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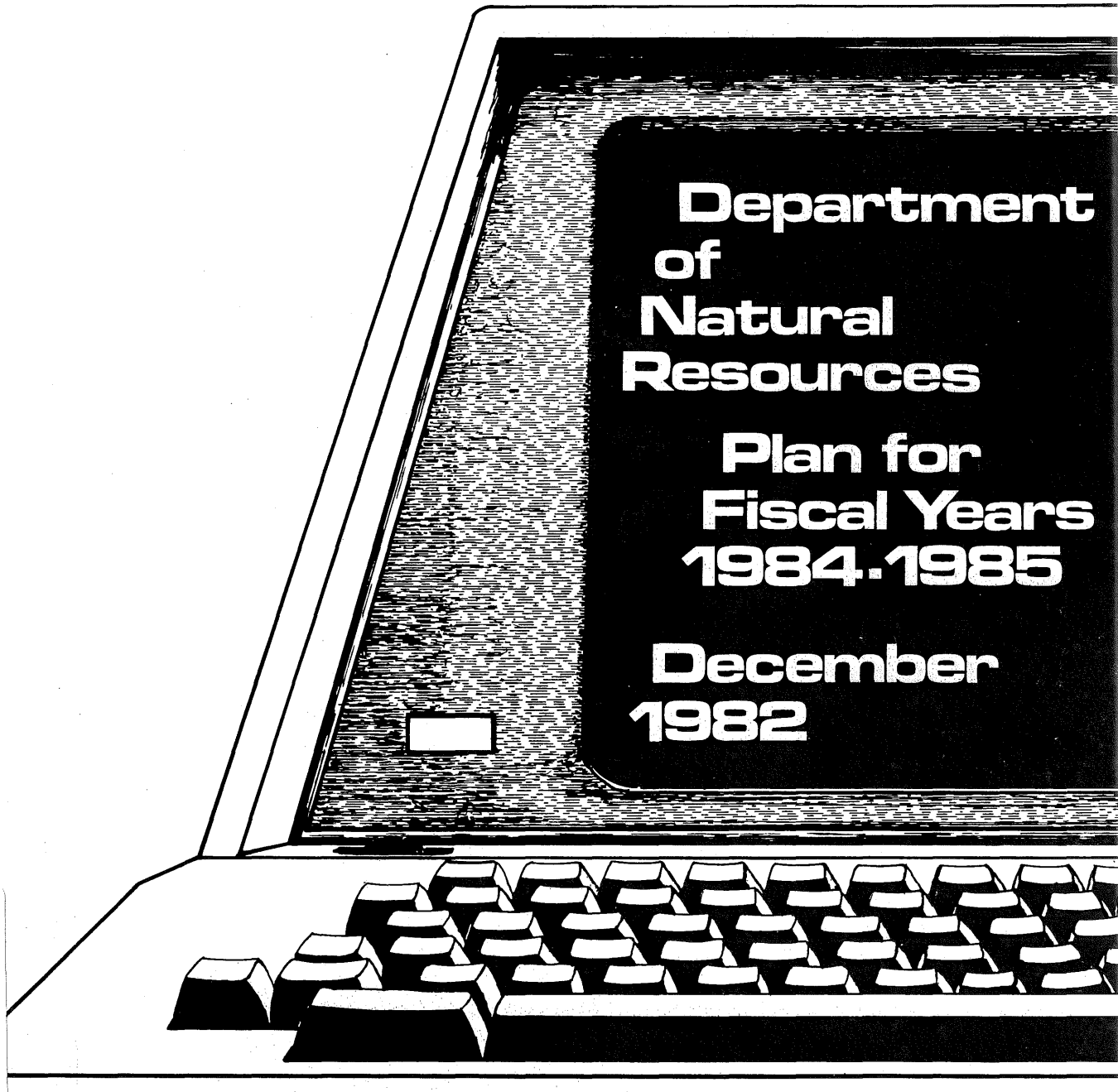
Information Systems



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This Information Systems Strategic Plan
was prepared for the
Legislative Commission on Minnesota Resources
through the efforts of the
Information Systems Technical Committee
of the
Department of Natural Resources

Robert Hodge, Enforcement
Larry Swenson, Engineering
John Bouthilet, Financial Management
Roy Johannes, Fisheries
Dennis Heisey, Wildlife
Jack Shea, Forestry
Kim Elverum, Information and Education
Rod Sando, Lands
Margaret Winkel, License Bureau
Bill Bryce and Patricia Lang, Minerals
Bill Hosfield, Parks and Recreation
Bill Becker and Paul Scobie, Office of Planning
Hank Fox, Systems Management
Ron Winkel, Trails and Waterways
Joe Gibson, Waters

in cooperation with the
Department of Energy, Planning, and Development

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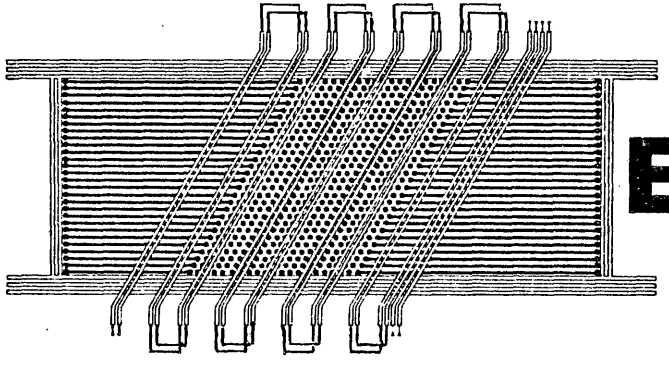
The technical appendices for this plan are printed under separate cover. They are available from:

Minnesota Department of Natural Resources
Office of Planning
Box 10
Centennial Office Building
St. Paul, Minnesota 55101



Executive Summary

Introduction

This report presents a development and management strategy for information systems for the Department of Natural Resources (DNR) for the 1984-85 biennium. It is a comprehensive look at:

- Applications to be developed
- Hardware requirements
- Data communication requirements
- Management of the development and operation of information systems

The plan is strategic in that it lists targets, but does not describe the methods which will be used. Each of the recommendations will be expanded into a systems development project or hardware acquisition.

The plan organizes all of the potential hardware, software, and organizational variables into a consistent pattern. Without a plan, it is difficult to evaluate requests, coordinate development and explain how the various pieces fit together. Many data processing applications are in operation or under development within DNR, but uneveness exists. Organizational units of the DNR which have substantial budgets have forged ahead, while other units are still working with older technology. One of the benefits of a strategic plan is that the "have nots" are given the opportunity to make their case for a bigger share of the funding.

Methodology

The study team consisted of one full-time employee on loan from the Department of Energy, Planning and Development and a technical committee of DNR employees. The committee carried out special studies, provided data, and reviewed results. Its members were selected to represent all of the organizational units of the DNR. The committee was a particularly important communications link to the division directors. It functioned well and was a major reason the project flowed smoothly.

The techniques used in the study were a blend of two methodologies - IBM's Business System Planning (BSP) and Critical Success Factors (CSF) as defined by Rockart at the Massachusetts Institute of Technology. BSP uses a very detailed analysis of organizational processes and data to identify applications. Executive interviews are used to define the organization's "information architecture." The BSP process is quite detailed and time consuming. CSF on the other hand identifies application priorities only through interviews. Its goal is to identify the set of items which are absolutely critical to successful operation. It is considerably less detailed and highly subjective. It was felt that a blend of the two methodologies would yield the objectivity of BSP and the ease of CSF. The blend worked well as the results of the interviews correlated with data collected on organizational activities and existing data bases. Application priorities were then developed from the intersection of these three lists:

- DNR activities (Appendix 1)
- Existing DNR data bases (Appendix 2)
- Applications determined in initial interviews

Hardware acquistion recommendations were developed from a consideration of the following classes of data processing hardware:

Large general purpose computers
Professionally programmed mini-computers
Office information systems
Word processors
Data entry systems

Large general purpose computers are the most familiar class. Machines of this type are in use at the Information Systems Bureau (ISB) and the University of Minnesota Computer Center (UCC). These machines typically have considerable capacity for data storage and high speed for fast execution of programs. Programming is usually done by professionals and access to these systems is available.

Professionally programmed mini-computers are intermediate in size and are programmed in languages which usually require professionals. They are roughly the same size and speed as larger machines from twelve to fifteen years ago. The state has a contract for the acquisition of Texas Instruments TI990s by agencies which can demonstrate the need for a mini-computer. The Division of Forestry has leased a TI990.

Office information systems is a relatively new class of mini-computers. They have been programmed by the vendors to perform a wide variety of office tasks, including data processing. The vendor programming is designed to be user-friendly, so that the machine can be used by semi-professional programmers. Nixdorf and Wang are currently the leaders in this class of mini-computer. The Fisheries Section has leased a Nixdorf 8845 Office Information System which will be used for word processing and the creation of a variety of fisheries oriented data bases, e.g., lake files and fish propagation. The machine will be programmed by Fisheries personnel.

Word processors are either mini- or micro-computers which have been programmed by the vendor for document creation. The DNR currently uses a variety of word processing equipment. A major element of this plan is a strategy for coordinating future acquisition of word processing systems.

Data entry systems are mini-computers which have been programmed to perform keyboard entry, file handling, and data editing tasks. They have taken over the tasks formerly performed by keypunches. Their major function is to do the work needed to get data ready for processing in a larger computer, however, modern data entry systems usually can do other work such as data base maintenance, inquiry, and light processing.

Past practice has been to purchase separate pieces of equipment for application processing, word processing, and data entry. This practice is changing as new versions of machines are introduced which are capable of performing a wider variety of tasks. Functions are, however, likely to remain distinct since a different piece of software will be purchased to perform each function. These changes will make migration toward a single vendor office easier in the future.

A key element of this plan is the evolution of the current hardware mix to a more coordinated environment in the future. A fundamental belief underlying the hardware strategy is that better access to computing resources will improve natural resource management and administrative operations.

Consideration of new systems and hardware configurations led naturally to an evaluation of how projects and operations are managed. The questions of what should be centralized was a major issue. The conclusions reached were based primarily on the DNR's current management practices. DNR Information System Management, Chapter 5 presents one way in which DNR can achieve centralized coordination while leaving flexibility to manage specific applications with appropriate unit managers.

Systems Summary

This chapter deals with applications development. The diversity within the DNR and the lack of overlap in day-to-day management activities made it necessary to establish a set of system categories to identify needed applications. The categorization made it possible to isolate department-wide needs from the needs of a single division. The categories are:

- Department-wide systems
  - Administrative
  - Strategic planning
- Divisional systems
  - Administrative management
  - Resource management
  - Research
- Word processing
- Data entry

The department-wide systems identified for development are:

- Administrative
  - Revenue accounting
  - Cost accounting
  - Land records
  - Forms inventory
  - Mailing lists
- Strategic planning
  - Lakes data base
  - Public lands data base
  - Land suitability

The divisional systems identified for development are:

- Enforcement
  - Violations tracking
  - Turn in Poachers (TIP) file
  - Hunter and snowmobile operator registration
- Engineering
  - Project control and other files
- Field Services
  - Equipment data base

Fish and Wildlife
- Lake surveys
- Commercial fisheries
- Fish production and distribution
- Hunting license lotteries
- Game licensing

Forestry
- Fire control
- Timber sales accounting
- Nursery management
- Timber inventory updates
- Timber stand improvement
- Private forest management

Information and Education
- Boat operator registration

Land Bureau
- Updating the "dead" file

License Center
- Boat and snowmobile registration

Parks and Recreation
- Park management and construction

Office of Planning
- Land resources and management planning

Waters
- Enhancement of the lakes data base
- Statewide water information system

Current information systems in the Division of Minerals are projected to continue to meet needs.

Hardware, Software, and Data Communications

The DNR currently uses a broad mix of computers. Major applications are run on large general purpose computers at:

Information System Bureau (ISB)
- Statewide accounting
- Timber inventory
- Land records

University of Minnesota Computer Center (UCC)
- Statewide Comprehensive Outdoor Recreation Plan (SCORP)
- Waters data bases
- Minerals data bases

Land Management Information Center (LMIC)
- Lakes data base
- Public lands data base
- Peat inventory data

The DNR is developing applications on machines it has acquired, such as:

TI990
- Forestry systems

Nixdorf 8845
- Fisheries data bases

The DNR also uses a variety of word processors. They include:

- Central Office
  - Centennial Office Building
    - Nixdorf 8845 - 3 terminals
    - IBM Display Writer - 3 terminals
    - Xerox 820 Microprocessor
    - Xerox 800 - 2 stations
  - Space Center
    - WANG 30 - 10 terminals
    - IBM Display Writer - 3 terminals
- Regional Offices
  - Grand Rapids
    - IBM Office System 6
  - Brainerd
    - IBM Office System 6
  - Bemidji
    - IBM Office System 6

The DNR also owns or leases a variety of terminals. The Forestry area offices are equipped with teletype-type terminals. The Office of Planning has several CRT and printer-type terminals. Also, micro-processor and terminal equipment is installed in most regional offices.

The DNR can gain much by coordinating the use of its hardware. This can occur in several ways:

- Improving access to processors currently in use
- Coordinating word processing
- Integrating divisions within regional offices
- Increasing inter-computer movement of data

The primary need seems to be the creation of a network which allows easy linking of machines and applications. To this end, the plan advocates substantial funding for a study of data communications needs.

New equipment could potentially be located in the License Center for data entry and file inquiry on game licensing and boat and snowmobile registration.

It is unlikely that the DNR can or should try to move all of its applications to a single machine or a single vendor, but it may be possible to move office type applications such as, word processing, filing, and calendars into a single vendor environment. The plan presents a word processing strategy which could lead to single vendor environment in early 1984. The major elements of the strategy are:

- Expansion of the word processing study to include cost/benefit data
- Defining equipment specifications for all regional offices
- Defining equipment specifications for the central office
- Extending all current equipment leases to a common date early in 1984

By the fall of 1983, a decision on implementation of a single vendor environment for word processing and office automation at the central office and regional offices should be made. In the meantime, the equipment currently installed will be used to the fullest extent possible.

Information Systems Management

Any review of information systems within the DNR leads naturally to an evaluation of how the department develops and maintains its computer based systems. The key to this issue is centralization versus decentralization. The DNR is a very diverse organization which practices decentralized management. It serves many, diverse clienteles whose needs are often in conflict.

The textbook answer to information systems management is to centralize under a manager who reports to the head of the organization. The limited research that is available seems to indicate that control of information systems in organizations parallels the type of managerial control of other activities in the organization. That is, organizations which are strongly decentralized also tend to decentralize control over applications, however, a centralized planning function generally seems to be necessary. This plan recommends that the DNR centralize planning, standards, and training and decentralize applications development.

Centralized planning will be accomplished through the establishment of a permanent information systems technical committee and the creation of an information systems planner position. The committee will be responsible for following activities:

Review, modification, and recommendations for the information systems plan
Approval of department-wide code structures
Review and approval of all new equipment specifications
Review and approval of hardware and software compatibility requirements
Review and comment on all application development specifications
Review and approval of the information systems training plan

Members of the technical committee will be selected to represent the following organizational units:

Assistant Commissioner for Administration
Assistant Commissioner for Planning
Enforcement
Fish and Wildlife
Forestry
Minerals
Parks and Recreation
Trails and Waterways
Waters

An information systems planner position will be created within the Office of Planning. This planner will serve as staff to the technical committee and liasion to other departments to explain the information systems plan and ensure its compatibility with state policy.

Applications development will be decentralized to conform to current practices. Information systems development positions currently exist in:

Bureau of Systems Management - 2 positions
Fisheries Section - 2 positions

Forestry - 3 positions
Minerals - 1 position
Office of Planning - 5+ positions
Waters - 2 positions

The staff of the Bureau of Systems Management will be increased by four positions and its responsiblities will be focused on administrative functions. It will also help smaller divisions and units on a "when and if needed" basis. This unit will be responsible for the development of the department-wide systems identified on page 3. It should also help the Divisions of Enforcement and Parks and Recreation with their information systems development. It will have responsiblity for the recommended overhaul of the License Center and overall data entry. Another of its duties will be to assist administratively in hardware acquisition and to function as a liaison with ISB.

The systems development functions already in existence in some divisions will continue. Parks and Recreation and perhaps Trails and Waterways may create information systems positions in the next biennium. Even though applications development will be decentralized, directors will ensure that their employees comply with all compatibility, documentation, and indexing standards. Also, department-wide planning activities should limit the amount of divergence which might not otherwise be noticed.

The Office of Planning generates potential operational systems useful to other divisions as a natural outgrowth of its work. Care must be taken to ensure that the office begins tasks only when substantial departmental need exists. This can be handled through the information systems technical committee. Most systems should migrate from Office of Planning budgets to divisional budgets when development is complete. This migration should be initiated by the assistant commissioner for planning. The Office of Planning must have a budget adequate to maintain the planning systems which have department-wide impact such as the Statewide Comprehensive Outdoor Recreation Plan.

The impact of establishing a responsive, efficient Data Entry Section would be felt throughout the department. Overall data entry capabilities of DNR should be improved immediately. It is likely that there will be significant savings in the License Center with the introduction of key-to-disk technology which will provide faster and more accurate data entry, data base maintenance, editing, and inquiry capability. Systems Summary, Chapter 2 includes an outline of one concept for improving the operation of the License Center. It suggests that significant improvements can be made if data entry, game licensing, hunting license lotteries, and boat and snowmobile registration are developed in an integrated manner.

The establishment of key-to-disk technology could also help centralize many of the data base maintenance activities now performed by student workers, clerical employees, and professional staff. While data entry will be tied primarily to license applications, the Data Entry Section should remain part of the Bureau of Systems Management during the systems development period. Once the needs in ongoing licensing activities and data entry are known, a final decision on where to place the Data Entry Section can be made.

Information Systems Budget - FY 84-85
1. Anticipated Application Development Costs

Application	Rough Cost Estimate	Potential Funding Source FY 84-85
Department-wide systems		
Revenue accounting	0	Completed in FY 83
Cost accounting	$ 250,000	LCMR allocation-Information systems
Forms inventory	30,000	General Fund-Administrative systems
Mailing list		
Public lands data base		See Land Bureau
Enforcement		
Violations tracking system	50,000	LCMR allocation-Information systems
Automate TIP file		LCMR allocation-Information systems
Improve query capability in hunting and snowmobile registration		LCMR allocation-Information systems
Target range permits	0	License Center-Change request
Labor distribution	0	Completed in FY 83
Engineering		
Project control cards and other filing systems	20,000	LCMR allocation-Information systems
Field Services		
Equipment data base	8,500	LCMR allocation-Information systems
Fish and Wildlife		
Chemical and pathological analyses	0	Game and Fish Fund
Lake surveys	305,000	Game and Fish Fund
Commercial fisheries		
Fish production and distribution		
Hunting license lotteries	100,000	Game and Fish Fund
Game licensing		
Forestry		
Fire control	689,000	LCMR allocation
Timber sales accounting	186,000	Various Forestry sources
Nursery management		
Timber inventory updates		
Timber stand improvement		
Private forest management		
Information and Education		
Boat operator registration	0	Include with hunter and snowmobile operator registration
Land Bureau		
Land records system	15,000	LCMR allocation-Information systems
License Center		
Hunting license lotteries	250,000	Biennial budget-Change request
Boat and snowmobile registration		
Game licensing		

Application	Rough Cost Estimate	Potential Funding Source FY 84-85
Parks and Recreation		
Park management and construction	150,000	LCMR conversion-Change request
Office of Planning		
Natural resources data system	483,000	LCMR conversion-Change request
Land resources and management planning	100,000	LCMR allocation
Division of Waters		
Enhancement of lakes data base	219,800	LCMR conversion-Change request
Statewide water information system		
Total for Applications Development	$2,856,300	

2. Applications Development Summary by Funding

General Fund	$216,000
Biennial Budget Change Request	250,000
LCMR-Conversion to General Fund	852,800
LCMR-Information Systems	343,500
LCMR-Other DNR Programs	789,000
Game and Fish Fund	405,000
	$2,856,300

3. Use of the LCMR-Information Systems Allocation

Applications Development		
Department-wide Cost Accounting	$250,000	
Enforcement - Violations Tracking	50,000	
Engineering - Project Control	20,000	
Field Services - Equipment Data Base	8,500	
Land Bureau - "Dead" File	15,000	
		$343,500
Information Systems Planning		75,000
Data Communications-Study and Hardware		80,000
Hardware Acquisition		
Word processing terminals		
Enforcement		
Personnel		
Commissioner's Office		
Engineering		
Minerals	30,000	
Micro-processors		
5 regional offices		
3 wildlife research	45,000	
		75,000
Contingency		26,500
Total LCMR Allocation		$600,000

1. Computer Hardware Budget		$/year
Current Equipment (also included in request for next biennium)		
Word processing equipment		$164,495
Texas Instruments TI990 mini-computer		25,000
		$189,495
Potential New Equipment		
LCMR-Information Systems Allocation		
Word processors		15,000
Micro-processors		22,500
Change Requests		
Waters-Statewide water data network		15,000
Parks-Information systems		15,000
Forestry-Regional offices information systems		10,000
		$77,500
Total FY 84-85 Hardware Budget		$266,995

5. Use of Hardware Budget-Word Processing and Data Processing		
Central Office		
Current word processing	$139,495	
TI990	25,000	
LCMR-Information systems allocation	15,000	
		$179,495
Regional Offices		
Current word processing	$25,000	
LCMR-Information systems allocation for micro-processor	19,500	
Waters-Statewide water data network	15,000	
Forestry-Regional office information systems	10,000	
		$69,500
Area Offices, Parks, and Research Stations		
Wildlife research-Madelia (1/8 of LCMR micro-processor allocation)	$3,000	
Parks-Information systems	15,000	
Forestry and Fisheries-Micro-processor hardware for area offices and research stations will be acquired in FY 83	-0-	
		$18,000
Balancing Total		$266,995

In addition to amounts identified for hardware acquisition, other funds have been allocated to pay processing costs. Some of these monies, which show up on line 17 in the budget, might become available for other uses. Development of new systems, migration of systems to other computers, or a combination of processing tasks could make this money available. An estimate of the amounts for FY 84-85 is shown on page 12.

Land Bureau-AID 325274	$5,000
Central Licensing-AID 325225	40,000
Information and Data Systems-AID 325134	14,000
Volunteer Management Intensification-AID 327155	10,000
Enforcement-DNR Laws-AID 325969	20,000
Field Services	900
Wildlife-Hunting License Lotteries	30,000
Biennial Amount	$119,900

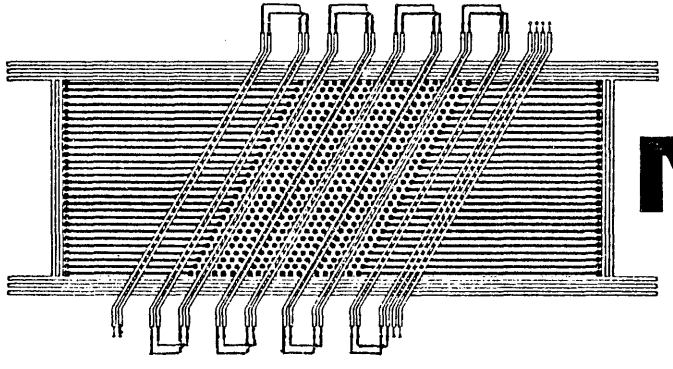
Several of the items listed above relate to either operation of the License Center or overall data entry. Therefore, it is suggested that this source of money be used to reequip those activities. For example, about $80,000 per year could come from data entry, data entry for hunting license lotteries, and boat and snowmobile registration. This amount should be sufficient to acquire modern equipment. The exact allocation of funds will have to await the results of the study of these applications since they should be considered together.

Workplan for the Balance of Fiscal Year 1983

The plan concludes with a list of tasks which should be completed during the balance of FY 83. Completion of the work suggested will ensure a fast start in the new biennium while providing a potential test of the operation of the permanent information systems technical committee. The list includes:

- Processing the paperwork for all new positions
- Establishing the permanent information systems technical committee
- Completion of the word processing study
- Defining equipment specifications for regional offices
- Writing a strategy document outlining options for the License Center, overall data entry, and hunting license lottery cluster
- Establishing the structure of a department-wide labor distribution
- Assisting Enforcement in improving its data entry for labor distribution
- Acquiring hardware for Forestry area offices and Fisheries research stations
- Gaining support for a multi-department study of state data communications needs
- Implementation of revenue accounting
- Expanding usage of the Nixdorf 8845

Conclusion16he plan contained in this document is the starting point for a continuing information systems planning activity. Its ideas have been reviewed and accepted by DNR mangement. It represents the DNR's information systems planning strategy at this time, however, data processing is undergoing another technological explosion, which can be expected to affect both hardware utilization and software development. Therefore, this plan must be considered a dynamic process which continues to incorporate new ideas as technology and funding allow. It is only the starting point.



Methodology

Purpose

This report contains a management information systems strategy for the Department of Natural Resources (DNR) for the 1984-85 biennium. All units within the DNR were included in the analysis,resulting in a strategy that comprehensively looks at the relationships among the following factors:

Applications to be developed
Hardware requirements
Data communication requirements
Internal organization for development and operation of information systems

This report arranges all of the DNR's information systems budget requests into a pattern, which resolves any seeming inconsistencies among various projects. The resolution shows the interdependencies among the previously mentioned factors and provides a basis for defending appropriation requests. After funds are appropriated, this plan will be a blueprint for the next biennium.

The plan is a strategic framework in that it lists the targets to be met but does not describe the specific methods to be used. Each of the recommended items will be expanded into a systems development project or hardware acquisition. As an example, this plan identifies the boat and snowmobile registration system as a high priority application, but it does not present a project plan for that system. Therefore, the plan is specific in terms of policy but general in terms of actual hardware and software.

Without a strategic plan, it is difficult to evaluate requests, coordinate development, and explain how the various pieces fit. Prior to the development of this plan, many good data processing initiatives had been started within the DNR, however, development has been uneven. Some units have good information systems, accomplished by individual managerial initiative, other units have seen little or no information systems development. There seems to be a correlation between the availability of funds, the availability of expertise, and the development of information systems. One of the benefits of a plan such as this is that it can give the "have nots" an opportunity to make their case for more funding.

Objectives

This plan was formulated to:

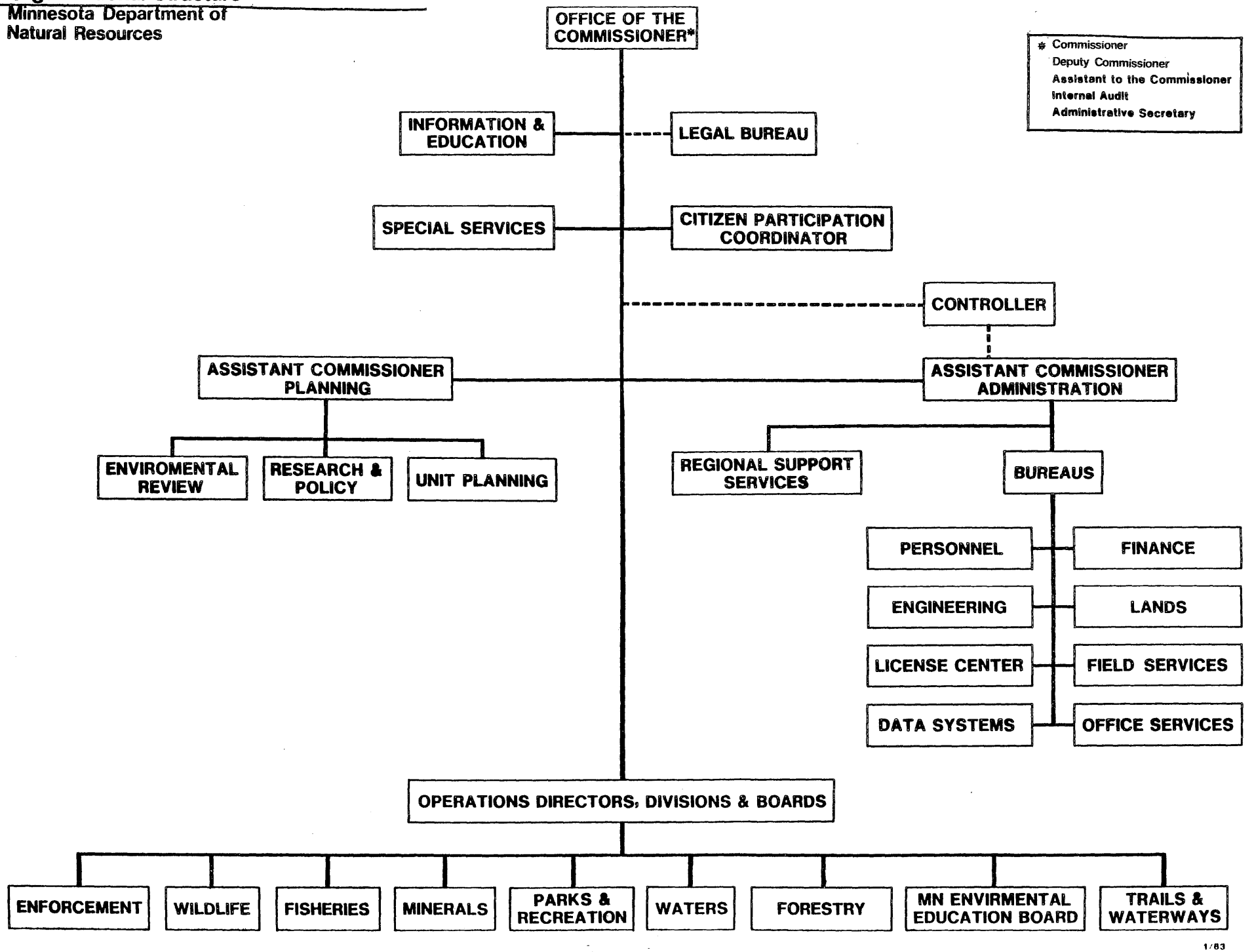
Organize all of the potential hardware, software, and organizational variables of the DNR into a consistent pattern

Use that pattern to guide overall development of the information systems while allowing flexibility in specific areas

DNR Organizational Structure

Figure 1 is a copy of the DNR organization chart as it will appear in 1984-85 biennial budget document. All of the organizational units of the DNR were included in the formulation of this plan. The biennial budget document includes the objectives for each of these units. The information systems portions of these objectives were extracted and included in this document.

Organizational Structure
Minnesota Department of
Natural Resources



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Method of Study

The study leading up to this document was sponsored by the Commissioner's Office through the assistant commissioner for administration. The study team consisted of one full-time employee on loan from the Department of Energy, Planning and Development and a committee of DNR employees which undertook special studies, provided data, and reviewed the results. The major objective of the study team was to create a technically competent plan consistent with the management philosophy of the DNR. As a result, both technical perspective and managerial perspective were integral parts of the planning process.

Concepts

Information systems planning is usually done according to one of the following published methodologies.[1]

Business Systems Planning
Critical Success Factors
Charge out
Delphi
Zero Based Budgeting

Busines Systems Planning (BSP)

The most often used methodology is BSP. This procedure was developed by IBM in the late 1960s based on its experiences in attempting to coordinate its internal use of computers. BSP was offered as a service to customers beginning in 1970 by the establishment of the Business Systems Planning Program. Since that time it has been refined and modified. The BSP process emphasizes obtaining both managerial and technical perspectives. The methodology starts with business objectives and works through data processing applications to data classes. Data classes are the elemental units which are the combined to make the data bases needed to support business processes. The technical aspects of BSP are quite well defined, rigorous, and primarily descriptive. The procedure is more subjective in the last step wherein the team attempts to create an "information architecture" which is the guide for development of compatible information systems.

In any case, BSP requires considerable staff and managerial support while generating a large amount of very detailed data. A major assumption built into BSP is that the data classes used by a business are related to each other through interdependencies within the information systems. BSP provides a structured approach to information systems planning which tends to create a "good" plan. On the other hand, it is a very detailed and time consuming process and perhaps is more laborious than is needed for a strategic plan.

Critical Success Factors (CFS)

CFS was developed by Rockart at the Center for Information Systems Research, Massachusetts Institute of Technology. The CSF approach involves a series of interviews. In the preliminary interviews managers are asked about their goals. The second round of interviews occurs after the analyst has messaged the data to create a minimum set of critical success factors. The assumption is that the development of information systems to support critical success factors will create an effective organization.

[1]Bowman, B.; G. Davis; and J. Wetherbe. A Three Stage Model for MIS Planning. University of Minnesota MISRC, working paper 81-05.

Information Systems Planning for the DNR

This plan was created using an approach based primarily on BSP and CFS, however, many elements were modified because of the specific requirements of the DNR. In particular, much of the detail was deleted from BSP because of time and staff limitations.

Technical Perspective

Sufficient data was collected to identify organizational processes and data bases and to establish the relationships among them. These data are contained in Appendices 1 and 2. The data collected helped identify applications which need better information systems support. It also showed that many of the DNR's information systems are functionally independent of each other in day-to-day operation but quite interdependent on a work planning level. For example, several DNR units have responsibilities which can modify the conditions on one given parcel of land. This operational independence and planning dependence required a modification in approach. All applications were categorized to illuminate the amount of inter-divisional dependence or independence. The DNR's working situation places considerable emphasis on the need to create linkages which will allow periodic gathering of operational data sets into planning data bases.

Another method used to achieve technical perspective was the establishment of an information systems technical committee. This group represents all of the organizational units within DNR. The purpose of the committee changed during the course of the study. Initially it was divided into four subcommittees:

Word Processing
Data bases
Equipment
Software

The word processing subcommittee designed and administered a questionnaire for the purpose of determining the need for word processing by each of the organizational units within the DNR. The word processing report and questionnaire are in Appendix 3. The report of the subcommittee is summarized in Hardware/Software Considerations, Chapter 3.

The data base subcommittee collected information on all of the existing data bases within the DNR. This information is included as Appendix 2. The report of this subcommittee showed that DNR uses a wide variety of computer-based systems, and that many of its data bases are independent of one another for day to day management activities. In many cases the data bases are lists which require only periodic update, e.g., public accesses, water permits, and fish stocking records. In other cases, the data bases supported cost and revenue accounting systems.

The equipment and software subcommittees did not have active work plans. While never officially disbanded, these subcommittees did not produce reports.

In the later stages of this planning activity the committee was used to gather data, review results and provide linkage to the working units. A major effort of the technical committee was the creation of a list of all DNR activities (Appendix 1). This varied and extensive list includes all of the categories of work that DNR performs. Over 400 items were identified, many of which

could profit from better information systems support. Looking at the relationship between DNR activities and existing data bases helped in the identification of needed data bases and applications.

Managerial Perspective

The BSP process attempts to gain managerial perspective through executive interviews. These interviews usually occur after the data have been collected and are used to verify conclusions and set priorities. The BSP methdology assumes that the team leader is a organizational executive not a consultant. Two modifications to BSP concepts were made in this study. Since the team leader was a manager on loan from another agency, a series of initial interviews were scheduled to introduce the team leader to DNR managers and to get an initial reading of priorities. The second modification was to discuss intermediate results and ideas with employees in order to resolve inconsistencies and move the final plan toward consensus. The mechanism for these discussions was the technical committee which had been formed to provide input and review. (The list of committee members is included as Appendix 12.)

The first round of interviews helped define needs and priorities. The results were similar to what could be expected in the initial phase of CFS. The managers were quite willing to express their goals and outline areas where they felt information systems development would help. Substantial agreement on priorities was found during the initial management interviews. For example, development of a cost accounting system was a high priority for nearly everyone.

Early drafts of certain sections of this plan were given to other state agencies for review. The additional reviewers were:

Department of Finance - Cost Accounting
Land Management Information Center - Data Communications
Department of Administration Information Systems Bureau - Data communications

Letters containing the review comments are included as Appendix 11. All comments from other state agencies and the comments of internal reviewers were taken into consideration in the formulation of this plan.

A final round of managerial interviews dealt with recommendations and the action plan. The objective was to achieve consensus on priorities for applications development, hardware strategy, and management strategy. These last interviews gathered many loose ends and ensured implementation of the plan by the DNR.

Development of Conclusions and Recommendations

This report contains recommendations in four major areas:

Applications development
Hardware acquisition
Data communications
Internal information systems management

Each of these areas is, to a degree, dependent on all of the others, however,

the logical starting point is to begin with applications and work toward internal information systems management.

Applications Development
The findings on applications development needs were based on the intersection of three lists:

DNR activities which are supported by information systems
DNR data bases which tie directly to active information systems
Applications identified during the initial interviews

The conclusions and recommendations in the Systems Summary, Chapter 2 are based on the comparison and intersection of these three lists.

Hardware Acquisition
Hardware acquisition recommendations are included in Hardware/Software Considerations, Chapter 3. They are based on consideration of the following five classes of data processing hardware:

Large general purpose computers
Professionally programmed mini computers
Office information systems
Word processing
Data entry

The last two hardware classes are also information systems classes, because of the specialization which occurs in this part of the data processing spectrum. The suggested hardware strategy complements the applications development strategy to create a workable hardware/software plan.

A key element of this plan is evolution from the current hardware/software situation to a more coordinated environment. Thus it builds on initiatives taken and uses that work plus potential new application development to justify more data processing capability. The starting point for the hardware strategy is the belief that better access to computing resources will improve natural resource management, and administrative operations.

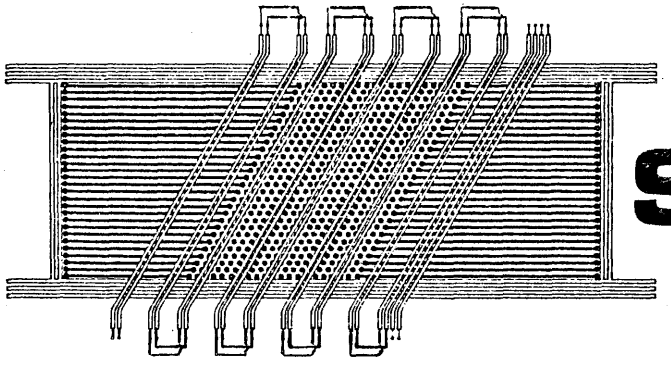
Consideration of data communication needs was included in this plan when it became apparent that the DNR needed better access to computers in the Twin Cities. The initial project work plan was expanded to include a section on the topic and the Information Systems Bureau (ISB) was informed of the DNR's desire to explore the enhancement of data communication. The Telecommunications Section of ISB made some suggestions early on which indicated that hardware might be available to meet the needs. They also indicated that the DNR's needs might be similar to those of the State University System and other agencies. Data Communications, Chapter 4 does not present a specific solution but it does indicate that there is sufficient justification to initiate a study of the costs and benefits of enhancing inter-computer communications and remote access.

Consideration of the new systems and hardware configurations suggested by this plan led naturally to an evaluation of how projects and applications are managed by the DNR. Existing management practices were reviewed in discussions with information systems developers and managers. The major

weakness of the current management system appears to be the lack of an overall information systems planning process which incorporates the many, varied computer uses in the DNR. This document and its follow-up should correct that deficiency. Chapter 5, Information Systems Management presents one way in which the DNR can enhance information systems coordination, while leaving responsibility for specific applications to appropriate unit managers.

Conclusion

This plan is the starting point for a continuation of information systems planning within the DNR. It has been reviewed and accepted by DNR management and represents the department's information systems planning strategy at this time. It should be noted, however, that data processing is undergoing another technological explosion which can be expected to affect both hardware utilization and software development. Therefore, this plan must be seen as part of a dynamic process which will continue to incorporate new ideas as technology and funding allow. It is only the starting point.



Systems Summary

Introduction

This chapter identifies high priority information systems development projects. The selection of projects and their sequencing is a major element of an information systems strategic plan. One goal of information systems planning is to outline a systems structure or "information architecture" as it is known in Business Systems Planning (BSP). This was only partially possible because of the diversity of potential applications in the DNR. A different approach based on systems categories was used to create this plan. It is felt that this approach best fits the organization.

System Types

The diversity and lack of overlap of day-to-day management activities within the DNR make it necessary to establish a set of systems categories. The categorization suggested makes it possible to isolate department-wide needs from the needs of a single division. The categorization should also allow the department to match funding sources to potential projects to ensure proper allocation of dollars. In Hardware/Software Considerations, Chapter 3, the systems types described here will be brought into a discussion of hardware types to form a hardware/software strategy for the DNR. This chapter provides the project list for that strategy. The system types are:

- Department-wide systems
  - Administrative
  - Strategic planning
- Divisional systems
  - Administrative management
  - Resource management
  - Research
- Word processing
- Data entry

Department-wide Systems

These systems will impact all divisions and bureaus, therefore, they require very careful design. All of the department-wide systems could be implemented to run on either a departmental processor (TI990) or at the Information Systems Bureau (ISB). Applications included in this category are:

- Administrative
  - Revenue accounting
  - Cost accounting
  - Land records
  - Forms inventory
  - Mailing lists
- Strategic planning
  - Statewide Comprehensive Outdoor Recreation Plan (SCORP)
  - Land suitability
  - Public lands data base
  - Lakes data base

The revenue accounting system could also be implemented using either the TI990 or the computers at ISB. In either case, a file of transactions must move from revenue accounting to statewide accounting. Cost should be the major criterion in the selection of appropriate hardware. It is likely that the

design of revenue accounting will show use of the TI990 to be less expensive. Development of revenue accounting should not interfere with the development of needed forestry systems, therefore, independent development teams are recommended.

Initial investigation of cost accounting (Appendix 8) indicates the development costs for that system could be reduced if it could be made to fit into the new payroll system and statewide accounting. Placement of cost accounting at ISB would reduce the need for a departmental computer, since cost accounting is the largest identified department-wide application.

A new land records system could reside in one of three places - LMIC, ISB, or the DNR's TI990. Development costs for all locations should be about the same. A major consideration in determining location is ensuring accessibility to the records master file by Forestry for use in timber sales and inventory and by LMIC so it can be coordinated with other public land files and MLMIS. It is likely that LMIC will create a public lands data base which will include DNR, MnDOT, and federal data. The DNR should consider placing records of management activities into this data base to make it an even more valuable planning tool.

The other two administrative systems - forms inventory, and mailing lists could be implemented on any computer. They will have fairly large data bases but they are simple systems.

Another type of department-wide system is maintained in the Office of Planning where data bases are constructed to support department-wide strategic planning. Examples of these are SCORP and the land suitability study. These strategic planning systems usually require data collection, integration, and analysis. They begin as projects and grow into operational systems. The final data bases are valuable and should be maintained for future use. These systems have different design criteria than the administrative systems listed above. The basic question in an administrative system is "What are the requirements?" whereas the question for strategic planning is often "What are the data and how are they structured?" This report does not discuss strategic planning in detail.

The SCORP data base was started several years ago with funding from the LCMR. It has been maintained and improved in the Office of Planning for several years. It should continue to reside there and sufficient budget should be allocated to ensure its continued maintenance.

The land suitability study project, funded by the LCMR, is the most recent strategic planning project undertaken by the Office of Planning. Its purpose is to assess the capability and suitability of DNR administered lands for a variety of land uses and demonstrate the usefulness of this assessment for making land management decisions. The study is designed to be an ongoing process of data collection and analysis to be incorporated into the DNR land classification system.

The public lands data base is being developed at LMIC. In order to give a comprehensive picture of public ownership in Minnesota, the data base includes data from the DNR, other state agencies, and the federal government. DNR land records will be a primary resource for this data base.

The lakes data base is under development now. It is a good example of how to use operational data to create a planning data. The data base will continue to be updated as more resource management data becomes available. This data base should become a more valuable tool over time, and ultimately the circle will close so that the data base is used for planning most lake management activities. LMIC will likely be very active in the creation and maintenance of the lakes data base.

Divisional Systems

Divisional management systems enhance administration within a division. It may be difficult to separate systems in this category from resource management systems, but the cut can be made by asking whether a particular system helps make more effective use of personnel. Systems in this category will most likely help the flow of work through a division or bureau. Examples of this might be systems which track a permit, a ticket, an environmental assessment worksheet, or the use of divisional resources such as staff and equipment.

Resource management systems are needed by a division to meet its primary responsibilities. They will usually relate to the stewardship of a particular resource and the DNR's actions relating to it. Examples of systems in this category are: timber sales accounting, water permit index, and MINESITE. The most important consideration in designing resource management is operational efficiency. These systems must do the job quickly and easily because they will be used to support management decisions over a long period of time. Compatibility is a major requirement, therefore systems should be designed so that data can be extracted easily and integrated with other data in a planning effort.

The goal of research systems is the production of information and/or models which can be used in future planning or decision-making. Research systems can result in data bases which are operationally useful such as, the inventory of all public accesses. Research systems which usually start as a well-defined project can become operational if they are successful.

Word Processing

Word processing is one way to increase efficiency in an office. The shared resource systems available today imply that word processing should be evaluated for each office location. Also, the hardware available today can be programmed to perform other functions such as maintenance of calendars, electronic mailing, indices, and filing systems. The results of the word processing survey are contained in Appendix 3. They indicate a need for word processing in the central office and the regional offices.

Data Entry

All systems require some form of data entry and the need for data entry extends to all divisions. It is critical to have ongoing data entry for many of the department's data bases. Data entry is generally dispersed throughout the department but that which is centralized uses older technology.

Applications Development Needs

The following pages summarize the development needs for each division or bureau and identify high priority applications. In some cases, applications are clustered because they logically fit together, e.g., hunting licenses and snowmobile and boat operator permits. The notes following each summary include a discussion of need and an estimate of the level of effort required.

Table 1, page 50 is a listing of the high priority applications development projects identified during this planning process. It also shows a rough estimate of the funds which should be allocated for each application development and the potential source of funds. The amounts shown are rough estimates, because in most cases, little or no systems work has been done.

Table 2, page 51 shows the amount of funding needed for development by potential funding source. The amounts shown are a major part of the funding requested for information systems in FY 84-85. The remainder will be used to support existing applications and acquire additional hardware.

Enforcement

	System Identified	Status	Development Need
Division management	Labor distribution	Poor/errors	Very high
Resource management	TIP file	Listing	High
	Hunter and snowmobile safety training registration	Sequential file	Needs improvement
	Tracking ongoing violations	Poor/hard to use	Very high
	Target range permits	Needed	High
Research	None	Not needed	

	Method	Development Need
Word processing	None	Very high
Data entry	Typewriter,OCR	Very high

Recommendation
Enforcement needs a major information systems overhaul, but no funds are allocated. Access to the Nixdorf 8845 would probably solve the division's problems for the forseeable future if hunter and snowmobile safety training registrations were overhauled at ISB. Funds for approximately one person-year should be allocated for assistance in the information systems overhaul in Enforcement. The highest priority for development is an ongoing violation tracking system.

Estimated cost
$40,000 - $60,000

Engineering

	System Identified	Status	Development Need
Bureau management	None	None needed	
Resource management	Project control cards	Manual	High
Research	None		Not needed

		Method	Development Need
Word processing		None	High
Data entry		None	Low

Recommendation
The Bureau of Engineering would likely profit from automation of their project control files and introduction of word processing. Access to computing capability for structure design, hydrology, stress analysis is needed. Most of this is available at UCC. They need a micro-processor or access to a shared logic word processor with terminal capability. A small amount of analyst time should be used to perform a needs assessment for this bureau.

Field Services

	System Identified	Status	Development Need
Bureau management	Building inventory	Cards	Very high
	Equipment inventory	Cards	Very high
	Firearms inventory	Cards	Very high
	Uniform purchase	Cards	High
Resource management	None		None needed
Research	None		None needed

	Method	Development Need
Word processing	None	None needed
Data entry	Cards	Very high

Recommendation
While the Field Services systems function well on cards for annual reporting, special reports are cumbersome. The data should be put into a base which can be manipulated. The data collection period should remain annual as this is sufficient to retain control.

Estimated Cost
Two person-months plus $2,500 or approximately $8,500

Financial Management

	System Identified	Status	Development Need
Bureau management	None		None needed
Resource management	None		None needed
Research	None		None needed

	Method	Development Need
Word processing	None	High
Data entry	SWA terminal	Adequate as is

Recommendation
Financial Management will have greater responsibilities if the department-wide systems develop as planned. They will be doing more data entry work and computer operation. It may be necessary to create a new section to handle cost accounting. Word processing is needed.

Fish and Wildlife, Ecological Services

	System Identified	Status	Development Need
Section management	None		None needed
Resource managemnt	Biometrics	Nixdorf 8845 being considered	Moderate
Research	Chemical analyses	Nixdorf 8845 being considered	Moderate
	Pathology analyses	Nixdorf 8845 being considered	Moderate

	Method	Development Need
Word processing	Will use Nixdorf 8845	High
Data entry	Will use Nixdorf 8845	Moderate

Recommendation
Ecological Services needs are mainly for word processing to report on test results and letters. Little in the way of information systems development is needed.

Fish and Wildlife, Fisheries

	System Identified	Status	Development Need
Section management	None		None needed
Resource management	Lake survey data	Under development on Nixdorf 8845	Very high
	Licensing of commercial fisheries	Under development on Nixdorf 8845	Very high
	Fish production and distribution	Being planned for Nixdorf 8845	High
Research	15 research projects at 4 sites annually	IBM PC network being set up along with large scale computing at UCC or ISB	High (at least 6 micro-processors)
	Creel Surveys		

	Method	Development Need
Word processing	Nixdorf 8845	Very high
Data entry	Nixdorf 8845 for managers/IBM PC for researchers	Very high

Recommendation
Coordination and data transfer must be established between the Nixdorf 8845 and the IBM PC network. The research sites need micro-processors for data entry, editing, and digitizing data. Researchers also must have complete data compatibility for their individual projects. The processing for resource managers in Fisheries is more closely related to static data base development with periodic additions and changes than to accounting. The Nixdorf 8845 was an excellent selection.

Fish and Wildlife, Wildlife

	System Identified	Status	Development Need
Section management	WMA ownership	Manual	Low
	Daily activity reports	Manual	High
Resource management	Hunting license lotteries	ISB	Very High
	Big game registration	ISB and local micro-processors	Low
	Habitat development and WMA management	UCC	Low
	Private land program	Manual	High
	Natural Heritage Program	ISB/Manual	Low
Research	Forest and wetland wildlife	Manual/ISB/UCC/ Wang 200	High
	Farmland wildlife	Manual	High

		Method	Development Need
Word processing		None	High/Nixdorf 8845
Data entry		Cards for lotteries, terminals or micro-processors for research	Very high/ at License Center

Recommendation
Identified needs in the Section of Wildlife seem to fall toward coordination among the wildlife research stations. This need is also dealt with in this plan's consideration of telecommunications. Licensing and lotteries tie directly into the overhaul of the License Center information systems.

Forestry

	System Identified	Status	Development Need
Divisional management	Labor distribution	Sufficient	Moderate
Resource management	Fire control	Being developed/ TI990	Very high
	Timber sales	Under developed/ TI990	Very high
	Nursery management	Planned for TI990	Very high
	Inventory updates coordinated with sales	ISB/being planned for TI990	Very high
	Timber stand improvement	Long range development	Moderate
	Private forest management	Long range development	High
	Local cruise calculations	Systems idea	High
Research	Research on data extracted from management activities	ISB/UCC	No more needed

		Method	Development Need
Word processing		IBM Office System 6	High/new equipment needed
Data entry		Under development TI990 micro-processors	Very high

Recommendation

Forestry is well underway developing information systems for its needs. The major issue is whether other applications such as land records, revenue accounting, and cost accounting should also be programmed onto the TI990. To do this would mean establishing the TI990 as more of a departmental resource and providing more operations and computer center management. At least one position would be required to provide this service. In any case, additional systems work must not interfere with the developments now in progress in Forestry.

Information and Education

	System Identified	Status	Development Need
Bureau Management	None		
Resource Management	Water craft operator permit	Sequential	Is working well with funding under $2,000
Research	None		

	Method	Development Need
Word Processing	None	Very high
Data entry	None	None needed

Recommendation
The list used for water craft operator permits should be combined with the new file for hunter and snowmobile operator certification. Potential information systems development for the film library, Minnesota Volunteer mailing list, and photo files should be considered for the next biennium.

Land Bureau

	System Identified	Status	Development Need
Bureau management	Land records/ acquisition exchange leases licenses easements	Card to tape	Very high/ location of master and deed files to be determined
	Dead file/ mineral rights	Partially automated file on Cyber	Very high/ coordinate with land records
Resource management	State-owned and managed lands	LMIC	LMIC needs access to accurate master file
	Mapper for state-owned lands	LMIC	LMIC needs access to accurate master file
	History of resource management activities	New systems idea	Very high
Research	None		None

		Method	Development Need
Word Processing		Old Xerox system	Very high
Data entry		Cards	Very high/ coordinated with with License Center

Recommendation

The land records system is due for a major overhaul to update data entry and reporting and to gather all types of land transactions into a single data base. Also the dead file (land which has been sold) should be automated so that all mineral rights are available. A decision must be made on the location of the master file. The logical places seem to be IBM, DNR's TI990, or LMIC. Any one of these would be acceptable, however, an updated version of the file must be available to Forestry and LMIC. Forestry will use it as a basis for timber sales and inventory. LMIC will coordinate it with other state, county, and federal ownership records to create a public lands data base. The LMIC data bases will be available for query and mapping. It is reasonable to continue using LMIC for that purpose since it has good generalized data base management software, excellent graphics capability, and MLMIS. The query capability can be made available with a minimum of software development, and DNR files can be available for many types of analyses.

License Center

	System Identified	Status	Development Need
Bureau management	Boat and snowmobile registration	Cards and manual	Very high/ tied to department-wide data entry
	Game and fish license sales	Part of Revenue	High/should be subsystem of revenue accounting
Resource management	Hunting license lottery	Card system at ISB	Very high
Research	None		

	Method	Development Need
Word Processing	None	None needed
Data entry	Cards	Very high

Recommendation

There is a high volume paperwork in the License Center. New systems are needed, but new development should be combined with hunting license lotteries and departmental data entry. There is also a need for file inquiry capability. Transactions could be entered using key-to-disk technology. Some transactions files could be sent to UCC or LMIC for processing, but license and registration files should be updated into a data base which would be under the control of the License Center. This data base would be used for all updates and inquiries. The files could be backed up at ISB, and large reports and sorts could also be run there. It may be that the labor savings in the License Center could pay for all of the new equipment and development. This is a major area for systems development. The change request as included in the budget should be sufficient to accomplish a major systems overhaul.

Minerals

	System Identified	Status	Development Need
Resource management	Scram and taconite permits	Manual	Moderate
	Environmental analysis and review	IRIS MINESITE Heavy Metals	Low/systems are analytical and used as needed
	Ore Estimation	Taconite Drillhole	Low/systems are analytical and used as needed
	Peatland management	LMIC	Low/adequate as is
Research	Many research projects	Ongoing	Low/use of UCC and/or PRIME adequate as is

		Method	Development Need
Word processing		Xerox 820	Very high
Data entry		Cards, Terminal	Moderate

Recommendation
Minerals could use department-wide revenue and cost accounting and good access to research computers at LMIC and UCC. It also needs access to the dead file of the land records data base (see Land Bureau, page 43 for further discussion).

Parks and Recreation

	System Identified	Status	Development Need
Divisional management	State park budgeting	Manual	Very high
	Campsite reservations and fee collection	Manual	Low/keep at individual parks because of need to answer detailed questions
	Local park management/ restaurants and shops	Manual	High/Itasca and St. Croix/ potential micro-processor installations
Resource management	Park construction	None	Analytical task dependent on visitor use data and cost accounting
	Changes to park environment/weed control, vegetation management	Manual	Same as above
Research	Tourist information	SCORP and manual	Very high
	Reports on costs	Partially automated	High

		Method	Development Need
Word processing		Wang 30	High/data entry capability needed
Data entry		Cards	High

Recommendation
Parks and Recreation has a great need for information systems to assist in resource management and park development. Personnel and money should be allocated to the division to begin this work. The change request as included in the budget should be adequate for development of adequate information systems.

Office of Planning

	System Identified	Status	Development Need
Office management	None		None needed
Resource management	None		None needed
Research	Variety of data bases and files for analytical purposes	UCC and PRIME with many terminals	Low/better access access to additional computer power

		Method	Development Need
Word processing		Wang 30	Low/system works well and should be maintained
Data entry		Wang 30, Terminals	Low/system works well, but better file transfer would help

Recommendation
Planning needs good access to a variety of computer resources. Maintainence of word processing is critical. Better ways to move data files from system to system is needed. Many of the activities of this office have in the past been funded by the LCMR. In order to maintain the same level of effort during the next biennium, $1,052,700 will have to be converted to a general fund budget. The activities which will be supported by the change request are:

Natural resource data systems - $483,000
Policy planning - $360,700
Mississippi Headwaters Board - $209,000

Another $400,000 has been approved by the LCMR for land resources and management planning (Land Suitability). It is difficult to identify specific applications in this office since much of its work depends on adequate access to computing resources. The items expected from the funds requested are detailed in the changes requests. The amounts requested for natural resources data systems and land resources and management planning ($883,000) are partially information systems items.

Trails and Waterways

	System Identified	Status	Development Need
Unit management	None		None needed
Resource management	Trail operation	Included in SCORP inventory	High/needs to be made operational in Trails and Waterways
	Public acccess	Included in SCORP inventory	High/needs to be made operational in Trails and Waterways
	Trail and canoe route conditions	Partially automated	Very high/ needs coordination with Parks and Recreation and Tourism data bases
Research	Trails and access planning	Uses SCORP and MLMIS	Low/Analytical capabilities exist

		Method	Development Need
Word processing		IBM Office System 6	Very high
Data entry		None	Low/some needed for planning and operation

Recommendation
Trails and Waterways has benefited from developments in the Office of Planning and is a good example of how data and analysis can support resource management. At some point, the unit must bear the cost of maintaining the systems so far developed. It is anticipated that sufficient funds are available in operations budgets to cover maintenance costs.

Waters

	System Identified	Status	Development Need
Division management	Divisional information systems study	Underway	Very high
Resource management	Enchancement of lakes data	Under development	Very High, a needed for all water management activities, should parallel land data base at LMIC
	Statewide water information system	Under development as LCMR regional water data network project	Very High, needed for permit
Research	Many data bases		Low to moderate institutionalization of data base maintenance

	Method	Development Need
Word processing	Wang 30 with Office of Planning	Need exists
Data entry	Done with student workers, cards, terminals	A department-wide Data Entry Unit would ease management problems

Recommendation

Waters has gone further than any division into data base management. It is now assessing how it should further organize and maintain existing data bases and create new ones. Thus far efforts have followed the direction of this information systems strategic plan. The major goals of the director are:

To establish a comprehensive lakes data base which will probably reside at LMIC. It will be created by gathering data from various DNR files e,g, Fisheries, SCORP, which will coordinate with systems for Statewide Water Information Management (SWIM).

To improve permit processing through the creation of a statewide water data network to tie regional offices and the central office together.

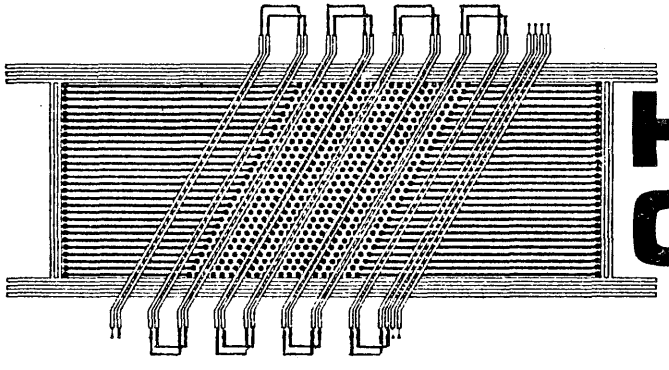
Table 1
Anticipated Application Development Costs

Application	Cost Estimate	Potential Funding Source FY 84-85
Department-wide systems		
Revenue accounting	0	Completed in FY 83
Cost accounting	$ 250,000	LCMR allocation-information systems
Forms inventory	30,000	General Fund-administrative systems
Mailing list		
Public lands data base		See Land Bureau
Enforcement		
Violations tracking system	50,000	LCMR allocation-information systems
Automate TIP file		
Improve query capability in hunting and snowmobile registration		
Target range permits	0	License Center-change request
Labor distribution	0	Completed in FY 83
Engineering		
Project control cards and other filing systems	20,000	LCMR allocation-information systems
Field Services		
Equipment data base	8,500	LCMR allocation-information systems
Fish and Wildlife		
Chemical and pathology analyses	0	Game and Fish Fund
Lake surveys	305,000	Game and Fish Fund
Commercial fisheries		
Fish production and distribution		
Hunting license lotteries	100,000	Game and Fish Fund
Game licensing		
Forestry		
Fire control	875,000	LCMR allocation (689,000)
Timber sales accounting		Various Forestry sources (186,000)
Nursery management		
Timber inventory updates		
Timber stand improvement		
Private forest management		
Information and Education		
Boat operator registration	0	Include with hunter and snowmobile operator registration

Application	Cost Estimate	Potential Funding Source FY 84-85
Land Bureau		
Land records system	$ 15,000	LCMR allocation-information systems
License Center		
Hunting license lotteries	250,000	Biennial budget-change request
Boat and snowmobile registration		
Game licensing		
Parks and Recreation		
Park management and construction	150,000	LCMR conversion-change request
Office of Planning		
Natural resources data system	483,000	LCMR conversion-change request
Land resources and management planning	100,000	LCMR allocation change request
Division of Waters		
Enhancement of lakes data base	219,800	LCMR conversion-change request
Statewide water information system		
Total for Applications Development	$2,856,300	

Table 2
Sources of Funds for Application Development

General Funds	$ 216,000
Biennial Budget Change Requests	250,000
LCMR Conversions To General Fund	852,800
LCMR - Management Information Systems	343,500
LCMR - Other Programs	789,000
Game and Fish Fund	405,000
	$2,856,300



Hardware\Software Considerations

Introduction

The diversity of DNR activities and computer-based systems makes analysis by system category necessary. Also, available data processing equipment tends to fall into categories which can be matched to organizational needs. This section discusses the hardware and software needs of the DNR.

Characterization of Hardware Systems

Literally hundreds of different computers on currently on the market. Some of these machines are targeted at specific applications or at organization types and some are general purpose. As previously discussed, management of information systems and data processing should parallel management of the organization. This will, in turn, impact the selection of hardware.

Hardware types are categorized below.

Large general purpose computers
Mini computers
Office systems
Word processors
Data entry and editing systems

Typical uses, applications, and staffing implications are shown in the table below.

Table 3
Comparison of Computer Types

Machine Type	Typical Uses	Programming	Application Types	Staffing
Large general purpose	Large files large loads diverse applications	Standard languages and data base management	Specific programming or software purchase	Professional centralized
Mini computers	Large files, fewer applications, smaller loads	Standard languages, file access software, no generalized data base management	Specific programming or software	Professional decentralized
Office systems	File maintenance light processing small business applications	Preprogrammed for data entry data base maintenance simplified language for word processing	Vendor-supplied software and light programming	Semi-professional some experience desirable

Machine Type	Typical Uses	Programming	Application Types	Staffing
Word processors	Document creation and maintenance, very light	Preprogrammed for document creation	No real applications	Clerical
Data entry	Key to disk data file maintenance editing and inquiry	Preprogrammed for file maintenance very light processing	Vendor hardware light programming	Clerical and semi-professional

If a heavy data entry and file inquiry need is identified, an organization can select key-to-disk data entry or an office system. The choice depends primarily on the data entry load since the keyboards are different.

If a heavy word processing requirement is identified, a word processor or an office system should be selected. The selection should be based on whether word processing is coupled with a data processing and data entry requirement.

If specific applications with large processing loads are identified, consideration should be given to acquiring a mini computer, or putting the application on a large, general purpose mainframe.

The difference between a mini computer and an office system is in the software provided. The office system typically has a very well developed menu that makes the creation of standard applications quite easy. Complicated applications which require substantial programming and processing are better suited to a mini-computer because applications can be tailored. The office system is a user-friendly machine, while the mini-computer is a "professional" machine. The Nixdorf 8845 is an office system and the TI990 is a mini-computer. A discussion of the different capabilities of the two machines is included in Appendix 5. Since the difference is based on software, one can expect to see office type systems operating on more powerful hardware in the future. An example of this is the Wang VS System. Also, more networking capabilities will be available so that hierarchies of networks can be created. Some computer vendors are now creating hardware which converts codes and protocols so that various hardware types can be connected to a single network structure. It must be emphasized that the equipment categories listed on the previous page are quite flexible as vendors are constantly inventing new combinations to meet the needs of specific markets. Hardware acquisition must always be made with an eye toward eventual connection into a data communications network, therefore, compatibility is a real issue.

There are four types of terminals used to access the systems listed above.

Teletype - one character at a time
Cathode ray tube terminals - screen formats
Intelligent terminals - some logic capability
Micro-processors - full programming capability

The design principle suggested is to use micro-processor terminals where:

Long distance telephone charges are anticipated
Off-line or local processing is necessary
Interactive use is not necessary, but could be an option

This design principle should reduce telephone charges and places some of the computing requirements on the micro-processor.

Computer Types Versus System Types

The following table shows a rough assignment of hardware type to DNR system type. Its main purpose is to illustrate the overlap and flexibility in placing new systems on specific pieces of hardware.

Large General Purpose	Mini-Computers	Office Systems	Word Processors	Data Entry	DNR System Type
X	X				Department Management
X	X	X			Division/Bureau Management
X	X	X			Resource Management
X	X				Research
		X	X		Word Processing
		X		X	Data Entry

Current Use of Computers in the DNR

Departmental data processing needs are new being met with several computers. It is not likely that all of the department's needs can be met by a single machine, as each task is aimed at the best suited hardware configuration. The future of data processing in general is to move toward more hardware diversity, more office automation, and more distribution to ultimate users. This trend increases the importance of providing better access to existing state owned computers at ISB, LMIC, and UCC.

Data communications should be a department-wide concern as it is the way in which computer access will be provided. It is possible to treat the Bell Direct Distance Dial (DDD) system as an organization network but costs of using DDD in an interactive mode may become excessive, thereby limiting system growth and usage. The bundling of many applications into leased lines as was done for the state or the use of off-line computing will likely result in savings to the DNR. This topic is discussed in Data Communications, Chapter 4.

DNR currently has three hardware focal points.

Division of Forestry - TI990 (Micro-processor)
Division of Waters - Nixdorf 8845 (Office system)
Office of Planning - Wang 30 (Word processor)

The need for additional hardware to support the License Center data base is easily demonstrated.

Word Processing

The DNR has a variety of word processing equipment in the central office and the regional offices. A word processing survey was conducted as a part of this planning effort. The survey attempted to obtain responses from all clerical employees. Response appears to be in excess of 95 percent.

Professional employees were also sampled using the same questionnaire. The questionnaire included queries on the amount of time spent typing, the number of items produced per day and per year, the types of documents produced, the amount of retyping necessary, and the volume of information flowing among offices.

The survey shows that the DNR has a large word processing requirement, which is being partially met with several hardware types. Table 4 below shows the volume of items produced and the equipment currently in use.

Table 4
Current Word Processing in DNR at High Volume Locations

Location	Volume Typed Items/Day	Equipment in use
St. Paul		
Centennial Office Building	163	Nixdorf 8845-3 terminals IBM Display Writer-3 terminals Xerox 820 Xerox 800 - 2 stations
Space Center	115	Wang 30 - 10 terminals IBM Display writer 3 -terminals
Metro Region	71	None
Outstate-Regional		
Grand Rapids	105	IBM Office System 6
Brainerd	56	IBM Office System 6
Bemidji	52	IBM Office System 6
New Ulm	23	None
Outstate-Local		
Itasca State Park	112	None

The table clearly shows the possibility for future coordination of word processing activities through selection of new hardware. Integration of word processing woould ease training problems and provide a basis for office automation. The table also shows that help may be needed immediately at the Metro Regional Office, New Ulm, and Itasca State Park.

The survey did not get into other potential office automation areas such as electronic filing and indexing, maintenance of calendars and "to do" lists, and dictation. These items are all available in some form in recently announced configurations. As was previously mentioned, more powerful office information systems will probably be announced in the future. While additional capabilities exist, acquiring them will be expensive, so an approach based on assessment of need is suggested. The word processing study should be expanded to cover these areas.

Research Computers

The department has two research clusters - fisheries and wildlife - which need internal compatibility. This compatibility can be had by installing micro-processor systems which can talk to computers in St. Paul and to each other with the capability for full program and data interchange.

DNR's Hardware Decision

The question facing the DNR is whether the forest management and lake management tasks should be put into one machine. Doing this would be a large step toward establishing a centralized data processing function. It could also provide a machine for the development of department-wide systems. From an operations sense there is little to be gained by putting these functions into the same machine. Also, moving the lake management tasks to a mini-computer might require substantial programming, since the software advantage of the office system would be eliminated. Nevertheless, there is much to be gained through standardization of code sets and making files available for planning and research.

In a look to the future, it is easy to see the significant investment which will be made in systems running on different machines, however, this is not a particularly good argument for going with one machine now for two reasons. Incompatible systems can be designed to run in the same machine, i.e., code sets can be different. And, new applications and hardware present a changing picture, so optimal standardization today could be quite inefficient tomorrow.

The TI990 is under a lease purchase arrangement with ISB and the Nixdorf 8845 is under a one year lease. Both of these machines meet the needs of the divisions using them. The Division of Forestry had large applications and was willing to invest in professional development and programming, so a mini-computer was a practical and effective selection. Fish and Wildlife had a large amount of data which needed automation for retrieval and a large word processing work load, therefore an office system was a practical choice as it allowed for rapid development of data bases and applications.

While a single machine may not do all the processing that is needed, there is much to be gained in the long run by coordinating word processing, office information, and data processing in a network of machines. This clearly is the trend of the industry, but DNR should not fall victim to heightened expectations, or be among the first to install newer technology. In order to keep the carts and horses in the proper relationship, hardware acquisition should proceed based on determination of costs and benefits. Only well-proven hardware/software systems should be acquired. It should be recognized that applications and hardware may be decentralized, but data communications can provide the link to make it a coordinated network.

Movement by the DNR toward a larger mini computer or a smaller general purpose computer in the short run will mean:

- More investment in applications development by Fish and Wildlife since their applications are less portable
- Development of a professional programming and development staff in the DNR
- Shared development responsibilities between the divisions needing the applications and the professional staff responsible for systems and programming

Many applications and projects will fall outside of the responsibility of this central group because they will run at LMIC, UCC, or ISB
Setting of department-wide priorities for applications development because it is unlikely that there will be sufficient professional personnel to meet all needs simultaneously
Larger up front investment in any application developed since more professional programming will be required.

Retention of the existing situation in the short run will require:

Establishment of a centralized planning, standards, and documentation function which would serve as staff to the information systems technical committee
Installation of data communications hardware which will allow easy access to any one of the processors in use
Periodic review of the hardware mix to determine whether greater efficiency can be gained by shifting to newer machines
Establishment of data communications standards and code mapping conventions which will allow the integration of files
Extending machine capability to new applications and other divisions.

In either case, the department's emphasis should be on software systems development rather than hardware acquisition. Several needed systems such as cost accounting and violations tracking could provide significant benefit regardless of hardware, however, it may be possible for the department to pursue a multi-threaded strategy because it already has a relatively large budget for word processing and office automation. For example, the cost of hardware now in use is:

Equipment Type	Cost/Year
IBM Display Writer - 2 sets	$ 36,000
Wang 30	55,000
Nixdorf 8845	40,000
IBM Office System 6	33,495
	$164,495

This amount, when matched with what is available from the LCMR information systems allocation, could provide more capabilities at central and regional offices, therefore, the department should work toward a hardware acquisition decision. Following is an outline of the longer run hardware/software strategy which should be followed.

1. Initiate and perform detailed planning for the high priority applications development projects cited in the Systems Summary, Chapter 2.

2. Coordinate the office information environment by completing studies which justify acquisition. The earliest possible date for such an acquisition is January 1984. A project of this magnitude would include the following steps:
   a. Expansion of the word processing study to include other office needs plus incorporating existing equipment costs into a cost/benefit analysis. Area offices should probably not be included at this stage because of generally low volume of items produced. Completion time: 4-6 months.

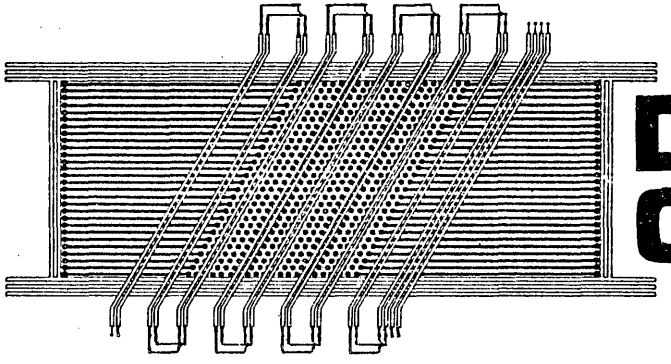
b. Study effect of migrating the lake management and forest management systems to different hardware. Completion time: 1-2 months.
c. Review, approve, and prepare bid documents. Completion time 2-3 months.
d. Receive bids from vendors. Completion time 2-3 months.
e. Make purchase decision. Completion time: 1-2 months.
f. Install equipment. Completion time 3-5 months.

3. Push existing equipment toward its limit during the interim by:
a. Expanding usage of the Nixdorf 8845, first taking care of the needs of Fish and Wildlife, then adding other uses. This evaluation should be done quickly to make maximum use of the equipment.
b. Investigating word processing software for the TI990 to determine whether it is feasible and/or reasonable for acquisition.

4. Extend leases on current equipment to February 1984. This will provide sufficient time to acquire and use any equipment needed in the short term.

5. Initiate and work with other agencies on the networking study suggested in Data Communications, Chapter 4.

This strategy aims the current situation toward a more coordinated future, while maintaining exphasis on needed applications.



Data Communications

Introduction

The DNR is a diverse organization comprised of many disciplines, each with a variety of data processing needs. Its work is geographically dispersed through six regional offices and many area and district offices, therefore data communications must be taken into consideration in this information strategic plan. The transmission of alphabetic and numeric data from facility to facility within the department is expected to grow as new systems such as timber sales accounting are developed.

This chapter includes a qualitative assessment of the data communications needs of the department. It also presents a very general outline of a potential solution to providing for those needs at a reasonable cost. The work done thus far indicates that further study of data communications should be initiated in cooperation with other computer users and computer centers.

The Current Situation

The DNR does not suffer from a lack of computer power. It has access to and uses facilities at the Information Systems Bureau (ISB), the Land Management Information System (LMIC), and the University Computer Center (UCC) and it has leased a TI990 for forest management and a Nixdorf 8845 for fisheries management. At this time, however, all of this computer power is not effectively inter-connected. The DNR needs more flexible access to existing computers and easy methods for moving data from machine to machine. Ease of access is particularly important for DNR employees in regional offices, forestry area offices, and research stations.

Some work has been done to provide access to Twin Cities computers. Forestry has had low speed terminals installed in 22 regional and area offices which operate on-line in dial-up mode and are used primarily for fire reporting. Forestry has also leased a line between St. Paul and Grand Rapids which is used for transmission of inventory data and has inter-connected four IBM Office System 6 word processors to move documents among the three northern regional offices and St. Paul. The UCC CYBER is used by wildlife researchers in the Bemidji area. This work is primarily on-line and uses local service through Bemidji State University. Fisheries is currently establishing a network of micro-processors so that data can be moved among its research stations.

On-line keyboard entry equipment will become increasingly expensive to use as telephone costs increase. A quick calculation done for Forestry showed that anticipated telephone charges could be reduced from $30,000 per year to $2,000 by moving toward off-line operation using remote micro-processors. This result can be generalized to other applications. It forms the basis for a design standard which is "stay away from on-line remote operations if at all possible."

Another factor which is important to the DNR is the clustering of terminals and applications at regional centers. For example, the city of Bemidji has a regional office which needs access to ISB, LMIC, and the UCC CYBER. A wildlife research station which uses Bemidji State University and a forestry area office will need access to the TI990. The Grand Rapids regional office has the following data communications needs:

Administration	- ISB for statewide accounting and personnel
Forestry	- TI990 for timber sales and fire control
	- ISB for forest inventory
	- Potentially LMIC for mapping through the Fire Center
Wildlife	- UCC for analysis
	- LMIC for LANDSAT vegetation data
Fisheries	- Potentially the Nixdorf 8845
	- Access to other Fisheries research locations
	- UCC for analysis
Waters	- LMIC for permitting work
	- UCC for access to existing data bases

Known needs at all offices account for about 60 remote terminals and micro-processors. Other divisions such as Parks and Recreation could use better access, but their systems have not been designed yet. There is also a need to move documents between the central office and the regional offices. It seems reasonable to attempt some multiplexing of these applications onto leased lines to St. Paul. Telephone charges for individual applications could be significantly reduced if this can be done. Also, the use of leased lines for multiple applications would allow outstate employees to have access at roughly the same cost as employees in the Twin Cities, so new applications could be added without substantial cost increases. An example of this is in the Bureau of Field Services where easy access to a capital equipment master file would allow the creation of special purpose reports. This would greatly improve on the manual effort now used to manually select data from standard reports. The computer could become a more useable tool, and data would be accessible to more employees.

The data processing centers in the Twin Cities also need better communications links, so that data can be moved more quickly from machine to machine. Currently there are only low speed dial-up connections, except for the link between ISB and Forestry's TI990. The Nixdorf 8845 cannot communicate at this time although the Fisheries Section wants to add data communications early in 1983. The current inter-connection pattern is a patchwork which was built as individual applications needed a specific connection. A better, more standardized inter-connection pattern would benefit the DNR by providing more flexible data transfer, however, the primary benefit would be the establishment of a set of standards for future hardware acquisition, namely each newly purchased machine would have to be able to communicate with the network. This benefit could extend beyond DNR to other state agencies such as DEPD and Mn/DOT.

Data Communications Study

The department should initiate a quantitative assessment of its data communications needs. It would be best if the study could be done in cooperation with other departments as part of a statewide effort. Data which are important in a data communications study are:

Locations and types of equipment
Clustering of equipment
Message volume, i.e., number of characters transmitted by each location
Interactive and off-line requirements
Locations of host processors

These data will be evaluated in combination with data communication considerations such as:

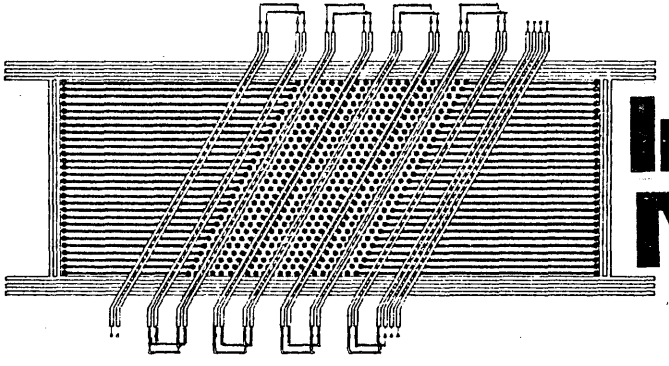
Line speeds
Cost of various communications options, e.g., dial-up, leased line, etc.
Use of multiplexing

The result of the study will be a recommended hardware configuration, and suggestions about software to be developed.

It is not possible to state precisely how much a data communications study would cost, especially if it is conducted in cooperation with other state agencies, however, such a study could take six person-months of consultant time at a cost of about $40,000. The total hardware cost would be in the range of $100,000, so three year equipment leases would cost about $40,000 a year. Since this would occur in the second year of the biennium only $40,000 would be needed. Therefore, $80,000 is a reasonable amount to budget for data communications.

Recommendations

LMIC is interested in improving its communication capabilities to give it better access to other hosts and to open their processor to remote users. As a result, LMIC would run closer to capacity. The UCC has also indicated an interest in enhancing "networking" and it is likely that other state departments have similar interests. The DNR should therefore, designate a substantial portion of its FY 84-85 LCMR information systems allocation to a study of data communications, reserving some money for hardware acquisition and software development. It should also work to bring other departments into the effort to provide a wider base of support. The second half of FY 83 could be used for detail planning for a study that would begin in July of 83. Approximately $80,000 should be reserved for the effort.



Information Systems Management

Introduction

This chapter categorizes existing DNR information systems so that management of systems activities can be reviewed. It also presents a management structure which should allow the department to facilitate the development of new systems and integrate them with existing information systems.

Concepts

The key to information systems management is focusing on the issue of centralization vs. decentralization. As will be noted in Hardware/Software Considerations, Chapter 3, the acquisition of a large general purpose computer is appropriate in a more centralized organization, while the use of more dispersed facilities is more fitting decentralization. Any demonstrated need for DEDP professional staff on a continuing basis also tends to support more centralization to improve management of technical employees and projects. On the other hand, there are conditions within DNR and the state as a whole which tend to pull the department in an opposite direction. For example, a common public land record is needed for resource management and planning, however each division may want to use the land records in a different way so accommodation of all operational needs in a single data base may be difficult. Also, the department has a wide variety of constituents, e.g., loggers, recreationists, and conservationists who each have their own vested interests and support or differ with DNR policies or actions.

It is not feasible for the DNR to move all of its applications to one machine, as needs are just too diverse. It will continue to function in an environment where employees seek to use the hardware or software system that best meets their particular need. The Land Management Information Center (LMIC) can meet many of the department's centralized planning needs and it may also become an excellent respository for planning data bases. The University Computer Center (UCC) will continue to provide low cost number crunching, and its faculty will process many analytic programs. The Information Systems Bureau (ISB) will provide the linkages to statewide systems and, with its large storage capacity, can be the location for large files. It can also become the primary node in a state agency communication network. Flexibility in using computing resources must be a key element in the DNR's information systems management strategy.

The complexity of the current status of information systems within the DNR changes the centralization vs. decentralization strategy decision into a consideration of what should be centralized and what should be decentralized. Fortunately, some research has been done on this topic so guidance is available. The primary help comes from two different areas - management control as taught by R.N. Anthony and Deardon, and Margarethe Olson's doctoral dissertation on management of information system. These two sources of information reinforce the idea that a management control strategy must fit the organization.

Ms. Olson's thesis makes the following points:

> "It appears from the case studies that a "good fit" between the information systems function and the organization can be recognized. It was not possible to conclude that a "good fit" leads to high quality information systems. It appears, however, that in these

companies a "bad fit" provides impetus to change the existing structure of the information systems function. The direction of change (from centralized to decentralized or vice versa) did not appear to be dictated by technology or general "trends" in data processing as much as organizational structure."[1]

And "...the one organizational characteristic that appeared related to centralization of systems management in both companies was the degree of centralization of operational control in the organization. In both companies, the management of an autonomous unit wanted as much control over information services as they had over unit operations. The information systems function also seemed particularly vulnerable to changes in the organizational philosophy of decentralization of authority."[2]

And "...the present study, especially the cases, appears to support the results of Garrity (1963), Dean (1968), and Reichenbach and Tasso (1968), all of whom found that the more successful information services functions were organized to conform to the organizational factors listed by Reichenbach and Tasso (see Chapter II). This suggests further areas for research on a contingency framework."[3]

Anthony, in his early book entitled Management Accounting Principles, defines management control as "the process by which managers ensure that resources are obtained and used effectively and efficiently in the accomplishment of organizational objectives."

In addition, the following quotes are from the summary of this text:

"The control system should be goal-congruent; that is, it should be designed so that when members of the organization are working in their own perceived self-interest they are also working toward the organization's objectives."[4]

"Management control focuses on responsibility centers."[5]

"The control system is designed and operated by the controller, but he is not responsible for the acts of control; these are the responsibility of line management."[6]

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1 Olson, Margarethe H. Ph.D. Thesis An Investigation of Organizational Contingencies associated with structure of the Information Services Function, 1978, p. 305.

2 Ibid. p. 306

3 Ibid. p. 311

4 Anthony, R. N., Management Accounting Principles, Richard D. Irvin, 1970.

5 Ibid.

6 Ibid.

The emphasis in this summary is on the subjective nature of control and its relation to organizational goals. The implication of this for the DNR is that its management control of information systems must match its management of other activities. Any discussion on what is best for information systems management should proceed based on the department's goals, objectives, and current management practices.

Categorization of Information Systems

The department has developed and will continue to maintain a wide variety of computer based systems. In order to sort this complexity into a manageable structure, it is necessary to categorize information systems activities and to determine an effective management control strategy for each.

The suggested categorization which is discussed more fully in the Systems Summary, Chapter 2 is:

Department-wide Systems
- Administrative
  - Revenue accounting
  - Cost accounting
  - Land records
  - Forms inventory
  - Mailing lists
- Strategic planning
  - Statewide Comprehensive Outdoor Recreation Plan (SCORP)
  - Land suitability
  - Public lands data base
  - Lakes data base

Divisional Systems
- Administrative management
  - Systems in this category enchance administration within a division. Examples of this type of system are the those which might track the progress of an action e.g. a permit, an environmental review or a ticket issued by a conservation officer.
- Resource management
  - This category includes systems needed by a division to meet its primary resource responsibilities. Examples of such systems are timber sales accounting, MINESITE, and water permit index. Resource management is an ongoing function which results in a sequence of decisions relating to the management of a specific resource. Therefore resource management systems must be operationally efficient.
- Research
  - The goal of research is the production of information and/or models which can be used in future decision making. Data bases and other computer based systems which start as research activities will, if successful, become operational systems.

Word processing
- Word processing is one way to increase office efficiency. The shared resource systems available today imply that word processing should be evaluated for each office location. Also, the hardware available today can be programmed to perform other functions such as maintenance of calendars, electronic mailing, indices, and filing systems.

Data Entry

All systems require some form of data entry and the need for it extends to all divisions. It is particularly important to maintain data entry on an ongoing basis. Data entry is currently dispersed throughout the department. That which is centralized uses older technology.

Information Systems Management Strategy

Major elements of an information systems management strategy for the DNR are:

- Establishing information systems planning, documentation, and compatibility standards
- Developing and maintaining department-wide information systems
- Developing and controlling divisional information systems
- Regulating the movement of information systems from research to an operational status
- Establishing a department-wide Data Entry Section
- Implementing a single vendor environment for word processing.

Information Systems Planning

A information systems planning function should be established by continuing the information systems technical committee and creating an information systems planner position in the Office of Planning. Creating a planning position may ensure the creation of a plan, but this will not in itself guarantee adherence to the plan.

Information Systems Technical Committee

The permanent information systems technical committee will be responsible for ensuring compliance to the plan. Its members will represent their division or bureau and act as technical representatives in the formation of department-wide information systems strategy. The responsiblities of the committee will include:

- Reviewing, modifying, and recommending the information systems plan to division directors
- Approving coordinated department code structures
- Reviewing and approving of all specifications for new equipment submitted by divisions and bureaus
- Reviewing and approving hardware and software compatibility specifications
- Reviewing and commenting on all applications development specifications
- Reviewing and approving the information systems training and data communications plans

Members of this committee should be selected to represent the following organizational units:

- Assistant Commissioner for Administration
- Assistant Commissioner for Planning
- Division of Enforcement
- Division of Fish and Wildlife
- Division of Forestry
- Division of Minerals
- Division of Parks and Recreation
- Trails and Waterways Unit
- Division of Waters

Actions of the committee such as approval of equipment specifications will likely require interaction with the Information System Bureau or Procurement for administrative purposes. In these cases, the primary responsibility for an acquisition or action will rest with the division or unit whose budget it will affect, however, the representative of the assistant commissioner for administration will assist with all administrative matters and in particular any interactions with ISB.

The committee will select one of its members as chairperson. The chairperson will serve for a period of time determined by the committee, but may be removed at any time by a majority vote or action of a higher authority.

Information Systems Planner
The information systems planner will facilitate functioning of the technical committee and be responsible for recording and transmitting necessary information. The responsibilities of this new position will include:

- Maintaining and revising on an annual basis the department-wide information systems strategic plan
- Establishing and maintaining a departmental data index
- Negotiating standardized departmental code structures and resolving code inconsistency
- Maintaining membership on the users advisory committee and the systems advisory committee
- Establishing and controlling compatibility requirements for hardware acquisition and data and program transfer
- Maintaining a departmental data communications plan
- Training DNR employees in use of department-wide systems
- Serving as an information source on new activities and/or systems at ISB, LMIC, and UCC
- Serving as staff for the information systems technical committee

The principle functions of this new position will be to ensure that DNR employees have the computer access they need to operate effectively and that operational data can be used for planning activities. As will be discussed more fully later, the primary objective of DNR information systems development will be to maximize the effectiveness of day to day operations in the divisions and bureaus. Planning will require data from operational systems on an intermittent basis so it must be possible to access all departmental and divisional data bases.

Development and Maintenance of Department-wide Information Systems
All of the bureaus report to the assistant commissioner for administration. Most of the department-wide systems will also fall under the jurisdiction of this position. A new section, Administrative Systems, should be formed to develop computer-based systems for:

- Financial Management (revenue accounting and cost accounting)
- Personnel
- Land Bureau (land records)
- License Center (major overhaul of licensing and boat and snowmobile registion)
- Field Services (data bases for capital items)

A new full-time information systems project manager position should be created to lead the newly formed group. The person selected to fill this position should have the qualifications needed to manage large systems development projects. Personnel from the Bureau of Systems Management plus new employees hired to design and implement applications in FY 83-85 will complete this new complement. This group will also serve as the backup for divisions, if and when, help is needed in a system development or maintenance activity. Four full-time professional positions should be a satisfactory complement for this new section, if most of the development work is performed under contract. This section may perform work to develop a divisional system if requested to do so, however, it should not assume responsibility in these areas unless asked. If accepted, this change will limit the scope and responsibilities of the Bureau of Systems Management.

Control and Development of Divisional Information Systems

Responsibility for the development and maintenance of divisional information systems should belong to the division directors. At the present time, information systems development is being carried out in the following divisions:

Fisheries - 2 positions
Forestry - 3 positions
Minerals - 1 position
Office of Planning - 5+ positions
Waters - 2 positions

While it may be theoretically feasible to consolidate all of these employees into a single group, there is little need for it because there is little operational overlap among the systems and their duties vary. (e.g., Forestry is engaged in information systems development in a professional programming environment; Fisheries is developing applications in a "user friendly" environment, and the Divisions of Minerals and Waters are primarily maintaining existing systems. Next biennium, information systems work could also begin in the Division of Parks and Recreation and the Trails and Waterways Unit.

In the long run, as applications become mature, it may be wise to move toward more centralization, but for now decentralized applications development and maintenance should be used. The division directors will ensure that their employees comply with all compatibility, documentation, and indexing standards. One complexity caused by this assignment of responsibility is that the various hardware centers (i.e. ISB, LMIC, UCC) will have to deal with several DNR managers. On the other hand, the directors and the assistant commissioner for administration are probably better at negotiating their needs rather than working through a liason. The Administrative Systems group will assist with administrative procedures. Also, the establishment of an information systems planning position in the Office of Planning will limit the amount of divergence from compatibility standards that could otherwise occur without being noticed.

Regulating the Flow of Research Systems to Operational Status

This should not be a problem for research systems developed within a division, since the director will be responsible for both research and operations, however, the Office of Planning will generate potential operational systems as

an outgrowth of department-wide strategic planning. It could become burdened with operational activities and costs unless these systems are made part of a divisional operations budgets. The usefulness and operational benefits of a system which started as a research project can be determined only by placing the responsibility for its maintenance on the division for which it was developed. The transfer of a system from research to operational status should be initiated by the assistant commissioner for planning since it is that office's budget which will bear the cost if the systems is not transferred to operational status.

It may be that some systems built as part of a research project should continue in operation within the Office of Planning, e.g., SCORP. In these cases, sufficient budget should be allocated to ensure adequate long term maintenance.

Department-wide Data Entry

The data entry capabilities of the DNR should be improved immediately. It is likely that significant savings can be made in the License Center by the introduction of key-to-disk technology which can provide faster and more accurate data entry, data base maintenance, editing, and inquiry capability. Systems Summary, Chapter 2 includes an outline of a concept for improving the operation of the License Center. It suggests that significant improvements can be made if data entry, game licensing, game lotteries, and boat and snowmobile registrations are considered together.

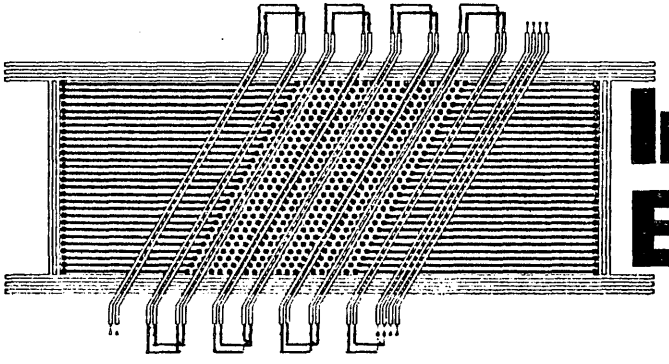
The establishment of key-to-disk technology could also help centralize many of the data base mainentenace activities now performed by student workers, clerical employees, and professional staff. The impact of establishing a responsive, efficient Data Entry Section would be felt throughout the department. While data entry will be tied principally to licensing applications, the unit should remain part of the Administrative Systems Section during its development period. Once the needs for ongoing licensing activities and data entry are known, a final decision on where to place the Data Entry Section can be made.

Implementation of Word Processing

One of the major factors in this plan is an evaluation of the DNR's word processing needs. The department has twenty work stations in the central offices, and three at regional offices, so the question is one of improving efficiency and reducing cost rather than implementation of a new technology. The recommended strategy for improving the department's word processing is included in Hardware/Software Considerations, Chapter 3 since it is more of a technology question.

Summary

The recommended changes included in this chapter should allow the DNR to integrate its various information systems activities and still retain decentralized management of divisional information systems applications. This alternative fits the organizational structure and should allow implementation with minimal disruption and cost. In fact, it may be possible to save enough from updating the licensing functions to pay for all of planning and management changes.



Information Systems Budget for FY 84-85

This chapter outlines the use of funds potentially available to the DNR in the next biennium. The applications development cost detail is found in the Executive Summary, page 9 and Systems Summary, Chapter 2, page 29. The outline below starts with an identification of sources of money for applications development. The second item shows how the LCMR allocation for management of information systems will be used. Items three and four outline the next biennium's hardware budget. They show current expenditures, possible new money, and how these two sources might be used to meet future hardware needs in three classes of DNR offices - central office; regional offices; and area offices, state parks, and research stations. The budget as laid out will provide hardware at locations where needs have been identified. The last item shows how the next biennium's data processing budget might be used to acquire new equipment for the License Center and department-wide data entry.

This budget will allow the DNR to develop the applications identified, integrate the use of computers and word processing, equip regional and area offices where needs have been identified and modernize the License Center.

1. Applications Development Summary by Funding

General Fund	$216,000
Biennial Budget Change Request	250,000
LCMR-Conversion to General Fund	852,800
LCMR-Information Systems	343,500
LCMR-Other DNR Programs	789,000
Game and Fish Fund	405,000
	$2,856,300

2. Use of the LCMR-Information Systems Allocation

Applications Development		
Department-wide Cost Accounting	$250,000	
Enforcement - Violations Tracking	50,000	
Engineering - Project Control	20,000	
Field Services - Equipment Data Base	8,500	
Land Bureau - "Dead" File	15,000	
		$343,500
Information Systems Planning		75,000
Data Communications-Study and Hardware		80,000
Hardware Acquisition		
Word processing terminals		
Enforcement		
Personnel		
Commissioner's Office		
Engineering		
Minerals	30,000	
Micro-processors		
5 regional offices		
3 wildlife research	45,000	
		75,000
Contingency		26,500
Total LCMR Allocation		$600,000

3. Computer Hardware Budget

	$/year
Current Equipment (also included in request for next biennium)	
Word processing equipment	$164,495
Texas Instruments TI990 mini-computer	25,000
	$189,495
Potential New Equipment	
LCMR-Information Systems Allocation	
Word processors	15,000
Micro-processors	22,500
Change Requests	
Waters-Statewide water data network	15,000
Parks-Information systems	15,000
Forestry-Regional offices information systems	10,000
	$77,500
Total FY 84-85 Hardware Budget	$266,995

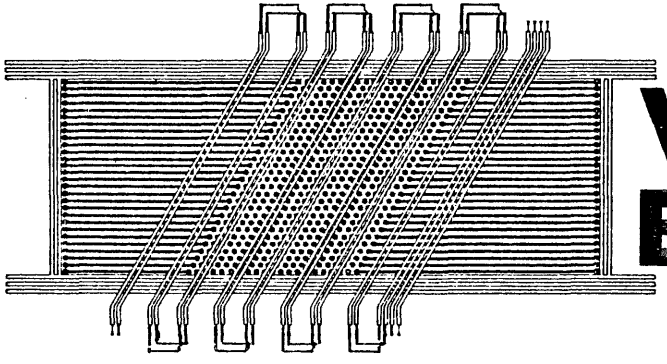
4. Use of Hardware Budget-Word Processing and Data Processing

Central Office		
Current word processing	$139,495	
TI990	25,000	
LCMR-Information systems allocation	15,000	
		$179,495
Regional Offices		
Current word processing	$25,000	
LCMR-Information systems allocation for micro-processor	19,500	
Waters-Statewide water data network	15,000	
Forestry-Regional office information systems	10,000	
		$69,500
Area Offices, Parks, and Research Stations		
Wildlife research-Madelia (1/8 of LCMR micro-processor allocation)	$3,000	
Parks-Information systems	15,000	
Forestry and Fisheries-Micro-processor hardware for area offices and research stations will be acquired in FY 83	-0-	
		$18,000
Balancing Total		$266,995

In addition to amounts identified for hardware acquisition, other funds have been allocated to pay processing costs. Some of these monies, which show up on line 17 in the budget, might become available for other uses. Development of new systems, migration of systems to other computers, or a consolidation of processing tasks could make this money available. An estimate of the amounts for FY 84-85 is shown below.

Land Bureau-AID 325274	$5,000
Central Licensing-AID 325225	40,000
Information and Data Systems-AID 325134	14,000
Volunteer Management Intensification-AID 327155	10,000
Enforcement-DNR Laws-AID 325969	20,000
Field Services	900
Wildlife-Hunting License Lotteries	30,000
Biennial Amount	$119,900

Several of the items listed above relate to operation of the License Center or overall data entry. Therefore, it is suggested that this source of money be used to reequip those activities. For example, about $80,000 per year could come from data entry, data entry for hunting license lotteries, and boat and snowmobile registration. This amount should be sufficient to acquire modern equipment. The exact allocation of funds will have to await the results of the study of these applications suggested in chapter 2 since they should be considered together.



Workplan for the Balance of FY 83

The major work items for FY 84-85 are outlined in chapters 1 - 6 of this plan. Applications development is included in Systems Summary, Chapter 2. Hardware acquisition is discussed in Hardware/Software Considerations, Chapter 3. The computer access study is outlined in Data Communications, Chapter 4. Each of these items will require a detailed work plan which is not included in this strategic plan. In fact, it is reasonable to wait until the 1983 legislative session is over before doing detailed project planning. In addition, some of the detailed planning will have to wait until additional personnel can be hired with funds scheduled to be available beginning in July 1983.

There are several tasks which can be completed during the second half of FY 1983 (January 1983 - June 1983) which will ensure that this plan is locked solidly in place. Completion of these task will allow the department to move quickly at the start of the 84-85 biennium. The following list of tasks includes work which goes beyond current work plans and budgets.

Write the position descriptions and process all necessary paper work for the following positions:

Hiring Authority	Position(s)
Assistant Commissioner for Planning	Information Systems Planner
Assistant Commissioner for Administration	Bureau of Administrative Systems Project manager-overall development Systems analyst - cost accounting Programmer/analyst - Enforcement and License Center Clerk typist 3

Establish the information systems technical committee.

Complete the word processing study as the first step in establishing a single vendor environment. A committee consisting of interested units should be formed to design this work. The committee should include representatives from the Office of Planning, the Section of Fisheries, the Division of Forestry, and the Bureau of Systems Management. This committee could be a subcomittee of the information systems technical committee.

Establish a subcommittee of the information systems technical committee to write equipment specifications for regional offices. Alternatively this might be a charge to the full information systems technical committee, although regional administrators should be a part of the process.

Write a strategy document outlining systems development options for hunting license lotteries, game licensing, boat and snowmobile registration, and departmental data entry. These items should be considered together in order to create the best match between the License Center and overall data entry.

Establish the labor distribution coding structure for cost accounting. This is a major department-wide function which requires input from the information systems technical committee and other interested parties. One individual should be given the task of defining the needs of all divisions, bureaus, and units. Logically, the work should fall to the Bureau of Systems Management, but they have a full schedule with revenue accounting, licenses, and lotteries. Alternatively, the Policy Planning Unit could pull the data together using the information systems technical committee for input.

Reorganize the labor distribution system in the Division of Enforcement. The current system is causing problems which should be corrected prior to the establishment of the new cost accounting system. Systems Management, Enforcement, and Fisheries should meet to resolve this as soon as possible. Enforcement should be a high priority for an additional terminal on the Nixdorf 8845.

Acquire computer hardware for Forestry area offices and Fisheries research stations. The primary responsibility falls on the divisions, but the Bureau of Systems Management should handle relations with the Information Systems Bureau (ISB).

Work through the users advisory committee of ISB to gain support for a major study of improved computer access and data communications.

Implement the revenue accounting system (See Appendix 9).

Expand usage of the Nixdorf 8845, first to other sections in the Division of Fish and Wildlife. Enforcement should then get the next available terminal. Other potential users include: Information and Education and the Office of the Commissioner. This should be done quickly to get maximum benefit from the equipment during its lease term.

Completion of these tasks during the last half of FY 83 will ensure a fast start in the next biennium. It will also provide a practical test of the operation of the information systems technical committee.