach does not, in PMM&Co.'s opinion, work to the advantage of the State or local school district.

PMM&Co. believes the use of a standard head-charge per pupil is a penalty to large districts. This fee structure does not encourage the larger district to join in the regional consortium. Additionally, a standard head count charge does not encourage the conservation of the consumption of the computer resource. Consequently, there is a problem of equity across district size.

If the region's objective is to encourage affiliation with their centers, the fee structures must reflect that objective. Consequently, fee structures which are based on the actual consumption of resources would encourage larger districts to affiliate with the consortium. At the same time, there is an overhead cost which imposes a greater penalty on the small district. In attempting to balance these two conflicting demands for equity, Region V has devised a billing algorithm which is designed to encourage affiliation and yet not penalize the smaller district.

Whatever the billing algorithm, it is imperative that users understand what costs have been incurred in the support of their district. Districts should see these gross cost figures so that they become more aware of resource consumption alternatives. Bills for service should be rendered with the gross cost displayed, and then the deduction for the state subsidy should be subtracted. (See B.1 (9)) Again, the objective is to improve knowledge in the district of actual resource consumption.

The regional centers must collect monies to support their operation to the level of the resource consumed. The state subsidy provides a means of reducing the burden on the individual school district. However, districts must have knowledge of the costs of processing. The individual regional boards can then determine the algorithm for billing which is acceptable for that region. The efforts of Region V and METRO II support this approach.

TASK AREA: B.1 Formation, Function and Structure of Regional Centers

EVALUATION QUESTIONS:

12. Are the regions making optimal use of MECC assistance?

FINDINGS

The current extent of regional staff utilization of MECC assistance is moderate to heavy. Projected future utilization shows less demand for MECC assistance from the regional centers. The desire for heavier utilization occurs in the first seven system standards:

- Requirements definition;
- Functional specifications;
- Detailed specifications;
- Test criteria development;
- Acceptance criteria development;
- Code or programmed application software; and
- Maintenance/enhancement.

More moderate utilization of MECC assistance occurs in the areas of implementation and training. The utilization of MECC assistance by member school districts within a region is virtually nonexistent. At the present time, the heaviest utilization of MECC assistance is in Regions I, II, V, and VI (METRO II). Light to moderate utilization occurs in the other three regions.

RECOMMENDATIONS

PMM&Co. believes that regions are making optimum use of MECC assistance at the present time. MECC assistance capacity is down presently

because of staffing difficulties. However, defining optimum to be the most favorable or greatest attainable use, we believe that there is room for increased use of the MECC abilities once the staffing shortages can be eliminated. We have noted specific areas for MECC assistance in B1(2) such as a Technical Forum for: (a) data center management; (b) vendor management; (c) communications net management; and (d) data center security and backup.

B.2 Assignment of Districts to Regions

TASK AREA: B.2 Assignment of Districts to Regions

EVALUATION QUESTIONS:

1. Are the size and number of regions logical in light of geographic conditions, school populations, number of districts and computer hardware considerations?

FINDINGS

51% of the school districts surveyed agree with the statement that the size and number of regions are logical and workable, considering geographic conditions, school populations, number of districts, and computer hardware. However, Region I and Region II have some basic disagreement with this position.

In the case of Region I, the respondents to the survey had concern about the extensive geographic size of this region. The Regional Center is located in Moorhead in the southwest corner of the region, which is approximately 150 miles from the northern boundary of the region and approximately 50 miles from the eastern boundary, directly east of Moorhead. With 100 school districts spread over this massive geographic area, we believe it is difficult to provide the proper and adequate service to all of these districts.

A response from Region II stated that a region should be composed of no more than 50 school districts. Although this region has had a history of difficulty with member districts, the services within this region to its member districts have improved during the past year. The district satisfaction level has increased in response to these positive changes. Thus, the size of the region appears to have a significant influence on the level of satisfaction because it permits regional staff to operate on a "circuit rider" concept and personally visit each school district on a more frequent basis.

RECOMMENDATIONS

As in our answer to A.1(1), we suggest that stratification of districts by population will be helpful in addressing the service needs of smaller districts. Therefore, we recommend that districts below 2,000 students which are geographically remote from the regional center be serviced with microcomputers acquired under the statewide contract. These districts should be supplied with a MECC supported software product to address finance and payroll/personnel processing. Training and problem-solving support would be received from the regional center.

The next level of district sizing (2,000 - 20,000 students) can be supported directly from the region with the ESV-IS systems. Using this support approach can reduce regional "circuit rider" requirement for direct support to the smaller, more remote districts by concentrating effort on those districts who are close enough to the regional center and/or have a student population large enough to justify the use of ESV-IS systems.

Small, geographically remote districts can be aided with the microcomputers supplied with easy-to-use application software, such as the Ortonville system. These districts would require initial training from the region at installation and start up. After established in regular processing, the support requirements from the region should be reduced to "trouble" number assistance over the telephone. Turnover of personnel at the district will necessitate retraining.

Figure 9

Number	Geographic Designation	Development Regions	Number of Counties	Number of School Districts	Total Public School Enrollment K-12, 1972	Total Population 1970	Land Area (sq. mi.)
I	Northwest	1, 2, 4	21	93	84,011	334,549	22,897
II	Northeast	3	7	36	83,656	329,603	17,950
III	Central	5, 7	14	68	99,896	363,493	11,813
IV	Southwest	6, 8	18	90	74,138	301,500	12,011
V	Southeast	9, 10	20	100	139,686	601,446	11,799
VI	Metro VI	11 (part)	7	49	427,364	1,874,380	2,820
VII	Metro VII	11 (part)	—	—	—	—	—
	Totals		87	436	908,751	3,804,971	79,290

REGIONAL COMPOSITION

FACTORS

TASK AREA: B.2 Assignment of Districts to Regions

EVALUATION QUESTIONS:

2. Are the procedures for assignment of districts to regions and the transfer of districts from one region to another clearly defined and followed?

FINDINGS

Based on the survey of local school districts, a very large majority (57%) of the respondents indicated that they did not know how districts were assigned or could be transferred from one ESV region to another. This local district response is consistent, considering that SDE has addressed this issue in the temporary administrative rules, currently in the process of being adopted.

The present regional format, which was also the original one, resulted from a report prepared by a MECC Subcommittee on Regionalization. This report, dated November 19, 1973, was compiled from many earlier reports and study materials. It stated that the existing planning and development regions "apply to education." With an indication that "common agreement on geographic lines is far from a reality, but considerable relationship and respect does exist for the established development regions." Three recommendations were proposed:

1. "Seven computer centers should be established to serve the needs of elementary and secondary schools of the State. (See Figure 9 for the statistical analysis.)

2. The computer centers should be physically located where they may be most closely associated with the populations to be served.

3. Administration of each computer center should be vested in a regional educational service agency (ESA)."

The seven-region network was configured using the first recommendation. Local school district assignments to the regions were based on geographical boundaries, except for (a) the TIES organization with its member districts throughout the state and (b) the metropolitan area with TIES and METRO II.

RECOMMENDATIONS

We believe that, while the recently proposed administrative rules address the assignment and transfer of a district to a region, the present regional configuration may not be optimally effective for the future. The needs of school districts, the size of school districts, and the geographic distances in the rural areas are factors which must be addressed in the future regional network. Assignments and transfers for objectively determined service and cost reasons should be the practice. Policies are being proposed which support this goal. We believe that the establishment of objective criteria for transfer and for originating a new region will be important for future growth and maturation of the ESV system.

TASK AREA: B.2 Assignment of Districts to Regions

EVALUATION QUESTIONS:

3. Should changes be made in the procedures for assignment of districts to a region? If so, how should the changes be determined?

FINDINGS

Local school districts' response to the issue of changing policy or rules for the assignment of districts to ESV Regions was mixed. Of the respondent school districts, only 35% agreed that no changes should be made in the policy or rules for assignments of districts, while 37% did not know or failed to respond. 28% believe that improvements can be made in regional configuration.

RECOMMENDATIONS

As we noted in our response to B.2(2), policies and procedures should be developed permitting district re-assignments for reasons of service and cost. Since a goal of the ESV-IS system is to provide computer services on a least-cost (Task Force report, May 1972), or a cost-effective ("MECC" Report, February 1974) basis, transfers or re-assignments of districts to another region may be necessary to continually satisfy this goal. Procedures have been developed by SDE.

We believe that the use of objective criteria for the assignment of districts to regions is the best method for handling this need. There are a number of districts which, due to economics, commercial arrangements, or differences of operating philosophy, desire to affiliate with another region.

Adjustment of district composition in regions for changing economic conditions, commercial movement, and technological advances must be permitted if the ESV system is to remain viable.

TASK AREA: B.2 Assignment of Districts to Regions

EVALUATION QUESTIONS:

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 threshhold of participation necessary to achieve the original objectives of the system?

FINDINGS AND RECOMMENDATIONS

For the ESV-FIN system, PMM&Co. believes that participation levels should be defined as follows:

- small (below 2,000 students) districts could report annually using (a) manual reports compatible with UFARS standards; or (b) financial application software developed for microcomputer systems, compatible with UFARS standards (ESV-IS systems);
- intermediate (2,000 to 20,000 students) should use the MECC developed ESV-FIN system, as this system was developed to be UFARS compatible; and
- large (above 20,000 students) could use ESV-FIN system if the system could address their needs. If their needs are not compatible with ESV-FIN, these large districts would need to reach an agreement with their region to customize ESV-FIN to meet their district requirements.

The objective of these multilevel efforts is to ensure effectiveness to the State and local districts. There is no "final solution" in any single financial application software system. We believe the important objective for the State is to maintain and foster the concept of uniform financial and reporting standards, not to mandate a single statewide system. To mandate a single system will result in a suboptimal solution to a component for legislative decision-making, namely comparable and timely financial data.

PMM&Co. believes that the ESV-IS services must address the needs of small, intermediate, and large districts. Accordingly, the participation of the different strata of school districts should result in different levels of usage. The threshhold for participation, in our opinion, follows the size stratification of school districts. This is consistent with the following fundamental principle identified in The "MECC" Report, dated February 15, 1973:

> "(10) No educational user of computer services and/or facilities shall receive, as a result of joining the proposed consortium, less service or less adequate service than needed and previously available through institutional and system resources."

Therefore, participation in the Consortium should be made more effective as follows:

- small districts could (a) report manually; (b) use applications systems developed for microcomputer systems, or (c) use ESV-IS systems;
- intermediate size districts should use ESV-IS systems; and
- large districts should be permitted to develop or modify ESV-IS software to meet their unique needs under the guidance and control of MECC-MIS.

For further discussion of the control aspects of development, please refer to question A.1(6).

C. Procurement of Hardware

TASK AREA: C. Procurement of Hardware

EVALUATION QUESTIONS:

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?

FINDINGS

The original goals for the ESV-IS system included the provision that a single contract would be entered into for the procurement of hardware. This goal has been achieved. The Facilities and Services Review Committee of MECC performs the review function on hardware procurement decisions when the request for an equipment purchase is in excess of $10,000. There are standards in effect for the review of these proposals, as well as the format for preparing the request to be reviewed by the Committee.

The proposal for hardware acquisition, which is to come before the Facilities and Services Review Committee, must include information on present facilities and services, a description of needs, and analysis of the alternatives for meeting the identified needs. This list should include cost estimates and staffing implications for this decision. PMM&Co. believes that the policy for the procurement of hardware is practical. As a means of examining the actions of the Committee, PMM&Co. reviewed the Region II proposal to acquire a B6800 for Duluth.

Review of Region II proposal to the Facilities & Services Review Committee

In actual practice, the objective of cost effective procurement may not have been achieved. PMM&Co.'s review of the hardware

proposal for Region II revealed that the following kinds of information were not presented in the proposal:

- Present facility description, to include a detailed description of the processing load which was being encountered on the present system;
- Costing information, which would detail consumption of resources at the Region III host processing site; and
- Alternatives analysis, which would detail the specific types of processing on options and their associated costs.

For objective decision-making these elements of information should be presented to the committee.

We believe the difficulty occurs when regions are making proposals to the Facilities and Services Review Committee without this detail and the Committee does not have the specific practical experience to analyze the proposal.

RECOMMENDATION

PMM&Co. believes that the existing policies for the procurement of hardware are practical. As we noted in the previous paragraph, specific costing and resource consumption information should be supplied. PMM&Co. recommends that guidelines for the submission of these procurement proposals be provided by the proposed ESV Planning and Control group. Such guidelines should include the following information:

- Methodology to describe present processing loads;
- Resource consumption analysis to include district consumption by application; and
- Costing calculations to include Central Processing Unit (CPU), input/output, and storage consumption.

To provide such information, it will be necessary for regions to begin measuring the consumption of their processing resource. Such action is necessary if the cost-effective delivery of processing service to the district is to be achieved.

As noted in B.1(5), we recommend that hardware acquisition decisions be removed from MECC. These decisions should more properly be the responsibility of the proposed ESV Planning and Control group. Such a group would have a broader perspective and would be distinctly removed from the day-to-day sales and service orientation of MECC ESV-MIS.

TASK AREA: C. Procurement of Hardware

EVALUATION QUESTIONS:

2. Do the policies and practices for reviewing hardware procurement provide adequate information to the decision-makers?

FINDINGS

Familiarity with the State of Minnesota procurement system is limited. 28% of the respondents indicated they were familiar, and another 49% indicated they were not familiar with procurement regulations. Twenty-three percent either did not know or failed to respond to the question. Negative responses of those familiar with the system were generally those of school districts who are unaffiliated with the MECC system and in many cases have their own hardware.

Based on responses from the few respondents who were familiar with this system, they do perceive that it does have a positive impact in:

- Reducing total cost;
- Reducing the incremental cost;
- Resulting in competitive prices;
- Meeting user needs;
- Providing information needed to make a decision; and
- Resulting in effective acquisition of large systems.

Specifically, policies and practices for reviewing hardware procurement decisions are contained in guidelines prepared by MECC for their Facilities and Services Review Committee, which is charged with reviewing all new hardware requests in excess of $10,000. This Committee also must make recommendations on the contemplated purchase. Eighty percent of the school districts did not know about the charge to this Committee, or strongly disagree that they perform an objective and rigorous review function. It is significant to note that four of the seven Executive Directors also took the position that this Committee did not provide an objective and rigorous review function.

We had the opportunity to review one proposal to procure a B6800 for Region II. PMM&Co. believes the documentation supplied to the Facilities and Services Review Committee was not adequate to support the decision-making required. Information was not provided in this proposal to adequately describe the actual processing load for Regions III. Cost analysis of the proposal was elementary and alternatives were not fully explored. Prediction of the income streams was optimistic, as was the schedule of installations of applications systems in the districts.

RECOMMENDATION

PMM&Co. does not believe that the policies for acquisition of hardware systems need to be revised. Rather, the practical execution of the policies needs to be strengthened. As noted in question C(1), greater emphasis must be placed on providing decision makers with hard information on systems loading and costing calculations. As noted in B.1(5), we believe that the proposed ESV Planning and Control group can review proposals for the acquisition of hardware to ensure conformance with:

- systems architecture; and
- long-range plans.

Members of this working group would need data processing and business expertise to deal with these issues and should not be in direct association with MECC ESV-MIS.

TASK AREA: C. Procurement of Hardware

EVALUATION QUESTIONS:

3. Has the MECC Facilities and Services Review Committee served a rigorous and objective review function?

FINDINGS

No. Nearly two-thirds of the respondent school districts did not know or were not familiar with the MECC Facilities and Services Review Committee. This same percentage were unfamiliar with the "objective and rigorous review function" to be performed by this Committee. Three Regional Executive Directors said that the Facilities and Services Review Committee was not providing an objective and rigorous review function. As noted in Question C(1), requests for computer systems over $10,000 value must be approved by the State Department of Education, MECC, and the Facilities and Services Review Committee. The proposal to be presented to these bodies consists of the following items:

- General objective of the facilities;
- Summary of needs for services (functional);
- Present facility and/or services which exist;
- A list and analysis of alternatives for meeting identified needs which includes cost estimates (capital or lease and complete itemized operating costs) and staffing implications;
- Recommended or preferred alternatives, in priority order; and

- The statement relating preferred alternatives to the existing plan in budget (including MECC and other regions which may be affected).

PMM&Co. analyzed the hardware acquisition proposal of Region II as a method of determining the operation of the Facilities and Services Review Committee. We present three sections of our analysis:

- Present facilities or services;
- Performance objectives; and
- Budgetary analysis.

Present Facilities or Services

The description of present facilities offered by Region II is brief and does not describe the processing mode which is being encountered on the B1728 computer system. (This remote job entry system connects to the B6800 system in Region III.)

There is no discussion in this proposal of the actual processing load which is being encountered at the Region III host computer. Further, information is not given concerning application loads by district, or by shift operation. PMM&Co.'s computer resources management review conducted at Region III noted that there was no written long-range plan for this region which covered the needs for hardware, software, personnel, and facilities. Although Region III gathers only limited performance data, no efforts have been made to reduce this data and to report it. Data on service level performances at Region III is not maintained, although system availability figures are calculated on a semi-monthly basis. This calculation is limited, and is based on the number of hours down divided by the total hours scheduled.

By way of contrast, METRO II has the most sophisticated processing resource planning of the regional centers. Using LOGGER (a Burroughs performance measurement tool), METRO II has created a costing algorithm which bills for central processing units, and input/output. Such calculations permit the regional center to analyze processing loads and to predict future requirements. They also are useful in alerting users to the amount of resource they are consuming per application area, e.g., ESV-FIN, ESV-PPS, and ESV-SSS.

PMM&Co. is concerned that MECC-MIS has not established guidelines for the retention of records on each of the ESV-IS systems. There is no definition as to the amount of time an accounting record, or a personnel record, must be maintained on the system. Therefore, each regional center has its own method for archiving records. As this process varies from region to region, certain regions can appear to be more "saturated." Such saturation can appear to users as reduced response time and result in requests for more processing resource.

Performance Objectives

Region II specified a number of performance objectives for the 1979-80 year. These objectives were:

- Train and install all 37 districts on the ESV-FIN system;
- Train 27 districts and install 24 districts on an ESV-PPS system; and
- Perform student scheduling on the ESV-SSS system.

To examine these objectives, we compared this plan with other regional centers. In the computer resources management review conducted by PMM&Co. at Region V, we observed that the support ratios per system were as follows:

- One service coordinator for 30 districts, and one processing coordinator for 20 districts on ESV-FIN system; and
- One service coordinator for every 10 districts, and one processing coordinator for every 10 districts on ESV-PPS system.

Using these ratios, PMM&Co. calculated that it will take 1.2 service coordinators and 1.85 processing coordinators for the ESV-FIN system in Region II. Based on present staffing at Region II, their projections of district service are in line with need.

Installation of the ESV-PPS system at Region II will require 3.7 service coordinators and approximately 3.7 processing coordinators. Such a level of staffing is not presently in place at Region II. At no time in this proposal is any of this support information relayed to SDE, MECC, or the Facilities and Services Review Committee.

It has been PMM&Co.'s observation that training on the ESV-FIN, and especially the ESV-PPS system, is a critical component for successful installation. MECC has not developed installation training materials for these systems. Consequently, each region must rely on the ingenuity of their service coordinators to develop training materials. ESV-FIN and ESV-PPS user manuals cannot accurately be described as user guides. Predominantly, they are technical descriptions of the system. Consequently, there is no simple, easily understood, user manual produced for these systems.

Region II has developed training materials for the ESV-FIN system. PMM&Co.'s review of these training materials shows them to be quite innovative, and easily understood by districts. These Region II training materials make the installation schedule for ESV-FIN credible. However, there are no specialized training materials developed for the PPS system. Based on PMM&Co.'s information from other districts attempting to install this system, such training materials are a critical component for successful installation at the district. Therefore, PMM&Co. believes that Region II's installation plan for ESV-PPS system is not realistic.

Budgetary Analysis

The funds flow analysis generated by Region II for this proposal has a number of assumptions which PMM&Co. believes are incorrect. The preliminary assumption, that revenue streams will be immediately forthcoming from all 37 school districts in all ESV systems, is not realistic. Based upon application systems which are installed through other regions, we see a pattern which has a large percentage of districts installed on the ESV-FIN system. The ESV-PPS is typically installed on 15-20% of the total number of districts in the region. The ESV-SSS system is installed only in seven districts throughout the state. Computation of revenue streams based on the assumption that all districts will be on all three systems is not realistic.

This lack of sufficient documentation and sufficient alternative analysis poses a dilemma for the Facilities and Services Review Committee when they must act upon this type of proposal. The Committee does not have information available to them which is sufficiently detailed to make a realistic decision on those processing requests. As the state is committed to a substantial sum of money by the purchase of a B6800, such detailed analysis should be conducted.

RECOMMENDATION

We recommend that the functions of the Facilities and Service Review Committee become part of the duties of the proposed ESV Planning and Control group. (See B1(5) for greater elaboration on this working group.)

The key to successful operation of an effective data processing consortium is an architecture scheme and long-range plan. These two components set the framework for operational decisionmaking. Using this framework, the working group can make informed decisions on facilities proposals.

The proposed ESV Planning and Control group should be composed of business, data processing practitioners, school district personnel, and region SDE representatives.

SDE and the proposed MECC ESV-MIS must define records retention policies. This step can reduce the possibility that excessive records are maintained and stored on the regional processing center, which results in storage and processing inefficiencies. Such unneeded loads increase the probability that equipment will be purchased when purchase is not yet fully justified.

TASK AREA: C. Procurement of Hardware

EVALUATION QUESTIONS:

4. Are existing state procurement procedures appropriate for acquisition of large scale computer systems?

FINDINGS

PMM&Co. analyzed the ESV-IS system bid specifications which made up the original request for proposal for the acquisition of hardware and software to support ESV-IS. Our review of this large system acquisition for the state convinces us that this was a competitive procurement. The winning vendor proposed a system which met the bid specification requirements. Our review of the second vendor's proposal shows that this proposal was not as responsive to the bid specification as was the winning vendor.

PMM&Co. concludes that the State has a competitive procurement that was conducted in a professional manner. The rating criteria were specified, and the bid specifications were not skewed toward any one vendor's product line.

RECOMMENDATIONS

PMM&Co. concludes that existing state procurement procedures are appropriate for the acquisition of large scale computer systems. In reviewing responses to survey questions, the major concern by respondents was about delay in this procurement process. In examining the time frames for the conduct of the ESV-IS system acquisition, PMM&Co. believes that this acquisition was conducted in a timely fashion, considering the complexity of the acquisition. We therefore conclude that, although time lines may be extensive, they were realistic.

We note that the state contract with Burroughs has only one method of acquisition: installment/purchase. This is a restricted acquisition strategy and should be reviewed prior to renegotiation of the Burroughs contract in 1983.

TASK AREA: C. Procurement of Hardware

EVALUATION QUESTIONS:

5. Are the prices for computer hardware acquired through state master contracts competitive by today's standards?

FINDINGS

Because the State has negotiated a contract which applies a standard 40.9% discount to whatever current Burroughs pricebook is in effect, the State has an extremely attractive discount. At a time in which the prices of hardware have been declining, the 40.9% discount has stayed with that reduction. Therefore the State continues to receive a substantial reduction even as hardware prices are dramatically declining in the industry.

To the extent that Burroughs remains competitive with the computer industry, the State will benefit from this contract. A Business Week article of November 12, 1979, discusses Burroughs' strategies for the 1980's. This article notes that Burroughs is committed to remaining competitive in the computer industry and to address consumer demand for distributed systems.

RECOMMENDATION

We believe that prices the state has negotiated are competitive and will continue to remain competitive through the life of the seven year contract. We note in C(7) that there are additional factors which must be considered when entering into a seven year installment/purchase contract. Please refer to that question for further discussion of these factors.

TASK AREA: C. Procurement of Hardware

EVALUATION QUESTIONS:

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?

FINDINGS

The State Master Contract with Burroughs benefits those users who need to acquire Burroughs computing equipment. For those districts which are below 2,000 students, PMM&Co. believes that the Burroughs product line does not meet their needs. These smaller districts have requirements which can be more easily satisfied with microcomputer equipment.

For the district with a size between 2,000 and 20,000 students, Burroughs equipment has application. These districts must acquire this hardware through the Region to benefit from the statewide 40.9% discount because districts can't buy on installment purchase. As Burroughs extends itself into greater capabilities for distributive processing, its product line will become more useful to smaller districts.

RECOMMENDATION

PMM&Co. believes that the MECC Instructional Timesharing master contract for the microcomputer filled a gap which must be addressed for the State to have cost-effective administrative services. Therefore, the combination of the two State Master Contracts with Burroughs and a microcomputer vendor provides a means of serving the needs of users in the State.

We are informed that school districts are prohibited by state regulation from entering into the seven year installment/purchase or installment contract the State has with Burroughs. To deliver Burroughs equipment to the district, the region must provide contractual service.

Only the largest districts require B1800 equipment. We believe that this contractual service to these few districts does not place an unmanageable burden on the region.

For small districts who chose to use microcomputers, the purchase prices of $4,000 - 5,000 do not represent a significant impediment to direct purchase under State negotiated pricing schedules.

TASK AREA: C. Procurement of Hardware

EVALUATION QUESTIONS:

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?

FINDINGS

The Burroughs installment purchase plan negotiated by the State of Minnesota includes an educational discount of 40.9% from the Burroughs purchase list price. A nominal finance charge of 5% is levied when the 84-month installment payment option is elected. The equipment can be returned to Burroughs at any time after the first twelve months by payment of a remarketing charge, which is based on the then current lease rates and the months remaining on the installment plan.

PMM&Co. completed a break-even analysis of the installment purchase plan compared to the one-year and five-year lease options. The calculations are based on a November 13, 1979 Burroughs B6810 quotation to Dr. E. Ronald Carruth of TIES. The following assumptions were made:

- Burroughs lease and maintenance rates will remain stable over at least the next 24 months;
- Maintenance agreements are for five-day, eight (or nine) hour coverage; and
- The transaction proposed in the November 13 letter to Dr. Carruth is representative.

While these assumptions may not prove to be valid over time, the most probable deviations from these assumptions would not materially alter our findings.

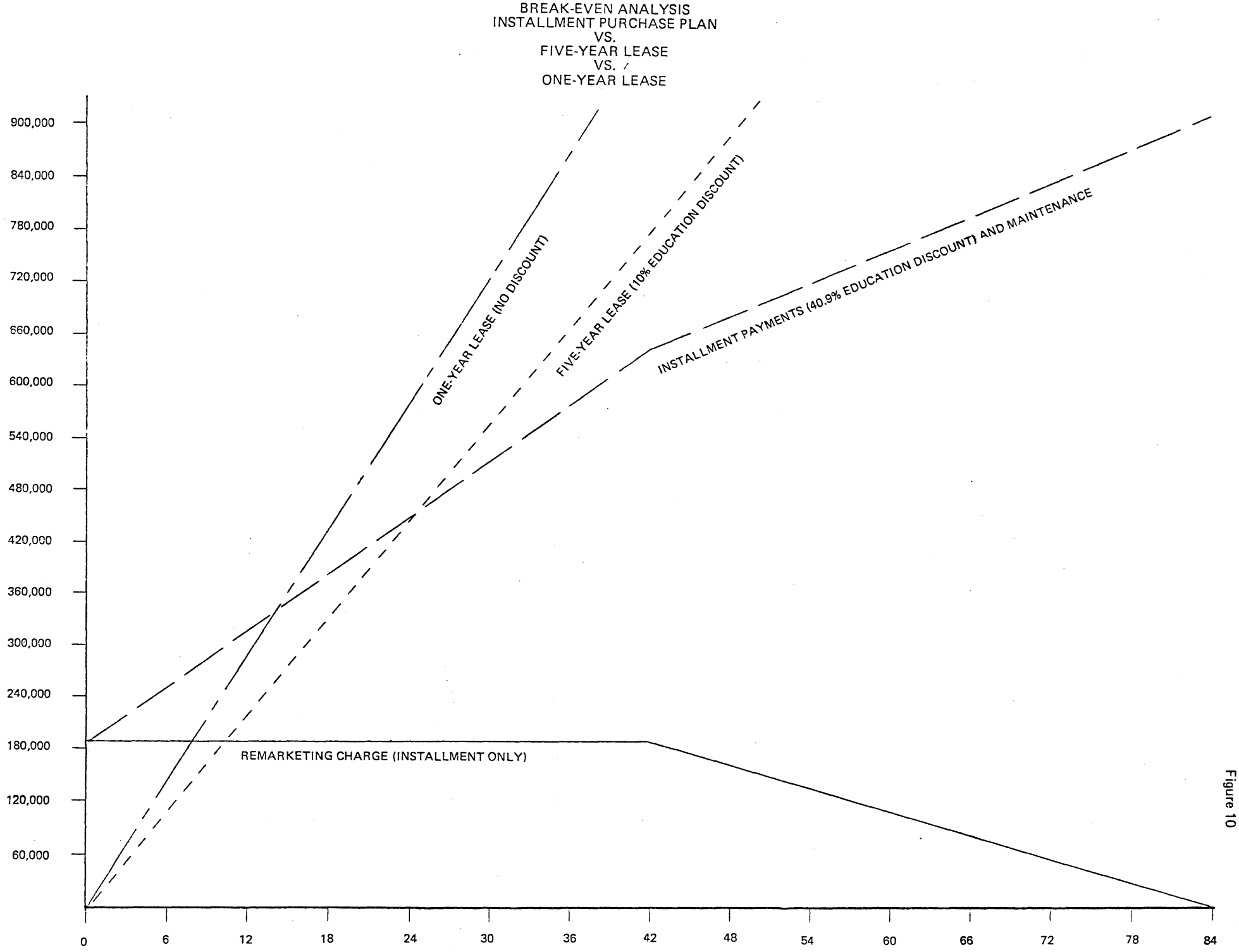

BREAK-EVEN ANALYSIS
INSTALLMENT PURCHASE PLAN
VS.
FIVE-YEAR LEASE
VS.
ONE-YEAR LEASE
900,000
840,000
780,000
720,000
660,000
600,000
540,000
480,000
420,000
360,000
300,000
240,000
180,000
120,000
60,000
ONE-YEAR LEASE (NO DISCOUNT)
FIVE-YEAR LEASE (10% EDUCATION DISCOUNT)
INSTALLMENT PAYMENTS (40.9% EDUCATION DISCOUNT) AND MAINTENANCE
REMARKETING CHARGE (INSTALLMENT ONLY)
0
6
12
18
24
30
36
42
48
54
60
66
72
78
84

Figure 10

One other available alternative, cash purchase, was not considered due to the Burroughs 5% finance charge, which is significantly below any reasonable "cost of capital" assumption that could be made.

As can be seen in Figure 10 on the facing page, the break-even point for the five-year lease compared to the sum of installment payment, maintenance agreement and remarket charge, results in a break-even point of 24.2 months. Making the same comparison with the one-year lease rate, the break-even is 14.1 months. Given these results, the installment purchase plan is clearly preferable in any instance where the equipment will be retained more than 24 months. This comparison ignores early termination penalties on the five-year lease which were not readily available since incorporation of such penalties would only serve to further shorten the break-even period.

Another factor is the continuing improvements in computer price-performance ratios, which is currently estimated at approximately 10% per year. Since a 24-month price-performance gain of 20% is substantially less than the Burroughs 40.9% education discount, this technological factor should not be considered material to an analysis of the economic alternatives. Technological obsolescence and price-performance improvements are important factors to consider when determining installation life and optimum replacement points, however, and should be given careful consideration during long-range installation planning.

RECOMMENDATIONS

PMM&Co. recommends that the State not purchase B6800 hardware from Burroughs on the installment purchase plan when anticipated use of the B6800 equipment is less than two years.

The State must remain aware that each installment purchase contract with Burroughs is for a full seven years. This commitment will extend contracts past the State's Master Contract, which will expire in 1983.

PMM&Co. recommends that the State investigate sales to third parties as an alternative to payment of the Burroughs remarketing charge.

We recommend that the State include all acquisition options in future RFP's. A financial analysis of each option should be performed as part of the State's evaluation.

D.1 Development and Maintenance of Software

TASK AREA: D.1 Development and Maintenance of Software

EVALUATION QUESTIONS:

1. Has the ESV software been developed according to the guidelines and policies provided?

FINDINGS

The use of a formal system development methodology is essential for the development of medium to large-scale systems.

The primary guidelines for the development of ESV software are:

- PRIDE for system development projects;
- Warnier Diagrams for program design; and
- Structured Programming for program coding.

MECC is curently functioning primarily in a maintenance and enhancement mode. The use of PRIDE appears to be virtually nonexistent at the present time. The PRIDE methodology was used during the first two phases of the development of ESV-FIN and ESV-PPS for:

- System Study and Evaluation; and
- System Design.

However, even for these phases, the commitment to the methodology was not complete. For example, the system study produced a user "wish list" of features. However, there is no evidence of an evaluation of the "wish list": a cost-benefit study. No performance objectives or other criteria for a post-implementation review were established, and there is no record of such post-implementation reviews.

In Phase 3, Subsystem Design, Warnier Diagrams were introduced and used for the remaining design tasks. Structured programming techniques (rules limiting how code can be constructed) were used for program coding. The standards in the design and programming areas appear to have been meticulously followed. The resulting programs appear to be of exceptional technical quality.

RECOMMENDATIONS

The danger in emphasizing design and programming techniques over the encompassing development methodology is that one can develop well-written computer programs for the wrong business problem. This appears to be true at least for the Payroll/Personnel System. User expressed concerns about the system, such as its overcomplexity for small districts, indicates that the first two phases of the system development did not accurately reflect the needs of all users.

TASK AREA: D.1 Development and Maintenance of Software

EVALUATION QUESTIONS:

2. Has the cost of developing the software been within budget? Has the budget for software development been adequate to meet anticipated needs?

FINDINGS

Budgets do not exist which were prepared identifying the costs of developing any of the application software. Survey respondents had little knowledge of the amount of the development costs for MECC developed software in any of the functional areas of finance, payroll/personnel, and student systems. The respondent school districts made comment about circumstances and reasons which may have contributed to the development costs exceeding the budget even though that budget was unknown to them. Some of the comments offered for the situation were:

- Inadequate time;
- Poor systems analysis; and
- Incomplete data for test criteria.

Respondents also said that the three systems were too large a project to begin with from "scratch" and the results were promised at too fast a rate. Finally, the systems were not completed through pilot and not signed off by the pilot district. It was also pointed out that there is no adequate mechanism or process for requiring formal approvals for enhancement to any of the systems. Respondents suggested that this may contribute to the case where costs do exceed budget.

It is difficult to determine the adequacy of the budget for such software development. Many factors have contributed to the delays experienced in the software development which tended to make the budgets less than adequate. PMM&Co. believes many of these factors were and are controllable.

Such milestones as the functional specifications, the development of test criteria, and the sign-off by pilot districts are critical checkpoints in system development and should not be bypassed. We believe that the adequacy question can be addressed as a result of our reviewing the objective statement contained in the program budget prepared the past two bienniums for MECC. Many of the objectives (goal statements) for the fiscal year commencing July 1976 were not accomplished as originally planned and are contained in subsequent goal statements with new deadlines. The biennial budgets do not contain any indication that staffing size has been inadequate or that the budget for any year has been inadequate.

PMM&Co. concludes that there has been no specific budget for software development. There has been no effort to link the system development life cycle with dollars and to use these commitments as a check on future developments. The stages in the system development life cycle would be:

- Feasibility analysis;
- Functional definitions;
- Detailed specifications;
- Programming; and
- Testing and implementation.

RECOMMENDATION

PMM&Co. recommends that, in each stage in the system development life cycle, reviews should be conducted to determine if development has been on time and on cost. It is at these junctures, or milestones, that decisions must be made concerning future alternatives for development. ESV Planning and Control is the working group that should be charged with this review. This group has knowledge of the long-range plans and system architecture for MECC ESV-MIS. It is also a logical group to conduct an impartial post-implementation review at the end of the system development.

TASK AREA: D.1 Development and Maintenance of Software

EVALUATION QUESTIONS:

3. Are the time lines for development of software realistic and attainable, in view of existing staff and budget resources?

FINDINGS

The ESV-FIN system was developed on time as originally published. The time lines for the development of ESV-PPS and ESV-SSS systems have been passed. The loss of staff in the ESV-PPS and ESV-SSS systems has stopped development of these software systems. MECC-MIS is attempting to remedy this situation by contracting with vendors who have experience in the student area to complete the development of that software product.

RECOMMENDATIONS

PMM&Co. observes that the time lines for the continued development of the ESV-PPS and ESV-SSS systems must be reviewed and revised. PMM&Co. recommends MECC examine the ESV-PPS system for system efficiencies, particularly in the update cycle and trial payroll cycle. The ESV-SSS system must be examined from a total processing standpoint, and development should not continue until the modifications which are presently envisioned are ratified by the user community.

MECC-MIS should produce a system development life cycle time table with budgetary dollars attached at each stage in the cycle. A review should be conducted in each stage in this life cycle. If development is not on time, or on cost, MECC ESV-MIS must then analyze alternatives available to the State at this stopping point. This alternative's analysis should include time and cost associated with each alternative.

These alternatives would then be presented to the proposed ESV Planning and Control group. ESV Planning and Control would discuss the options and reprioritize further development efforts at MECC.

TASK AREA: D.1 Development and Maintenance of Software

EVALUATION QUESTIONS:

4. Have the needs of the various users been addressed in the development of the software?

FINDINGS

The original goal statements contained in The "MECC" Report of February 15, 1973, stated that MECC was to "assist the systems of education and various coordinating agencies in providing meaningful information to governing boards and the executive and legislative branches of government to aid them in formulating effective educational policies." This goal statement indicates that the users of the system were to be the State Department of Education and legislative bodies.

In the same MECC report, another objective was to "provide effective management information services, including administrative data processing, for the management of education and educational resources at all levels." This goal statement extends the audience from the Legislature and SDE to the individual school districts. Although specific needs were not identified in this original MECC report, this general policy was to be operative.

Based on individual district responses to the survey instrument, PMM&Co. can find no overwhelming support for the idea that user needs were addressed in the development of any of the ESV systems. Region VI, which has been actively involved in development, strongly agrees that user's needs have been addressed. The remainder of the regional and district responses were evenly distributed between agree and disagree.

RECOMMENDATION

PMM&Co. believes that, to address this question, it is necessary to stratify user's needs according to the size of the school district. As

such, we have included in question A.1(1), a stratification of school districts based on enrollment. We believe that these enrollment levels are a logical approach to addressing needs. Using this set of criteria, PMM&Co. believes that the needs of all of these different levels have not been met in the development of the ESV-IS software. The needs of the intermediate school districts have been addressed in this system. The needs of small districts and the needs of large districts have not been addressed. Consequently, PMM&Co. recommends that MECC address the other two levels of users, namely small districts and large districts, with separate solutions which are based on the ESV-IS model. We recommend that microcomputer systems, such as Ortonville, be used for small districts and that customized versions of the ESV-IS be produced under MECC-MIS control and monitoring to support large districts.

The production of "custom" ESV-IS systems for large districts would have as operating principles:

- the State standard definition of data elements;
- the State data base structure and data base access techniques;
- the standard computational process for the maintenance or updating of data elements; and
- the State standard for transaction processing.

Therefore, any "custom" versions of ESV-IS would be totally synchronized with State requirements. Additional data elements, calculation and reporting routines would be the differences from the regular ESV-IS. Such alteration would reduce the maintenance burden on MECC-MIS as transaction processors, updating routines and most reporting would be compatible with the ESV-IS.

TASK AREA: D.1 Development and Maintenance of Software

EVALUATION QUESTIONS:

5. Does the software meet State Department of Education reporting requirements?

FINDINGS AND RECOMMENDATION

As a result of PMM&Co.'s review of the ESV-FIN system and the UFARS standards, we conclude that the software does meet the SDE reporting requirements as specified in UFARS standards identified in the Gray Manual. Our review leads us to believe the SDE objective of having the UFARS system fully automated by July 1, 1980 will not be met. PMM&Co. believes this to be true because: (a) the Blue Manual is not yet completed; and (b) 250 school districts are not operating on ESV-FIN as of October 1, 1979.

SDE should consider identifying a plan of action to enable them to successfully implement the entire UFARS system. The SDE planning process should determine a new target date for such completion.

SDE has not defined the data elements necessary for internal department reporting and management. This definition of data elements is to be complete in January 1980. When this definition is complete, analysis can be completed to determine if the SDE-IS and ESV-IS support these data elements.

We recommend that completion of the SDE data element definition be the highest priority for SDE. This definition is a critical component in linking the data acquisition calendar and the ESV-IS systems.

TASK AREA: D.1 Development and Maintenance of Software

EVALUATION QUESTIONS:

6. Have appropriate procedures and documentation been established for maintenance of the software?

FINDINGS

The following steps outline the procedures and documentation used in maintaining software:

- A green sheet (problem) report is received at MECC-MIS;
- A MECC-MIS problem report is made up;
- The problem is analyzed, and necessary corrections are formulated;
- A patch file is created;
- The patch is distributed;
- The original source code is not changed;
- The programs are re-compiled, applying all the patches since the last release; and
- Periodically, there is a major release:
  - patches are applied permanently to the source code.
  - new copies of the source code are distributed.

This method provides tight control over software maintenance for MECC-MIS and is a good technique. However, there appear to be some problems in

terms of communication between MECC-MIS and the region with regard to the patches. Specifically,

- Regions do not see the problem statement on the original green sheet. They only see the patch. The problem statement would help them assess the impact or related problems at their own installation; and

- Pre-release information would be useful to the regions, summarizing the patches and their impact. Some regions are not installing individual patches as they come out.

Additionally, while the mechanics of the process appear to be adequate, the question arises as to how prioritization of maintenance requests and enhancements takes place. There does not appear to be any method or procedure for prioritizing either requests for maintenance or modifications to the system software. The present process for modification of statewide ESV-IS software is based on input from the Regional Coordinators, the ESV Regional Directors, and the "green sheets." There are no formal advisory committees with user district representation in the process.

RECOMMENDATIONS

The present structure has not been effective in establishing priorities for MECC enhancement and modification. The Regional Coordinators have a link to the district, but are not users of MECC software. PMM&Co. recommends direct linkage with ESV-IS users through their regional center. With this linkage firmly established, the proposed ESV Planning and Control Advisory Committee could assume a role in the priority-setting mechanism for enhancements and modifications on the ESV-IS systems. (See B.1(5).) To further rationalize this process, PMM&Co. recommends that requests for enhancement or modification be stratified.

We observed that there is no stratification of work requests in this program modification process. A minimum stratification would be in three categories:

- fixing errors or program maintenance;
- minor enhancements, such as changes to report formats; and
- major enhancements, such as major new system features.

MECC has begun to apply stratification by program errors and enhancements. We recommend further steps be taken to break out major and minor enhancements. In our recommendation for the establishment of an Advisory Committee under the proposed ESV Planning and Control group (B.1-5), we note this committee must prioritize work for MECC ESV-MIS. Such a prioritization effort should help to identify minor changes which may be of major advantage to the consortium providing good payback for the effort.

TASK AREA: D.1 Development and Maintenance of Software

EVALUATION QUESTIONS:

7. Does MECC have the appropriate staffing level, organization, qualifications and experience to enhance and maintain the software?

FINDINGS

No. MECC does not have the appropriate staffing level, organization, qualifications and experience to enhance and maintain the ESV-IS software. Specifically, the loss of the functional area specialist in payroll/personnel, combined with turnover in the student functional area, has reduced MECC's ability to respond to needs for enhancement and development of software. At present, MECC-MIS is using an independent contractor to complete the installation of the student (SSS) system. PMM&Co.'s examination of his contract shows that the contract does not have specific deliverables associated with it, nor time frames for delivery of service. It is a labor hours contract which specifies assistance to MECC for the development of the student system.

The State personnel system has reduced MECC's competitive ability to attract skilled data processing personnel. We analyzed the "Salary Survey of Selected EDP Positions for Twin Cities Area" prepared by Stanton Associates, Inc. in April 1979. Stanton found that the ranges for State of Minnesota data processing positions were narrower, but that the State was competitive for salaries at entry-level positions. The mean salary of the private and State positions at the entry level was less than mid-range. By contrast, at the higher Senior Systems Analyst positions, the maximum salary in the private range exceeded by $4,500 annually the maximum State salary of $24,500. The mean salary in the private sector Senior Systems Analyst position was in the lower half of the range, but the mean salary for the same State position is 75% of the $24,500 maximum. This situation at the State presents limited opportunity for upward salary movement and may contribute to turnover at this higher position. This circumstance is

critical since these senior people are needed for MECC-MIS, to complete the development of the student system and to enhance and refine the existing payroll/personnel system.

The organizational structure of MECC-MIS is understandable and concise. The problem is a number of these positions remain unfilled after a considerable period of time. This lack of a full complement of staff, combined with difficulties in attracting competent personnel from the marketplace, places MECC-MIS in a disadvantageous position in regard to development and enhancement of the statewide systems.

RECOMMENDATIONS

We recommend that MECC-MIS use contractor personnel only as the deliverables, timeframes and costs are defined contractually.

We recommend that MECC-MIS define its position descriptions for the State Personnel system prior to advertising those positions. Such descriptions should receive only minimal alteration by State Personnel to preserve the original meaning. We further recommend that the job announcement process take no more than two weeks from submission of the request until advertisement. Whatever personnel system MECC-MIS is operating under, MECC-MIS must have the flexibility to respond to the marketplace for the senior level analyst.

TASK AREA: D.1 Development and Maintenance of Software

EVALUATION QUESTIONS:

8. Do the systems (ESV-FIN, ESV-PPS, ESV-SSS) operate in an efficient and effective manner utilizing state of the art data base concepts, data communication and hardware capabilities?

FINDINGS

Data Base

The operational systems at MECC-MIS make use of the Burroughs data base management system (DMS-II). However, they do not reflect some of the current state-of-the-art concepts in data base, either because of limitations in the data base management system itself or in how it was applied by MECC-MIS. For example:

- There are no relationally-structured data sets for MIS-type queries;
- Use of the Burroughs on-line query language (DM INQUIRY) is difficult because the data sets have been designed as disjoint rather than embedded;
- Direct on-line update of the data bases is not possible; and
- Whenever the physical structure of a data base is changed, all programs using the data base must be recataloged.

A relational data structure is the design of data sets such that they appear to be two dimensional tables. These design structures facilitate the removal of redundant data in the data base and on the optimal structure for flexible reporting against the data base. The current data base design reflects an operational level orientation of the applications which make use of the data base. As a result, flexible management information reporting is not easily accommodated.

Under DMS-II, the data bases are composed of a series of disjoint data sets. Relationships between the data sets are maintained by pointers called "counted links." The disjoint data sets technique makes sequential processing of the data set more efficient. However, the on-line query language cannot be used for quick reporting which must relate separate data sets. This is because the query language cannot make use of the counted links. An alternative method of data base organization is the use of the embedded data sets. If embedded data sets were used, the query language could relate separate data sets. The trade-off that was taken here was for more efficient sequential processing rather than the flexibility required for use of the query language.

None of the current applications allow direct on-line updating of the data bases, even though good on-line update facility is supported by DMS-II. Transactions are keyed into batches which are input to the system for batch processing.

One of the drawbacks of DMS-II is the dependence of application programs on the physical structure of the data base. Although the applications need not know explicitly the data as physically stored, they do have to be recataloged any time the physical structure of the data base changes. That is, a change in the length of the record in a given data base would require that all the programs which make use of that record be identified and recataloged. Not only is this an inefficient use of staff resources, but the potential exists for overlooking a program which needs to be recataloged.

RECOMMENDATIONS

ESV Application Systems

Each of the ESV application systems will be discussed from the standpoint of efficient and effective operations.

- ESV-FIN

  The ESV-FIN system is, in PMM&Co.'s opinion, an efficiently designed system. There are good input edit controls, and the data base structure and organization is efficient. Our examination of the ESV-FIN user manual shows this to be a well-documented system. This user manual is somewhat technical for the average small district user; however, the information which districts would need to process with the ESV-FIN system is available in this manual. Regions II and III have developed useful ESV-FIN manuals for small districts. These manuals should be examined by MECC for future ESV-FIN user documentation.

- ESV-PPS

  The ESV-PPS system is not designed for efficient operation. The editing process for ESV-PPS consists of three levels. Users do not receive the final level of edit until a payroll is actually run. Such an editing process is wasteful and

confusing to the district. Current pay information is not maintained within the ESV-PPS data base. This pay information is kept in a series of payroll work files. The linkage to retrieve and record information on current pay creates an extra step in processing and is an inefficient design.

In interviews with districts, and in responses received on the PMM&Co. survey, we have received a picture of the ESV-PPS system which is not promising. This system consumes an extensive amount of district time in clerical staff support. The input process, although relatively simple for the creation of records, is extremely difficult when a final payroll is a goal. Therefore, the system does not operate in a manner which effectively supports school district needs. We recommend further development on ESV-PPS be stopped and the ESV-PPS system design be re-evaluated by an independent third party to determine future alternatives available for this product. MECC-MIS would continue to support the field ESV-PPS during this evaluation period of ESV-PPS.

- ESV-SSS

  At present, there are no MECC-MIS personnel who are directly responsible as functional managers for the Student Support System (SSS). Employees at METRO II are assisting a contractor who has been hired to complete the implementation of ESV-SSS. Based on information received in the survey conducted by PMM&Co., there is little knowledge of this student system in the school districts. These districts do not believe that they have been consulted on the design of the ESV-SSS system, nor are districts which are using the system satisfied with documentation that has been supplied for the system operation.

  The ESV-SSS system uses a different method for the creation of transactions. This method, GEMCOS, is a Burroughs system product. It is designed to be a transaction processor and includes data security. The other two MECC-developed ESV-IS systems utilized CANDE. CANDE is a Burroughs system product which provides generalized file preparation and updating. PMM&Co. notes that these are not consistent processing methodologies. As such, MECC-developed systems do not exhibit the same characteristics to users which should be expected for centrally developed software. Further development on ESV-SSS should be stopped until an independent third party evaluates future alternatives to support this product.

PMM&Co. recommends that the ESV-IS system be brought into synchronization as regards computer operations. A consistent processing methodology reduces training time for the district and improves the effectiveness of the service delivered to the user.

TASK AREA: D.1 Development and Maintenance of Software

EVALUATION QUESTIONS:

9. What potential do the ESV-FIN and ESV-PPS systems have for use by other governmental users in Minnesota? In comparisons with other states?

FINDINGS AND RECOMMENDATIONS

PMM&Co. believes that the concept of ESV-FIN and ESV-PPS have potential use in other governmental organizations in Minnesota and in other states. However, the transferability of the existing ESV-FIN system to other governmental units is dependent on the compatibility of accounting and financial reporting systems. ESV-FIN is designed to follow the UFARS standards and procedures, which may be compared to the accounting standards and different procedures in the other organizations. In PMM&Co.'s opinion, ESV-FIN is an efficiently designed system for Minnesota school districts.

The ESV-PPS system, in its present form, has little potential for use by other governmental users in Minnesota or in other states. Because we determined that the ESV-PPS system is not designed for efficient operation (see D.1(8)), we believe the system is not effective and has limited use by other organizations.

Local school district response to the survey question concerning the potential of the systems for use by the governmental users produced the following results:

- 51% indicated that the ESV-FIN system would either have extensive or some use;
- 45% indicated that the ESV-PPS system would have either extensive or some use; and

- 21% indicated that the ESV-SSS would have either extensive or some use. ESV-FIN was considered to have the greatest potential for use by other levels of government in the State of Minnesota and in other states.

The survey responses are consistent with our conclusions. The survey response to the ESV-PPS system is stronger than might be expected because of user understanding of "System" as the ESV-PPS concept, rather than the ESV-PPS system itself.

TASK AREA: D.1 Development and Maintenance of Software

EVALUATION QUESTIONS:

10. Does the ESV-IS software meet the needs of very large as well as small school districts?

FINDINGS AND RECOMMENDATION

The ESV-IS software does not meet the needs of large as well as small school districts. Small districts have significant disenchantment with the ESV systems. These systems exhibit a level of complexity which small districts do not feel is warranted for their operations. There is a significant overhead burden in clerical personnel for the smaller districts to utilize the ESV-IS systems. The user's survey conducted by PMM&Co., as well as on-site visits with a number of school districts, reaffirmed this position. Less than a majority of respondents agreed that the current software developed by MECC met the needs of both large and small school districts. Of the 41% agreeing, only one respondent, or about 1%, strongly agreed. It is significant that 31% either didn't know or didn't respond, and the remaining 28% disagreed, including 16% strongly disagreeing. Strong disagreement was shown by three Executive Directors, while two of the remaining four Executive Directors strongly agreed that the software met the needs of large as well as small. Executive Directors representing large out-state regions with many small school districts commented that the systems were designed for large school districts and were cumbersome, complicated, and would require some modifications for the smaller districts.

As noted in question D.1(8), there is variation in districts' support requirements for each of the ESV-IS systems. ESV-FIN is the simplest of the three systems. However, there is significant overhead for the small district to supply clerical personnel for data input to the ESV-FIN system. A number of districts report difficulties in the handling of vouchers and payment of vendor accounts. PMM&Co. does not believe that there is any

processing or logic problem with ESV-FIN. Rather, these difficulties arise from lack of training in the accounting concepts which are the base for the ESV-FIN system. It is our observation that a number of these problems are due to a transition from a cash accounting to a modified accrual accounting system. As such, it is incumbent upon the regional processing center to ensure that districts thoroughly understand these accounting concepts.

For the large districts, we believe that ESV-FIN is an essentially acceptable method for financial reporting and control. The ESV-PPS system can be adapted in most large districts except that this system consumes an excessive amount of computing resource. There are several features identified by large districts in the personnel area which are not supported by ESV-PPS. We do not believe that these requested features are the major need. What is needed is an efficient and more user-oriented PPS system. The ESV-SSS system has the least commonality with large district needs. This system does not support transportation/busing models, or a number of other large-district-specific requirements. We do not recommend further development of the ESV-SSS system until a third party review has been conducted of this system to identify alternatives to the State.

D.2 Implementation of Software

TASK AREA: D.2 Implementation of Software

EVALUATION QUESTIONS:

1. Is MECC providing adequate user and technical training to the regions?

FINDINGS

MECC has a number of approaches for supporting regions. MECC will contract with Burroughs to establish training courses in DMS-II. MECC also provides assistance to the region on a direct basis such as the work that has been done for Region II in the installation of the B6800 computer. MECC is not directly involved at the present in the user training. During the installation phase of the ESV-FIN and ESV-PPS systems, MECC was involved with the region in setting up training programs. The user documentation which was available for these training programs in FIN was acceptable. Our examination of the PPS documentation shows that this documention is not acceptable from the perspective of a user. Forms design and overall systems flow need improvement to more fully communicate operations of the PPS system.

The data centers have heavy reliance on on-the-job training as a primary training methodology. Most of the centers also provide some essential technical training and encourage personnel professional growth. 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 between regions.

The following paragraphs describe PMM&Co.'s examination of the user manual-technical training available to the regions.

ESV-FIN

Our examination of the ESV-FIN user documentation revealed the following information:

- This user documentation is logically constructed and can, with some data processing expertise, be understood;
- Forms design for input into the ESV-FIN system is workable; however, there are needs for improvement; and
- Regions have "customized" this ESV-FIN user documentation to produce smaller, more easily understood manuals for the user.

The ESV-FIN system is a relatively stable system. The documentation associated with it is usable and workable for the district. PMM&Co. has noted, on visits to Region II and III, that very good modified user manuals have been produced by these regions. Additionally, Region III has produced input forms for this system which are legible and easy to understand. PMM&Co. recommends that MECC obtain these manuals and consider releasing a ESV-FIN user guide which would parallel these customized versions. PMM&Co. believes that such efforts would be appreciated by districts between 2,000 and 20,000 students, as these districts typically do not have financial personnel with data processing backgrounds.

ESV-PPS

PMM&Co. has examined the ESV-PPS user manual. We believe that this user manual is difficult to understand for the following reasons:

- There is no overview description of the payroll/personnel system;
- System flow and procedures from a user's standpoint are not described;
- Examples used in the manual are not complete and consistent;
- Specific steps for preparing a normal payroll are not contained in the manual;
- Input forms and screens are not shown in the manual;
- There is no comprehensive index to the manual;
- The manual assumes that the user is already familiar with the payroll/personnel system;
- The primary function of the manual is to serve as a reference guide rather than an introduction or instructional guide to the system; and
- Error codes are buried in the manual and are difficult to locate.

Region III's service coordinator has produced a valuable user's guide which should be considered by MECC as a possible supplement to the existing ESV-PPS user manual. PMM&Co. believes that the forms design in the Region III guide is outstanding. The explanation of processing flow is simple and easy to understand, and the manual is small and portable.

ESV-SSS

PMM&Co.'s examination of the documentation available on an ESV-SSS system leads us to the following conclusions:

- There is no final ESV-SSS user documentation;
- Preliminary user documentation for the resident/family and student accounting modules has been produced; and
- Overall system design and flow has not been executed in the manner in which they were originally described in Phase I and Phase II documentation.

MECC does not have available any individual on the staff who is capable of managing this system in addition to other duties. We believe that it is imperative that user needs for the ESV-SSS system be reaffirmed. Further developments or documentations should not proceed until this step is complete.

RECOMMENDATIONS

PMM&Co. believes there are a number of areas of technical training which could be used to the advantage of the State:

- A significant opportunity exists to reduce training costs by sharing training plans and results between regional centers and MECC;
- Contingency training and backup support at the regions should be coordinated through MECC;
- Computer operations procedures developed at the regions should be compiled and published by MECC for each of the ESV-IS systems;
- Training procedures and model user manuals should be produced by MECC;
- Installation guides for each ESV system or new releases of previously existing systems should be provided by MECC;
- Future ESV systems user documentation and operating procedures should be produced as a product of the piloting process at the region for new systems or enhancements to existing systems; and
- MECC should provide training for regions in the use of computer performance reporting tools after these tools have been developed with third party assistance.

PMM&Co. believes that the implementation of these recommendations will be advantageous to the State. In addition to the obvious technical sharing which would occur, we believe that a purposeful dialogue would be established which would encourage further cooperative efforts between the local school districts, regions and MECC.

TASK AREA: D.2 Implementation of Software

EVALUATION QUESTIONS:

2. Are the regional centers installing the software as it is intended?

FINDINGS

PMM&Co. believes that regions are installing the statewide software as it was intended and developed. However, regions are modifying the statewide ESV-IS software. This modificiation can occur at a number of points in the processing cycle. These data processing cycles are:

- Creating the input transactions;
- Processing the input transactions;
- Updating the data base; and
- Reporting.

Modification to the ESV-IS system is primarily occurring at the reporting stage. PMM&Co. does not believe that this poses any threat to the integrity of the ESV-IS systems. However, there are exposures. METRO II is heavily involved in the ESV-PPS and ESV-SSS systems. This involvement includes development and modification of applications programs which affect the creation and maintenance of the data base. As such, this involvement is at the very heart of the system. Consequently, it is important that MECC-MIS ensure programming standards and documentation standards are maintained for these efforts.

TIES has a processing methodology which is not the same as the MECC-developed ESV-IS product. This processing methodology has the followng differences:

- Multidistrict processing, in which a number of districts are processed at the same time;

- Standardized COBOL naming conventions which go from the general to the specific; and

- The use of GEMCOS as the input transaction processor versus CANDE which is used as the MECC transaction processor (except in ESV-SSS).

TIES has modified the ESV-FIN system to be compatible with TIES processing methodologies. TIES modified, using GEMCOS for data security reasons, the processing methodology of ESV-FIN. The resulting system does not use CANDE as a transaction processor and uses multidistrict processing. TIES FIN is not supported by MECC, but was a SDE-approved modification.

RECOMMENDATIONS

PMM&Co. recommends that MECC develop a consistent processing methodology for handling transactions which would be applied across all systems. At present, this processing methodology is fragmented. Different naming conventions and programming standards, along with different processing approaches or transactions, all serve to confuse the user and to increase the burden for training to the district. We believe there are efficiency opportunities which should be explored in multidistrict processing. An independent third party review should be conducted of the ESV-PPS and ESV-SSS. This review would identify:

- Alternatives to improve processing efficiencies;

- Alternatives to improve editing and reporting features of these systems; and

- Alternative systems which could be offered to support the functional requirements of payroll/personnel and student.

TASK AREA: D.2 Implementation of Software

EVALUATION QUESTIONS:

3. Are the schedules for implementing the software by the regions reasonable?

FINDINGS

These schedules for implementing software by the regions have two characteristics:

- realism for the intended effort; and
- State-mandated requirements for the ESV-FIN system of July 1, 1980.

Region III and Region V have established service coordinator and processing coordinator ratios for the ESV-FIN and ESV-PPS systems. Using these ratios, these regions are able to predict the impact of additional districts coming on to the regional processing center. These regions then can plan for the addition of service coordinator and processing coordinator personnel to support the additional demands from districts on the ESV-FIN and ESV-PPS systems. These support ratios are a logical method for determining personnel requirements and for coordinating these requirements with the regional personnel who are presently aboard or will be coming aboard in the future. This is a rational approach for service support and should be encouraged across the regions.

Region II, in its proposal before the Facilities and Services Review Committee, detailed an implementation schedule which, in PMM&Co.'s opinion, is extremely optimistic. This schedule calls for the implementation of ESV-FIN in 37 districts by July 1, 1980. This schedule will require 29 districts to be installed between July 1, 1979 and July 1, 1980.

Additionally, Region II has committed to training 27 districts and installing 24 dis- tricts on the ESV-PPS system. This will require 23 districts to be brought up between July 1, 1979 and July 1, 1980. PMM&Co. does not believe such schedules are realistic.

The schedule for the installation of ESV-FIN is ambitious. Experience has shown that a processing coordinator can support approximately 20 districts, and a service coordinator can support approximately 30 districts. These support ratios should be used as a method to predict future staffing and support requirements in the region. In examining the support ratios for service coordinators and processing coordinators for the regions outside the Twin Cities metropolitan area, we believe that Region II and Region IV will encounter difficulty meeting the July 1, 1980 date.

RECOMMENDATION

Support ratios should be linked with processing resources planning to predict future resource needs at the region. These ratios support staged hiring of regional personnel, reducing "peaking," and crisis hiring.

We recommend linking these support ratios to processing resource planning to ensure smoother computer upgrades. Mandated installation dates can dramatically increase the need for support personnel and computer hardware. Regions must plan to ensure service is not degraded for their present user community to meet mandated extensions of service.

TASK AREA: D.2 Implementation of Software

EVALUATION QUESTIONS:

4. Are the regional centers utilizing or planning to utilize the software in such a manner as to maintain the single statewide system concept?

FINDINGS

As noted in question D.2(2), the single statewide system approach is not being maintained. There are major processing methodology differences between TIES and the other regions. Those regions which are using the MECC-developed software are standardized on the ESV-FIN system.

There have been modifications to the ESV-PPS system and to the ESV-SSS system. Such modifications have occurred in the application programs which process transactions and maintain the data base. These modifications affect the most critical portions of the ESV-PPS and ESV-SSS systems. Such modifications should be closely controlled by MECC-MIS to ensure consistent transaction processing and data base integrity. There have been modifications to the reporting cycle for ESV-PPS and ESV-SSS.

We do not believe that modifications to the reporting cycle are a significant control weakness. This type of innovation can be useful to the ESV system by reducing the requirements on MECC-MIS to create such customized reports for districts.

RECOMMENDATIONS

Therefore, PMM&Co. believes that modifications to report outputs should be encouraged by MECC-MIS. MECC-MIS should receive documentation concerning these new reports, and make this documentation available throughout the regional processing consortium. To ensure installation at the regional center of the most current version of ESV-IS software, one approach which has been used in private industry is to use an encrypted

code number in the release tape for any new application system. Once this new application system is installed on the regional processing center, a message would be printed at the console with a decoded number. The regional centers installing this application release would call MECC-MIS and repeat that console number. MECC-MIS would thus be assured that the system release had been entered onto the Regional computer system library.

TASK AREA: D.2 Implementation of Software

EVALUATION QUESTIONS:

5. Is regional and district-unique software being developed and documented in a manner which will permit utilization by other regions and districts?

FINDINGS

Regional and district-unique software is being developed in the following areas:

- METRO II is modifying and enhancing the ESV-PPS system and ESV-SSS system;
- Region III is modifying reporting modules for the ESV-SSS system; and
- TIES has modified the processing methodology of the ESV-FIN system to be compatible with TIES operating environment.

Report modifications which are created for MECC-developed ESV-IS systems are not being shared between regions. PMM&Co. believes that MECC should be the central repository for these customized reports.

MECC-MIS is involved in the modification to the ESV-PPS and ESV-SSS system with METRO II. This is a close working relationship, and MECC has direct knowledge of this activity.

Region III is modifying report output for the ESV-SSS system. Because this system is not released and user documentation is not available, this region has created documentation and has customized reports to ensure acceptability to Region III districts. PMM&Co. is not aware that these modified reports are being made available to MECC-MIS. MECC-MIS is not

developing the ESV-SSS system. MECC-MIS has contracted with a vendor for the completion of the implementation phase for this system. We see little coordination between MECC-MIS, the vendor and Region III on this process.

RECOMMENDATIONS

PMM&Co. believes that this lack of coordination is not a positive situation. Control should be exercised by MECC-MIS to ensure that modifications which are accomplished to the ESV-SSS system are consistent with MECC system development standards. PMM&Co. does not believe that further development should be continued on the ESV-SSS system until user needs have been reaffirmed for this system. Once that is complete, the Phase II documentation must be revisited, and these specifications must be revised. It is imperative that this system be developed in accordance with these revised specifications.

TASK AREA: D.2 Implementation of Software

EVALUATION QUESTIONS:

6. What controls, if any, should be placed on development of software by regions?

FINDINGS AND RECOMMENDATIONS

There are two types of controls which could be applied to software developed by regions:

- Standards for programming and naming conventions; and
- Standards and procedures for systems development projects.

The first type of control should be applied at the regional level. But these controls should only apply to software which is being developed as a permanent product. The development of one-time or temporary programs, such as those for ad hoc reports, should not be subject to the same controls. These programs are developed quickly and in response to one-time needs. It is impossible to maintain controls on this type of software, and an attempt to do so would give the impression of unresponsiveness to the user. Software that is permanent in nature should be developed, using specific standards for the following types of items:

- Common data naming conventions; and
- Program design standards such as Warnier diagrams and structured programming.

The purpose of these types of controls is to increase the probability that the software is transferable and also to facilitate a determination as to whether the system is really district or region-unique.

The second type of control deals with the project management aspects of systems development. Controls in this category are often referred to as systems development methodology. PRIDE is such a methodology. These controls should only apply to the development of permanent software. The degree of application of these types of controls depends on the size of the undertaking. The development of a single program can generally take place successfully without the use of this type of project control.

The development of larger applications should be controlled by standard systems development methodology.

The amount of control, that is the degree to which the system development methodology is used, will vary according to the size of the system under development. Any project which requires a significant amount of time or resources to develop should follow a complete formalized methodology. The PRIDE systems development methodology is suitable for control of such projects. However, portions of the methodology which the State does not wish to use should be replaced by an alternate methodology rather than be rejected altogether.

There are several reasons for the use of a methodology such as PRIDE. Such methodologies help ensure that the system being developed is feasible, cost-effective, and responsive to the needs of users as originally defined. Furthermore, they provide a framework in which the development effort can be monitored in terms of time lines and project costs. In summary, a formal systems development methodology is required for any significant undertaking to monitor product quality and development productivity. Without such controls, there exists the danger that (a) the development effort will not come in on time or on budget, (b) that the delivered system will differ from the envisioned system, or (c) that management will not be able to determine whether the product was worth the effort, since anticipated benefits and initial estimates of feasibility may not have been defined.