

STATE OF UTAH
AUTOMATED GEOGRAPHIC REFERENCE
PROGRAM

A STRATEGIC APPROACH

July 1, 1984



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July 1, 1984

Mr. Harold Carpenter
State of Utah
Data Processing Coordinator
104-B State Capitol
Salt Lake City, Utah 84114

Dear Mr. Carpenter:

We are pleased to present our recommendations for a strategic approach for the State of Utah Automated Geographic Reference (AGR) Program. This report is the result of a review of AGR activities. The overall objectives of this review were to:

- evaluate the goals, objectives and activities of the AGR Program
- identify strengths and limitations of AGR
- develop a job description for a State AGR Coordinator
- develop a strategic plan for AGR, including recommendations and action plans to overcome any limitations observed

To accomplish the objectives of this study, we utilized available background information and conducted interviews with AGR Steering Committee and Task Force members. We also spoke with several AGR users. To gain information about how geographic information systems are becoming institutionalized in other states, we contacted operators of similar programs in Minnesota and Arizona.

This study involved the AGR Program and did not include an evaluation of other information processing activities in the State. We have attempted to develop a practical approach for the AGR Program consistent with the overall systems planning goals for the State.

Many of our recommendations were developed as a direct result of ideas and suggestions made by State of Utah employees interviewed for this study. While it is not possible to recognize each individual who contributed to this study, we wish to express our appreciation for the cooperation and support extended to us during our effort to develop a strategic approach for AGR. We would be pleased to review any aspect of our report with you at your convenience.

Yours very truly,

Price Waterhouse

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I. MISSION OF THE AUTOMATED GEOGRAPHIC REFERENCE (AGR) PROGRAM

Background

In 1981, the State of Utah established the foundation for a geographic information system (GIS) with the intended purpose to support and enhance decision making in state government. The Automated Geographic Reference (AGR) Program was conceived as a computer-based system for managing, manipulating and analyzing any information (date base) that can be geographically referenced. This information could include, but would not be limited to, natural resource, cultural and economic data. Potential AGR users could include any state or local government agencies whose information requirements, management needs or proposed data base matched the capabilities and requirements of the system. Over the long-term, access to the program might also be extended to private sector entities whose studies and reports would, in turn, become part of the public domain. These private sector sources would have access to the program on a fee basis.

Advocates of AGR perceived the program as a means to introduce an efficient, cost-effective tool to address critical issues tied to state resources. Although the AGR concept was fairly new to Utah, similar programs had operated in the public and private sectors throughout the United States for more than a decade.

AGR began at an initial funding level of \$85,000. Resources included donated staff and loaned hardware from interested state agencies. These early advocates included the State Division of Data Processing, DAS and the Department of Natural Resources and Energy.

Since 1981, AGR has been working to become fully operational. The AGR program was recommended in the Utah Systems Planning Report (September 1982) as a tool for "all departments and agencies that create or use information referring to geographic locations." In addition, some legislative support has developed, particularly among legislators with a keen interest in natural resource management.

The AGR staff has undertaken numerous tasks to make the program operational. These activities have included:

1. Providing consultation and training to potential users of the system;
2. Establishing guidelines for proposal development and project planning;
3. Assisting users in developing project proposals;
4. Screening project proposals;
5. Developing technical expertise to operate the system;
6. "Troubleshooting" projects;
7. Identifying standards for data input and file documentation;
8. Supervising data file and data base development;
9. Responding to inquiries.

Due to limited resources and GIS expertise at the outset, AGR emphasized the support role that it can provide to users rather than a "production shop" or service bureau capability, which it would have been unable to offer at the time.

Currently, funding for the program has increased to more than \$400,000 during the current budget cycle. This budget has been used to purchase new hardware, including a Prime computer, and a state-of-the-art software package (ARC/INFO). Funds also had been allocated to hire additional technical staff.

Recently AGR has been reorganized and consists of a task force and a steering committee with representatives from DNR, the State Office of Planning and Budget, and the Division of Data Processing, DAS. The purpose of this reorganization has been primarily to:

1. Assess the progress made to date by AGR;
2. Identify alternative strategies to enable AGR to become a more effective management tool;
3. Provide new focus to the program.

These tasks developed due to concerns expressed by the steering committee that AGR was caught in an "activity trap" and had been unable to demonstrate significant accomplishments after more than two years of operation.

AGR Mission Statement

Prior to discussing specific strategies to improve AGR effectiveness, it is critical to define the mission of AGR from a state perspective. Individuals in state government interested in and committed to the AGR program have expressed a broad range of perspectives on the purpose, capabilities and limitations of AGR; however, from their comments, the goals discussed below have been stressed consistently.

The Automated Geographic Reference (AGR) Program has a three-fold mission in Utah over the long term. The primary mission of this program is to serve as a tool to enhance decision making of government organizations. This tool differs from other resources traditionally available to decision-makers since the information used is geographically or spatially referenced as well as computer based. These attributes provide the potential

to analyze a variety of otherwise dissimilar data for a study area and to develop optimal and timely strategies to address critical state issues.

Tied to this primary aim is a secondary goal to coordinate the design and development of a state-wide data base of geographically referenced information. Successfully achieving this goal will require interface with other government and private organizations as well as the development and widespread use of specific guidelines, policies and procedures to operate geographic information systems (GIS) in Utah.

Thirdly, the AGR Program recognizes the need to increase awareness of its capabilities and benefits as well as to facilitate its use. Based upon an earlier study prepared by AGR's software vendor¹, as well as from inquiries made to AGR, at least forty-seven (47) state agencies might derive benefits from AGR participation.

Increased awareness of the program may ultimately enable AGR to develop a state-wide user community; however, the critical issue will be to establish a reasoned and selective approach to gradually add new users to the program. Selection criteria for users of the program must be based upon the specific problem that the user is seeking to address within the scope of overall, critical state issues. As an adjunct, users and projects should also be assessed on the basis of their contribution to the development of a comprehensive data base of geographically referenced information available and intended for recurring use by a broad user base. Potential users must also be evaluated by their willingness to train their staff to use the AGR system.

¹ Conceptual Design and Implementation Plan for a Geographically Based Data Information System, State of Utah. Prepared for the State Planning Coordinator's Office by Environmental Systems Research Institute, (ESRI), Redlands, California: September 15, 1980.

The following sections of this study will provide recommendations and offer alternative strategies, which should be evaluated on the basis of the stated goals for AGR. Specific activities to accomplish these goals are discussed in Part IV.

II. THE GEOGRAPHIC INFORMATION SYSTEM (GIS) ENVIRONMENT

Common Elements of Geographic Information Systems (GIS)

For the last fifteen years, many public and private sector organizations throughout the United States have strived to develop GIS to meet their information and management needs. Twenty-four states have GIS varying considerably in scope, complexity and capabilities. Their common element, suggested by the director of the Minnesota program, is that they can be viewed as a means to an end rather than an end in themselves.

Successfully implementing a GIS requires an appreciation of the level of funding, commitment of staff, and outside support necessary to develop the hardware/software and to create a data base. Based upon the experience of other successful programs, the following considerations must be emphasized:

1. Programs require focus to succeed beyond initial inception. Successful programs are typically the result of specific projects tied to critical state concerns. Data base development is usually not the result of an on-going process. It is tied to specific project needs.
2. Development costs over the short-term will be relatively large although the potential long-term benefits should more than compensate for these initial costs.
3. The time frame to make a GIS fully operational may range from five to ten years.
4. The ability to increase or maintain program funding levels is tied to the ability to demonstrate the usefulness of the program. Selecting high impact and/or high visibility projects addressing critical state concerns has been an effective approach to justify a GIS in many states.
5. Creation of a data base is the most costly and time-consuming aspect of developing a GIS.
6. Natural resource data has typically been the initial

inputs to a GIS due to the potentially widespread applications for such information.

7. Legislative and/or executive support is essential for maintaining viability of a GIS; however, programs must remain politically neutral to maintain credibility over the long-term.
8. New users and services can only be added gradually over time. Limited resources prevent programs from offering services to a state-wide community of GIS users until a program becomes fully operational.
9. Strong interagency commitment and cooperation is necessary to establish program priorities.

For this study, the GIS in Minnesota and Arizona were contacted to identify their implementation strategies and to compare those strategies with the AGR approach in Utah. These programs demonstrate that awareness of the nine considerations summarized above does contribute to the success of a GIS. A discussion of these programs follows.

Minnesota Land Management Information System (MLMIS)

Minnesota is widely recognized as having the first and most successful state GIS. It is a mature and well-established program as compared to counterparts in many other states. The Minnesota program also is generally credited with developing many of the GIS tools and approaches used by other state geographic information systems.

The Minnesota Land Management Information System (MLMIS) was begun in 1967 and developed over ten years in an academic environment (University of Minnesota) under contract with the State of Minnesota. During that time, the following tasks were completed:

- the data base was developed;
- the initial pilot study was completed;
- an incremental approach to the development and application of the system was established.

Since 1977, MLMIS transferred to The Minnesota State Planning Agency and has operated as a service bureau, known as the Land Management Information Center (LMIC). The program is not limited to providing services to the State Planning Agency but serves a large user community, charging fees for services and products.

Although LMIC had demonstrated its usefulness and effectiveness by 1977 when it was transferred to the planning agency, there still was considerable discussion of the cost-effectiveness of incorporating this program into government operations. Minnesota's rationale, then and now, includes the following points:

1. LMIC allows for a concentration of technical resources necessary for such a program. It provides unique technical capabilities that are otherwise beyond the budgetary and staffing resources of the user agencies.
2. A state GIS encourages data sharing and integration resulting in better management decisions and less duplication of data and efforts.
3. The system encourages recurrent use by state agencies rather than contracting for one-time studies from an outside resource.

When LMIC shifted to the State Planning Agency in 1977, it had an annual budget of \$300,000. Most of LMIC's effort at that time was in developing a data base and computer programs; however, client projects also were conducted on a contract basis. For 1984, the LMIC budget is estimated at \$1,200,000. Of that amount, \$675,000, or 56% of the total budget, will be funded from user fees. A copy of the fee schedule used by LMIC is included in Appendix A of this report.

Critical elements in the success of the Minnesota GIS have been the support of the state legislature and an initial narrow, project focus, which expanded gradually as the data base developed. The Lakeshore Development Study, funded by the legislature in the late 1960's provided the impetus for

establishing MLMIS. A land use map was the first major product of the system.

High visibility and high impact projects coupled with legislative actions to accelerate the collection of natural resource data helped to institutionalize MLMIS. From those early studies demonstrating the effectiveness of MLMIS as a management tool, the scope of projects and the range of services have gradually expanded over a fifteen-year period. The Minnesota legislature apparently has been so convinced of the usefulness of the program to the extent that the Legislative Commission on Minnesota Resources requires MLMIS compatibility for all natural resource acceleration programs that it funds.

Arizona Land Resource Information System (ALRIS)

Arizona has been working since 1981 to establish the Arizona Land Resource Information System (ALRIS). Using Minnesota as the standard, ALRIS would be described as a start-up program working to become fully operational. Unlike Minnesota, Arizona created ALRIS within the scope of enabling legislation for the State Land Department.

Since its inception, the focus of the program has intentionally been narrow to effectively use the limited resources allocated to it. The program operates primarily as a service center, with an informal motto that "ALRIS helps those who help themselves." This help includes:

- training
- project design
- consultation
- troubleshooting

ALRIS compares the time required by its staff to support projects against the resources a user is willing to invest in a project as a way to prioritize projects.

Data base development has been a high priority for ALRIS. It has frequently been project driven and includes a great deal of natural resource data, since primary users of the system are State Forestry, Water Resources and the Game and Fish Departments.

Another important factor in ALRIS's success has been its ability to develop a strong interagency mandate. This mandate appears to successfully skirt many political and ownership issues common to GIS programs. The enabling legislation which created this program in the State Lands Department is probably the primary reason why these issues have been avoided.

ALRIS's apparent success is tied to several key elements. These elements have helped ALRIS to work with its available resources and to structure the demand for services to match those limited resources. These elements include a strong program focus, which helps ALRIS to identify projects, users, tasks and services compatible with its overall strategy. The commitment of professional staff with geographic and technical expertise provides a solid foundation for systems development and enhancement. A strong interagency mandate and legislative support provides assurance that ALRIS projects and data base development will be tied to critical state issues. In combination, this support, direction and review is helping to institutionalize ALRIS as part of state information processing activities.

III. THE AGR ENVIRONMENT

Summary of Findings

The Automated Geographic Reference (AGR) Program has been working to become fully operational for three years. The program has developed primarily as the result of a growing need for such a system by divisions of the Department of Natural Resources and Energy (DNR). This need at DNR coincided with recommendations from a middle management level in State Data Processing to purchase hardware and software to start a geographic information system (GIS) in Utah. Unlike other state GIS, AGR was not established with a strong project focus, such as the Lakeshore Development Study in Minnesota. In the beginning, it also did not have strong support from either the executive or legislative branches in state government.

From that starting point, AGR has operated in an environment marked by a variety of problems. These problems are briefly summarized below.

1. Concerns over focus and scope of the program. Since an overall project focus had never been defined, priorities have been established by the department(s) committing resources to AGR. Critics argue that these priorities primarily address individual department agendas and not necessarily state-wide issues or needs.
2. Questions of ownership. Ownership issues had been raised, particularly when the AGR staff was located at DNR. Concerns over whether other departments have equal access to the AGR system have been mentioned. These ownership issues are further complicated, since several state departments/divisions have committed staff, equipment and other resources to the current AGR program.
3. Concern that AGR cannot demonstrate its effectiveness as a decision making tool. Few recognized at the outset that making AGR fully operational might require 5-10 years of commitment and effort. The initial staffing complement struggled with a two-fold task to learn the

system and to train and support users. As a result, the expectations of upper management and users had not always been met.

4. Absence of strong momentum in establishing AGR. For the last three years, AGR has been striving to overcome a poor start. During the first two years, funding levels were inadequate to move the program forward quickly. AGR staff were essentially untrained and needed to develop expertise before they could effectively assist others. Developing AGR staff expertise quickly was hampered by the PIOS software, which was difficult to use.
5. Absence of an effective management reporting system. Demonstrating AGR accomplishments has been difficult due to a lack of established performance measures, formal policies and procedures, or detailed operational plans. Status reporting has been informal and often has been the result of a specific upper management request. It appears that AGR has had an operating posture of reacting to inquiries and problems at the expense of proceeding with planned activities.
6. Available leadership and management support not commensurate to needs of the AGR Program. Leadership and the commitment of upper management has been insufficient for the demands of developing a geographic information system (GIS). As a shared program, AGR has not received consistent support from its contributing state departments to achieve the synergy necessary to move the program forward quickly. Management decisions have not always been made in a timely manner. Even as the Department of Natural Resources took a larger role in developing AGR, it did so with strong support of the Executive Director, but with limited upper management resources to provide direction and closely monitor program progress.
7. Apparent absence of a strong constituency at the users' level. Among current and potential users, AGR has not yet developed strong support for its overall performance or its quality and level of service. A few users have perceived the AGR staff as impeding user access to the system. Whether or not these perceptions are accurate, they may adversely affect the credibility of AGR.

Despite these problems the environment for AGR in Utah is characterized by opportunities. The need for accessing information in a timely manner remains a critical concern in state government. Large amounts and varieties of information

need to be considered simultaneously in the decision making process. Based on an earlier study, at least 47 state agencies might benefit from AGR and could contribute valuable information to a state-wide geographically referenced data base. As a minimum, those agencies who have already committed resources to train personnel and to start projects are likely to make recurring demands on the system, once its effectiveness has been demonstrated. If the current AGR organization cannot address this need for using automated, geographically referenced information in decision making, other organizations in state government and in the private sector will meet it.

AGR Strengths and Limitations

Identifying the strengths and current limitations of the AGR program are necessary to obtain a complete picture of the AGR environment. Based upon interviews and a review of AGR correspondence and documents, some of the major characteristics have been summarized below:

AGR Strengths

- New systems hardware and software
- Strong commitment of individual AGR staff to the program
- Strong staff mix
- Strong funding level
- Upper management (Steering Committee) support
- Cohesiveness among AGR staff
- Satisfaction among several recent users of the program
- Frequent status reporting to the full steering committee

AGR Limitations

- Apparent absence of overall program focus
- Lack of clearly detailed organizational structure

- Lack of documented policies and procedures
- Unmet expectations on the part of some users and upper management
- Time management problems at an operational level (AGR staff)
- No detailed, updatable operational plan for AGR staff activities
- No performance measures
- No milestone reporting tied to established performance measures or to an operational plan
- Some user dissatisfaction with the level of support and access provided by the AGR staff
- Lack of clearly defined goals from the contributing departments
- Unclear lines of responsibility and authority within the AGR staff both to the Steering Committee, and to the Department of Natural Resources.

Overall, these limitations appear to have had an adverse effect on the overall performance of AGR. Strong and consistent leadership within the AGR program will be necessary to address these current weaknesses. A State AGR Coordinator could be given responsibility to manage the program and to translate policy issues into specific operational tasks. The next sections of this report offer a framework to overcome these perceived limitations.

IV. STRATEGIC APPROACH FOR AGR

This section provides the assumptions, tasks and organizational alternatives comprising a strategic approach for AGR. This approach has been developed as recommended steps to accomplish the AGR mission discussed in Part I and to overcome program limitations identified in Part III of this report.

Strategic Assumptions

Several assumptions have been made to provide the basis for the AGR strategic approach. They include:

1. Appropriateness of AGR mission. AGR is intended to support the development of optimal strategies to address critical state issues.
2. Appropriateness of a "Central AGR". A central AGR unit providing technical assistance to a customer base with varying information processing expertise is an efficient and appropriate method to institutionalize AGR.
3. Data sharing environment. The initiative to develop a data sharing environment among state agencies is feasible and viable. It will provide the basis for systems planning in the future.
4. Inappropriateness of decentralizing AGR. Developing individual GIS for any state agencies requesting them is not cost-effective given the current costs of systems hardware and applications software. This approach also would run counter to the state systems planning effort and would increase the risk of developing incompatible data sets between individual GIS programs.
5. Funding and program performance. The AGR Program is one among many programs vying for state general funding. If AGR does not or cannot demonstrate its usefulness, the state will reallocate those resources where they might be better used.
6. Cost-recovery program. Over the long-term, AGR will develop into a cost-recovery program, funding a portion of its overall budget needs through users' fees. This

cost-recovery program could require establishing an enterprise account for managing the collection of fees for services and products.

The following section identifies specific short-term and long-term activities that will help AGR demonstrate its usefulness as a management tool.

AGR Objectives and Tasks

The long-term objective of AGR is to institutionalize this system into state government by demonstrating its effectiveness as a decision making tool. Within two years, AGR must concentrate its activities to:

- bring new users and data into the system;
- consolidate legislative and executive support;
- become self-supporting as some type of cost-recovery program.

Over the next year, the most critical short-term objectives for AGR will be to demonstrate that it is building a data base, training new users and providing output from the system useful to state management, planning and decision making. AGR must concentrate on production activities conducted primarily by AGR users, but also by AGR staff. Attention, support, and additional training must be given to those users, such as State Lands, UGMS, Water Resources, State Planning and Budget, who have high visibility and high impact projects, which can be used to demonstrate the benefits of AGR as well as add to a broad, state-wide data base.

Both the AGR Steering Committee and the AGR Task Force will have specific responsibilities to move the program forward. Without both groups making a firm commitment to meet those responsibilities, the AGR program will continue to make slow

progress and may be unable to overcome many of its current limitations. The tasks recommended to correct these problems are discussed below.

A. AGR Steering Committee

The Steering Committee must take an active role in providing direction and establishing priorities for AGR over the short-term. Affirming operational priorities of the AGR staff as well as overall project priorities recommended by the AGR staff are primary tasks. Because of its upper management perspective, the Steering Committee has a better sense of what projects will gain legislative support for AGR as well as provide the optimal building blocks for an AGR data base.

The Steering Committee must determine where the AGR program will reside within the state's organizational structure. Alternative locations with a brief summary of their advantages and disadvantages are discussed later in this section. The Steering Committee must also provide coordination for building legislative support of AGR for the next budget cycle.

In addition, the Steering Committee must supervise an executive search for a State AGR Coordinator. This position is intended to provide strong leadership to the AGR team, which is critical to the long-term success of the AGR program. The coordinator would represent the AGR program on a state-wide basis and would be expected to bring strong management skills to the job. Part V of this report provides a suggested job description for this new position.

Over the long-term, the AGR Steering Committee, or another executive level committee, should continue to provide direction and affirm priorities for the AGR program. Even as AGR becomes a fully operational, cost-recovery program, a need will continue to exist to prioritize AGR projects on the basis of important state

issues and needs. AGR operations personnel cannot be expected to keep abreast of state priorities. Their primary responsibility must be to develop a fully operational AGR program with the resources provided to them.

B. AGR Operations Staff

The AGR staff must address issues in all functional areas to make the AGR program fully operational. In some respects, the program is making a new start, as a result of the purchase of new hardware and software; however, the tasks discussed below would be necessary regardless of the system configuration.

Prior to the start of these activities, the AGR staff must obtain Steering Committee approval for AGR operational priorities. With the approval of the Steering Committee, the AGR staff must also be prepared to draw upon outside resources to accomplish these tasks. These resources may include vendor support; however, they should also include resources available through the state university system that may address specific program needs.

Specific tasks necessary to meet AGR short-term and long-term objectives are detailed below. For the purposes of this plan, short-term activities are those completed within a one-year time span. Long-term activities are defined as those activities completed within a two-to four-year time period.

1. Operations:

a. Short-term

- Complete the testing and debugging of the new system using actual projects rather than test data. The bulk of this effort should be undertaken by AGR users and AGR processing staff.
- As an adjunct to project work, develop documentation and input standards and procedures. This effort should be coordinated by one of the AGR

assistant managers with input from the AGR processing staff, AGR users and technical support from Data Processing (designated by the Data Processing Division representative on the Steering Committee).

- Develop the data base architecture for the new system (Work is currently in progress on this task).
- Provide support service to current AGR users who have received training on the new system. These services primarily would include software testing and consultation. Designate an assistant manager and a processor to coordinate this activity.
- Offer follow-up training and support to get divisions on the system as quickly as possible. If necessary, contract for additional support from the software vendor for this task.
- Develop an internship program, utilizing local university resources. Designate an assistant manager to coordinate this activity. Such a program can:
 - address short-term project staffing needs
 - tie to a potentially valuable source of research and development support
 - expand the local labor pool of GIS professionals
- Develop formal guidelines to select new users for training on the system.
- Develop detailed operational plans and update them on a semi-annual basis. Identify key performance measures.
- Establish a milestone or status reporting system to quickly communicate AGR progress to the Steering Committee.
- Provide formal training for new users and follow-up training for established users.
- Maintain and distribute a catalog of all data in the AGR system. This catalog would tie directly to the state's planned data dictionary.

b. Long-term

- Broaden the range of services offered to users by the AGR staff to include:
 - consulting support
 - project management
 - full-service production and project management

- Increase the development of interfaces to obtain new data from federal and other sources.
- Increase research and development activities in anticipation of users' needs. These activities could be coordinated with research activities in the state university system and might include:
 - testing available software to match specific applications
 - evaluating new technologies, that meet current or planned applications.

2. Applications Development/Addition of New Users:

a. Short-term

- Concentrate AGR activities on completing projects. Successful projects are the most effective means to promote AGR. Designate one manager to work with the Steering Committee to develop information on recent AGR projects, both completed and in progress. Stress successful projects and work in progress rather than general systems capabilities. Keep in mind that legislators may be the primary audience for this information.
- Limit the AGR marketing effort. Supporting current users (i.e., those who have projects in progress or are trained on ARC/INFO) should be the priority of the AGR staff. Troubleshooting on projects, follow-up training and strong user support services should be the primary marketing tools. Designate one of the AGR managers and one AGR processor to coordinate this effort.

b. Long-term

- Target new users on the basis of how their project/data can contribute to the development of an AGR data base as well as address critical state issues. Obtain Steering Committee direction and support in this process.
- Update information geared to legislative and executive concerns. Schedule informal status meetings with small groups of legislators who have supported AGR to apprise them of current projects.
- For new and targeted AGR users, develop separate informational sessions geared to upper management and to operational staff needs.

- Evaluate the appropriateness of accessing the AGR program by private sector entities. Consider guidelines for fees as well as for ensuring that information and findings developed for such users remains in the public domain.
- Develop informational materials highlighting successful AGR projects in Utah. Stress the benefits and cost-effectiveness of such an approach in planning, managing and decision making.

3. Organization:

a. Short-term

- Establish an organizational structure with clearly defined responsibilities for all managers and staff. Designate specific individuals to be responsible for administrative, operations and project-related activities. Develop position descriptions.
- Develop a stronger working relationship with the Steering Committee. This committee should establish priorities for increasing the user base, selecting projects and developing legislative and executive support for AGR.
- Develop written policies and procedures for:
 - proposal development, review and approval
 - project management
 - project documentation
 - administrative activities
 - other
- Identify and document the potential role of the state university system to support AGR. This support could include staffing, research and development activities, and special studies. Establish faculty contacts to identify potential support areas.

b. Long-term

- Update AGR organizational descriptions as needed.
- Update AGR policies and procedures on an annual basis.
- Utilize the state university system as an AGR resource. Develop a written plan defining this working relationship.

4. Fiscal:

a. Short-term

- Update the program budget.
- Prioritize activities and purchases using cost/benefit considerations.

b. Long-term

- Update budgets annually.
- Develop recommendations and establish a time frame for operating AGR as a cost-recovery program. Evaluate the appropriateness of operating as a partial or full cost recovery program.
- Evaluate alternatives for charging users' fees.
- Determine costs for system upgrades.
- Implement a fee schedule for AGR services by working with the State Division of Finance to determine the appropriateness of establishing an enterprise fund or other account for the collection of users' fees.

AGR within the State Organizational Structure

Tied to the action plan for AGR is the issue of where AGR staff, equipment and resources should reside within the State of Utah organizational structure. In less than three years, AGR has resided in three, very different "organizational" locations: at the division level in Utah Geological and Mineral Survey (UGMS), within administrative services in DNR, and as the AGR Task Force. At this point, it will be critical to establish AGR in a permanent location appropriate to the mission of the program (Part I of this report), as viewed from an overall state perspective.

Since a task force is a temporary organizational form created around a specific agenda, a permanent organizational location should be defined. As minimum requirements this location should provide AGR with:

1. A state focus for data base development, targeting of new users, and selection of high impact projects.

2. The necessary level of support and commitment from upper management to provide direction, establish priorities and monitor progress of the program.
3. Protection of its current funding level, particularly in the next budget cycle.
4. A "neutral" location for the program in support of the assumption that AGR has been established to address critical state issues as well as to foster interagency support of the program.
5. A "stable" location where AGR can operate, for the most part, removed from divisional, departmental and party politics.

Several possible organizational locations for AGR are summarized below. An outline of the potential advantages and disadvantages of each alternative is also included.

Alternative 1: Department of Administrative Services (DAS)

Administrative Services has been suggested as a potential permanent home for AGR. This department is responsible for a number of cost-recovery programs providing services to other state organizations. Several of the programs grouped in Administrative Services are involved in addressing state information needs, including Data Processing and State Archives.

Advantages of DAS

1. DAS provides a neutral location for AGR.
2. It has experience managing other programs involved in information processing.
3. It is visible and service oriented.
4. It could focus interagency support for AGR.
5. It may offer a more entrepreneurial environment for AGR since many DAS programs are cost-recovery.
6. DAS and its programs are available to a state-wide user base.

entrepreneurial
= response to
supply &
demand

7. DAS provides a location compatible with the state data sharing initiative.

Disadvantages of DAS

1. DAS may be unable to protect AGR developmental funding in the coming budget cycle. Trends in state government show a tightening of administrative spending. AGR runs the risk of losing its ability to progress if funding is cut.
2. It could be argued that the overall mix of programs within DAS is not synergistic and will impede AGR development.
3. Administrative programs are often a target for criticisms on inefficiency in government. Until AGR can sufficiently demonstrate its effectiveness , it has the potential of becoming a target for such criticism toward DAS programs.
4. Geographic information systems (GIS) are typically located within state planning or natural resources agencies where they can establish a stronger interface between the system and its users than might be possible in DAS.
5. Because of the potential for competing demands on DAS upper management from a variety of DAS programs, AGR may be unable to obtain the level of support necessary to provide direction and establish priorities for the program.

Alternative 2: Department of Natural Resources (DNR)

The Department of Natural Resources has been a traditional home for a GIS in many states. In Utah, DNR has had a strong interest in and been a supporter of AGR since the beginning. Until recently, AGR has reported to the Deputy Director of DNR through the Department's Data Processing Division.

If AGR were to remain in DNR, it has been recommended that it be in a different location, preferably tied to an overall DNR planning function. The advantage to such an approach is

that it could help to highlight AGR progress, more quickly expose its operational problems, gain higher priority among DNR activities, and provide needed program focus.

The main disadvantage to this approach is a perceptual one. It could be argued effectively that DNR cannot provide a focus on critical state issues outside the purview of DNR. It also could be argued that other state departments could be limited in their access to and use of the program.

One approach to address this concern would be to ensure that a portion of AGR's budget/resources (10-20%) is allocated to other projects tied to critical state issues. A determination of programs and agencies matching that criteria would be made by the Steering Committee, representing State Planning and Budget, DNR and the Division of Data Processing.

Advantages of DNR

1. DNR is an effective means to interface users (DNR divisions) with AGR.
2. DNR has a strong need to develop AGR to improve management, planning and decision-making as well as to organize and store its large and varied data base of natural resource information.
3. DNR has a wide group of divisions anxious to be trained on the AGR system and to undertake projects on their own.
4. DNR support could reduce the potential risk of funding cuts during the next budget cycle.

Disadvantages of DNR

1. DNR is not a "neutral" location for AGR. Perceptual problems of DNR "ownership" of the program will continue to hamper diffusion of and access to AGR by other state agencies.
2. It will be difficult to develop interagency support for AGR.
3. Critical DNR issues are not necessarily critical state issues.

4. AGR could become the center of division and department politics.
5. A partial allocation of AGR's budget/resources does not ensure that critical state issues can or will be addressed.

Alternative 3: A Division in DNR

Suggestions have been made that a division in DNR, such as UGMS or State Lands, might be a good location to make AGR operational.

Advantages:

1. AGR would be used and tested in a highly controlled, focused environment.
2. DNR could continue to support funding requests for AGR.
3. Division control could result in rapid expansion of a data base, however narrowly it might be defined.

Disadvantages:

1. This alternative narrows the focus of AGR to address the issues of one special interest group. It does not match AGR services to critical state issues or needs.
2. It establishes the precedent that divisions can maintain their own GIS. At least in the short-term, this is neither cost-effective nor compatible with the state's data sharing and integration initiative.
3. This alternative may limit the access to AGR by equally deserving and appropriate state agencies.
4. This approach does not encourage the commitment, support or interest of upper management in state government.
5. The approach discourages interagency support of AGR.

Alternative 4: State Office of Planning and Budget

State planning agencies have been another traditional home for GIS in other states. Many of these states believe that planning agencies provide the greatest opportunities to use AGR in addressing critical state issues. They may also

provide the greatest potential for instability due to shifts in state leadership. This must be a consideration in choosing to locate AGR in the State Office of Planning and Budget.

Advantages

1. This alternative would provide AGR with data base development tied to current and critical state concerns.
2. The State Planning and Budget Office will provide AGR with higher visibility at the executive and legislative levels.
3. The State Planning and Budget Office can help to coordinate interagency support of AGR.
4. The State Planning and Budget Office could address the issue of stability by locating the AGR program in its Data Resources office.
5. This alternative could provide the necessary focus to ensure that critical state issues are addressed.
6. Locating AGR in State Planning and Budget could reduce and, over the long-run, eliminate the need for an AGR steering committee since the focus of this office is in addressing critical state issues.
7. AGR in the State Planning and Budget Office reinforces "state ownership" of the program and could also serve to encourage the interest in and use of AGR by other state departments.

Disadvantages

1. State Planning and Budget may not be able to gain the necessary legislative support to maintain AGR funding levels.
2. The Office is nonetheless a political environment, which might not provide a sufficiently stable and neutral setting for AGR.
3. At least until AGR can demonstrate consistently that it is an efficient, cost-effective tool, it could be a highly visible target for critics of spending for systems development.

Recommendation

Based upon the minimum requirements for a permanent AGR location, it appears that the Office of Planning and Budget could eventually provide the most appropriate setting for AGR.

Planning and Budget can provide a state focus for data base development, selection of high impact projects and the targeting of new users based on state needs. It also can offer the support and commitment of upper management to establish AGR priorities tied to state needs.

Planning and Budget reaffirms "state ownership" of AGR, encouraging access to the program by new state departments. It can also coordinate the diffusion and development of AGR expertise in other state departments. Although Planning and Budget operates in a political environment, it has the capacity to locate AGR within an office such as Data Resources, which may experience little political impact on its activities.

Although the State Office of Planning and Budget may be the most effective operational setting for the AGR program over the long-term, the AGR Steering Committee must consider all of the alternatives discussed above, particularly in light of anticipated election year changes. As a minimum, change in the location of AGR should be linked to the state's budget cycle. More importantly, any change should be made with the concurrence of all departments and divisions represented on the Steering Committee.

Given probable staffing changes resulting from state elections, the location selected for AGR must also be considered from the perspective of its potential for adverse impact on AGR. A reasonable course of action must be to protect AGR from the confusion associated with a change in administration. Primary and contingency plans should be developed from the available alternatives to address this eventuality. These plans reasonably could include maintaining AGR in its current organizational setting.

V. ROLE OF THE STATE AGR COORDINATOR

The Steering Committee has proposed that a position of State AGR Coordinator be established to provide leadership to the AGR Program. Based upon our summary of findings, a strong need exists for leadership at the middle to upper management level in the AGR Program. This position would have the responsibility as well as the authority to establish priorities and to direct AGR program activities. Other responsibilities could include:

1. Represent the AGR Program state-wide;
2. Act as legislative and executive level liaison for the AGR Program;
3. Provide guidance to the AGR staff in coordinating AGR data base development activities among other state departments;
4. Work with Directors of Divisions/Departments to identify new uses and data sources for AGR;
5. Represent AGR in the network of other state, federal and private sector GIS;
6. Review and approve equipment purchase for AGR, both for the central organization and for user groups;
7. Supervise and approve updates to AGR operational and strategic plans;
8. Work with an AGR executive or steering committee to define AGR priorities;
9. Translate state policies into AGR operational objectives and activities.

The State AGR Coordinator would be in a pivotal position to manage the successful implementation of the AGR Program in Utah. Whether that position is classified as merit or exempt as well as what management level would be appropriate for the job would be tied to the organizational location selected for AGR and should be determined by the Steering Committee.

*6. also relevant
compatible
Equipment for
these not yet
identified
users*

APPENDIX A

BILLING POLICY AND RATE SCHEDULES
FOR THE MINNESOTA LAND MANAGEMENT INFORMATION SYSTEM

LAND MANAGEMENT INFORMATION CENTER

MINNESOTA STATE PLANNING AGENCY

ROOM LL-65 METRO SQUARE BUILDING

7TH & ROBERT STREETS

ST. PAUL, MINNESOTA 55101

(612) 296-1211

EFFECTIVE OCTOBER 1, 1983

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BACKGROUND TO THE LAND MANAGEMENT INFORMATION CENTER (LMIC)

The Land Management Information Center (LMIC) is a service bureau that provides computer-based data analysis and graphic display of environmental information to land managers in the state. The service bureau is funded through legislative appropriations for permanent staff and general over head costs and through user fees for specific products and services related to client projects. This statement of policies and fee schedules is intended to reflect the state's position regarding access to the service bureau and cost-recovery for its operation.

LMIC SERVICE BUREAU GOALS AND OBJECTIVESGOAL

To perpetuate a viable service organization by balancing activities supported by general fund monies and client fees.

OBJECTIVES

1. To establish a balance between short-term needs of service bureau projects and long-term needs of user services and data upgrades.
2. To recover both direct expenses (equipment maintenance and production staff) and indirect expenses (data backup and system expansion) through user fees.

3. To provide a subsidy to service bureau activities by expending regular budget funds for A.) initial project design consultation, B.) training, C.) data management/upgrade, D.) hardware/software management/upgrade, and E.) office administration (scheduling, accounting, and office operation).

BILLING POLICIES

Policy #1 LMIC Service Bureau client's billings will recover direct and indirect costs:

| Direct Cost Items | Annual Cost |
|--------------------------------------|--------------------|
| Equipment Maintenance | \$ 75,000. |
| Depot Maintenance | 5,000. |
| Space Rental (33% of office) | 13,000. |
| Utilities | 11,000. |
| Computer Phones | 2,000. |
| SUB-TOTAL | \$106,000. |
| Indirect Cost Items - | |
| User Services | Annual Cost |
| Data Backup | \$ 10,000. |
| Tape & Disk Pack Purchase | 1,000. |
| Hardware/Software Upgrades | 94,000. |
| SUB-TOTAL | \$105,000. |
| Operating Balance Accrual | |
| FY84, 85, 86 set-asides | 43,000. |
| TOTAL | \$254,000. |

Policy #1a LMIC Service Bureau billing is designed to amortize the hardware/software investment over a 5-year period; long-range system development will occur through a combination of enhancements and replacements.

- Policy #1b** LMIC Service Bureau billing is designed to accrue an operating balance through the collection of a \$43,000.00 set-aside for FY84, 85, and 86. The original revolving fund loan balance of \$250,000.00 will revert to the general fund over that period.
- Policy #2** LMIC Service Bureau billing will recover the direct wages plus 19% fringe and 14.5% leave (6.25% annual, 6.25% breaks, 2% sick, and 4% training); wage rates will be based on classification rather than employee with an assumption of Step 2 for student workers and Step 3 for professionals and clericals.
- Policy #2a** There is a 7% administrative overhead charged on all salaries which is forwarded to the Minnesota Department of Finance for their handling of state-wide accounting of revolving funds.
- Policy #3** LMIC Service Bureau billing for non-government clients (non-governmental end user) is based on three times the computer rates as for government clients and the same production wage rates for staffing with the addition of consultation fees of \$20.00 per hour.
- Policy #3a** LMIC will offer computer time and staff services to non-governmental clients as available; non-governmental projects have a lower priority than governmental projects.
- Policy #3b** It is LMIC's policy not to provide services for non-governmental users that are in competition with private providers.
- Policy #4** There are a number of possible computing projects that use a considerable amount of processing time so that the expense with normal day or even night rates are beyond the budget of users. So as not to eliminate those projects from consideration and yet not impact other users LMIC is offering a "block time" concept. Users may apply for a block of time over a prearranged time period (night or weekend) for a particular project and be charged a prearranged amount which represents a fraction of the normal amount. Requirements include: 1.) prearranged agreement for expenses on a particular project, 2.) block time assignment during night or weekend hours, and 3.) time duration within which project will be completed.

LMIC BILLING RATE SCHEDULE

| COMPUTER EXPENSES | GOVERNMENT RATES | NON-GOVERNMENT RATES |
|--|------------------|----------------------|
| TERMINAL CONNECT/HR. | \$ 1.50 | \$ 4.50 |
| TERMINAL CPU/HR. | 85.00 | 255.00 |
| TERMINAL DISK/HR. | 7.00 | 21.00 |
| BATCH CONNECT/HR. | 0.00 | 0.00 |
| BATCH CPU/HR. | 60.00 | 180.00 |
| BATCH DISK/HR. | 5.00 | 15.00 |
| NIGHT CONNECT/HR. | 0.00 | 0.00 |
| NIGHT CPU/HR. | 40.00 | 120.00 |
| NIGHT DISK/HR. | 5.00 | 15.00 |
| PENPLOTTER/HR. | 2.00 | 6.00 |
| DIGITIZING/HR. | 0.00 | 0.00 |
| DEANZA/HR. | 0.00 | 0.00 |
| DISK RECORDS/1000/WEEK | 4.00 | 12.00 |
| REMOTE TERMINAL CONNECT/HR. | 1.50 | 4.50 |
| SPINWRITER LINES/1000 | \$ 1.00 | |
| TRILOG LINES/1000 | .20 | |
| FOUR ACROSS MAILING LABEL LINES/1000 | 3.60 | |
| TRILOG B/W PLOT/FOOT | .15 | |
| TRILOG COLOR PLOT/FOOT | .80 | |
| VERSETEC PLOT/FOOT | .25 | |
| PENPLOTTER PLOT/FOOT | .35 | |
| PENPLOTTER VELLUM/FOOT | .45 | |
| PENPLOTTER MATTE/FOOT | 2.00 | |
| PENPLOTTER CLEAR/FOOT | 3.00 | |
| THREE ACROSS MAILING LABELS LINES/1000 | 3.60 | |
| WHITE TRILOG LINES | .30 | |
| STAFFING/HR. | | |
| Student Worker - Clerical | 6.50 | |
| Student Worker - Paraprofessional | 8.00 | |
| Student Worker - Paraprofessional Sr. | 9.50 | |
| Clerk Typist II | 9.00 | |
| Clerk Typist III | 10.00 | |
| Data Entry Operator | 9.00 | |
| Data Entry Operator Sr. | 10.00 | |
| Research Analyst | 12.50 | |
| Research Analyst - Intermediate | 14.00 | |
| Research Analyst - Specialist | 15.50 | |
| EPD Programmer | 13.50 | |
| EPD Programmer Sr. | 15.00 | |
| EPD Programmer/Analyst | 17.00 | |
| Senior Staff Production | 18.00 | |

OTHER CONSIDERATIONS

1. These policies and rate schedules, are subject to revision in response to their effectiveness in recovering costs and perpetuating the system.
2. Products from LMIC are intended for the use of the client. In most cases the data and project results are public domain upon review and release by the client. Products cannot be resold for a profit by the client.

APPENDIX B

APPENDIX B
SELECTED REFERENCES

A variety of resources were used for this study including published material and internal memoranda and correspondence. The information referenced below provides additional background information on geographic information systems (GIS), the AGR Program, and the State of Utah data sharing initiative.

Conceptual Design and Implementation Plan for a Geographically Based Data Information System, State of Utah. Prepared for the State Planning Coordinator's Office by Environmental Systems Research Institute (ESRI). September 15, 1980.

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Utah Systems Planning, September 1982.