

DRAFT

AGR STRATEGIC PLAN

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OBJECTIVES OF AGR'S STRATEGY

Put AGR in a position to continue its leadership role in GIS

Build a state database

Ability to keep current with technology

Create environment that can → Provide access to variety of potential users

HARDWARE

Current hardware

The current hardware environment is built around the a minicomputer, Prime 4150. Terminals at AGR and at remote sites with input (digitizers) and output (plotters) peripherals have been the extent of the system. However, recently pcs and workstations with ARC/INFO installed on them have also been connected to the Prime. Another significant expansion of the system has been the addition of the Division of Environmental Health's Prime 2750 computer. At the local government level Salt Lake County and Salt Lake City have installed ARC/INFO on Sun workstations. Utah County has had ARC/INFO running on a Prime 9650 for some time. As of yet we have not established connections to local government; however, it is our intent that cross access be established for sharing of information.

Proposed strategy

The potential platforms for running ARC/INFO have increase rapidly. This variety of options makes it necessary to determine a strategy that will help to maintain compatibility within the GIS community and to minimize problems in sharing of information.

AGR processing

AGR needs to increase processing capacity and will need additional storage as the database continues to grow. I propose that AGR acquire workstations for processing and reduce its demand on the Prime. The Prime will be used for managing the database and for supporting existing users. AGR will also use the pc as much as possible but until the software revisions are consistent from pc to mini, AGR will not heavily build its system on pcs. An objective will be to build the state's GIS system to encourage sharing of information. We should avoid barriers by developing standarization in hardware. Because of problems in communicating between workstations of different vendors, it is proposed that an RFP for a GIS workstation standard be released.

The mainframe option with an MVS version of ARC/INFO is not yet available; its release is planned for next year. Jack Dangermond indicated that a possible rental agreement may be worked out for the MVS version. This would make it more feasible to acquire. However, Dangermond also indicated that developing this version is presenting special problems and I have concerns about the success of this effort. Another question that cannot be answered until the software is available is it cpu consumption, i.e., the cost of running on the mainframe. Again the revision may also be a problem; it is not being developed under rev. 5.0.

Database storage

By shifting processing from the Prime, the need to upgrade the Prime can be delayed. This time will allow us to explore the option of using the mainframe as the storage place for the state database. Using the mainframe storage would be an advantage because of the its place within the state's communications network. All state agencies and many local governments have access to the mainframe. The storage capacity would not be the continuing problem as it is on the Prime.

Graphic output

Currently final output is generated on a Calcomp pen plotter. The process is slow and does not produce the quality of output that is becoming standard in the field. At conference poster sessions pen plotter output is no longer seen; all displays are being produced with electrostatic plotters. AGR needs to upgrade its final output and should acquire an electrostatic plotter.

New users

AGR provides direction to new GIS users. One of AGR's objectives is to make the technology available to a broader audience. Hardware recommendations should be based on several factors which need to be developed more fully but would basically include: (1) volume of work-- transactions per day, (2) future database requirements, and (3) budget. One rule of GIS that should be recognized when acquiring equipment is "all users need more as they use the technology." This means that the initial investment should be planned so that it could be easily upgraded.

With very limited ability to handle additional users on the Prime, new users will have to acquire their own processing unit. Compatibility with the existing hardware should be a primary consideration. The state's communication network will be a key component in developing an integrated GIS in the state. Generally workstations should be considered by a new user. However, if an agency anticipates that it will have many users, it should consider using a mini computer with a number of terminals. The workstation option requires that each workstation purchase the software; on the mini the software is shared. Data sharing requirements may also be better met with a mini; it certainly would be easier to manage the database on a mini rather than on several workstations. From AGR's perspective it would also be easier to coordinate and manage the development of the state database if large users maintained their data on a mini. PCs provide the less costly way for a user to begin in GIS; however, pc software is behind current versions and not all capabilities are available for a pc. As pcs continue to be more powerful, the differences between pcs and workstations may dissolve. Workstations are expensive however prices are expected to decline significantly (50%) in the near future.

For users starting out with small scale activities which would not put a burden on the Prime, AGR will continue to provide the option of additional terminals connecting to the Prime.

SOFTWARE

ARC/INFO was selected as the state standard and should continue to serve as the standard as long as it meets the state's needs.

Additional software

Other software is used to support the work done with ARC/INFO. This software includes TIN for terrain modeling, EPLE for surface draping, DTAP which is used to process the USGS's digital elevation maps.

AGR does not have the facilities for using remotely sensed data and needs to develop that expertise in that area. Links between ARC/INFO and ERDAS data have been built. AGR should plan to acquire ERDAS software. *what is that?*

Much of the state's data resides in ADABAS. The state should acquire the RDBI for ADABAS. We are working with California and Washington who are very interested in accessing ADABAS. Cost for developing the RDBI is \$30,000.

With the availability of the TIGER files we will be able to develop an address matching file. The ability to do address matching will make it possible for agencies such as social services and health to use much of their existing data with GIS. AGR's objective is to develop a statewide database for address matching.

Autocad is a popular technology and can complement GIS work. Because of the similarities between autocad and GIS and because of the option of converting data between the two systems, AGR should develop an expertise in autocad. This would allow AGR to better work with agencies using autocad and to better direct agencies interested in both technologies.

There are many other GIS systems and CAD systems which serve special purposes. Data files from most of the more popular systems can be converted to an ARC/INFO format. Systems which do not have clean conversion programs should not be purchased by the state. AGR should not have the responsibility to develop conversion software. Ideally the State Data Processing Coordinator's Office will oversee the purchase of GIS software and review proposed acquisitions with this in mind.

ADMINISTRATION

AGR has a structure based on two functions. (1) AGR provides a broad range of services under contract to GIS users. (2) AGR provides statewide leadership in the development of GIS in Utah; this leadership reaches beyond state agencies and includes local government and even federal agencies.

Mainstreaming the technology

AGR has been working to make GIS a technology available to all agencies and to have it viewed as a part of the statewide data processing environment. AGR would like to take advantage of the statewide communications network, to access data maintained on the IBM mainframe and to provide technical support to all agencies interested in GIS. AGR is operating as a vertically integrated services and computer center operation. This tends to isolate some of AGR's activities and puts it out of the flow of statewide data processing planning.

Location of Prime

The idea of moving the Prime computer to the Computer Center and its operation to the Division of Data Processing (DDP) has been discussed over the past year. However, with the planned renovation work in the State Office Building further plans concerning this move have been delayed. With available space in the Computer Center, I believe that the appropriate location for the Prime is the Center.

As we analyzed the impact of moving the Prime operations to the DDP, a critical concern was identified. The funding of work done by AGR to improve system operation, development of AMLs, structuring project data and moving that data into the state database would be lost. These costs have been included in the rate structure. The loss of these revenues would have a significant impact on AGR.

AGR staff have developed the skills and expertise to work in activities that cut across AGR. While individuals have areas of specialization, no one is dedicated full time to a single job, for example, computer operations. As a result it is difficult to separate activities and people. Solving a problem for a user may include both system operations aspects and application software elements.

Keeping up on Technology

When AGR acquired ARC/INFO, AGR quickly became a leader in application of GIS in the nation. However, AGR has not been able to maintain that status. Any updating and upgrading equipment is a major hurdle. The upgrade of the Prime one year ago had to be scaled back and as a result we are quickly reaching its capacity. Terminals have not been regularly updated; for example, the existing terminals cannot be equipped with a mouse. The mouse allows easier use

of the technology as well as more rapid response. The ISF for AGR is relatively small and organizationally provides little flexibility for AGR to test and acquire new technology.

These hardware limitations also result in limiting the growth of staff expertise. If staff does not have access to the newer technology, their expertise also becomes dated. Applying new technology serves as a catalyst within the organization and stimulates new and creative applications of GIS technology.

Recommendation

Because I believe that it will be in the best interests of AGR to become part of the state's data processing environment, I recommend that AGR be moved administratively into the Division of Data Processing. This would mean that all AGR staff would be moved into the DDP and that the internal service fund would be transferred. However, the leadership role for GIS does not fit into a service organization such as DDP. That function should remain in the Office of Planning and Budget and that the general fund portion of the budget remain in OPB. I propose that a GIS Coordinator position be established in the OPB. That position would be responsible for development of the state database, coordination of GIS efforts, developing pilot projects with agencies, and promoting the use of GIS. Much of the work would be accomplished by contracting with AGR for services to support these areas. It may be advisable to establish the GIS Coordinator position in statute with that person serving as staff to a GIS advisory committee.

AGR has been through more shifts in administration and location than any organization deserves and I make this recommendation with reluctance for that reason. However, I do believe that in the long term interests of AGR the move to the DDP will provide a more stable foundation and would provide greater opportunities for staff.

The GIS Coordinator will work closely with AGR staff and the Division of Data Processing. Responsibilities of the GIS coordinator need to be more completely defined but should include:

- Staffing a state GIS Advisory Committee
- Building the state database; setting priorities; for setting milestones in implementation of a database management system
- Oversee the potential GIS network capabilities
- Provide leadership and support in developing pilot projects
- Develop a "marketing strategy" for AGR and produce the necessary support materials
- Coordinate with OPB in identifying important state issues that should be analyzed
- Coordinate with local and federal agencies as well as state agencies
- Assist agencies in developing a strategy, plan and budget for implementing GIS
- Identify funding sources for proposed projects

Advantages

By placing AGR in the DDP we move toward integrating GIS technology into the general data processing environment. In the larger organization there will be greater flexibility for meeting increased demands and for staying abreast of the technology. As part of DDP, AGR can be involved in the planning of communications networks and will better understand how to serve GIS users. Working with mainframe data and exploring other relationships such as data storage, and possibly a mainframe version of the software, should be more effectively accomplished as part of DDP.

There would be greater opportunities for staff to broaden their expertise.

Concerns

The culture of AGR differs from the DDP. The group is small and works closely with minimal oversight of day-to-day activities. Individuals have a significant amount of responsibility for their projects and authority to make decisions. Dress standards are informal; work schedules are flexible. The strong commitment to GIS shows in the quality work and organization loyalty.

For this budget cycle agencies have developed plans based on AGR's current rate structure; if AGR is incorporated into DDP the rates should not be changed until the agencies have time to prepare for the change.

OPB needs to have a strong commitment to maintaining the GIS leadership role. General funds for GIS are necessary to support the activities of the GIS Coordinator.

OPB is in a position to identify statewide issues which could be better dealt with using GIS tools. However, in order to do this OPB needs to have funding marked for this purpose. OPB cannot rely on the current GIS general funds. I recommend that OPB request an appropriation for issue analysis that can be used for GIS projects such as the wilderness area project.

To maintain a clear definition of the relationship between OPB and DDP, an MOU should be used to articulate areas of responsibility.

DATABASE

The development of the state database is a crucial component for a growing GIS environment. The structure for the database has been developed by AGR and query capabilities have been built. Areas that need to be focused on are:

- An easily accessed index of information in the database
- Published standards for directing users
- Prioritize base maps, process and have available
 - USGS DLG
 - USGS DEM
 - US TIGER files
- Interface to ADABAS to begin building links into the mainframe data

AGR's strategy should be to identify the base maps for the entire state that should be part of the database and take the initiative in acquiring them rather than relying on data being added through projects. AGR's strategy should be to develop the necessary interfaces to access information in existing databases. To help accomplish these objectives the GIS Advisory Committee should play a major role in planning and controlling the development of the state database. Development and management of the state database should be the responsibility of the GIS Coordinator working closely with AGR.

AGR SERVICES

AGR provides a full range of services to both potential GIS users and current users; these include: Needs assessments, project design, project implementation, project management, project coordination, analysis and modelling, technical assistance, database design, and training.

Generally in the past users have been directed toward developing a significant level of expertise in using ARC/INFO. Thus an agency was required to make a commitment of staff and resources for training in order to use GIS. However, AGR has made a shift in this emphasis toward developing an environment in which a user can begin using GIS technology without having to

understand ARC/INFO. AGR can work with users to understand their needs and develop macros (AMLs) to run parts of programs they require; the AMLs can be put into a menu format that is easy to use. As the user becomes more comfortable with the technology, it is anticipated that additional training would be sought. AGR should continue along this line of encouraging users to apply GIS in their particular areas of expertise and AGR should provide tools that make GIS technology easier to use.

AGR should continue to provide the full range of services to users, from needs assessment and project planning through implementation and analysis. One responsibility that AGR must continue to assume is setting of standards for data from projects that should be added to the state's database.

Training

Training is a service that AGR has been providing on an as needed basis. By providing training AGR has an opportunity to incorporate standards and guidelines into the training. However, training has not been a priority and places stress on the organization whenever it is done. Staff are taken away from other responsibilities to put together a class. Training is not done regularly so each time requires preparation. AGR does not have a training facility so for hands-on work the equipment in the AGR office is used; this places a burden on the rest of staff. With move to the fourth floor office, a training room will be available, however, equipment will still have to be moved from the office into the training room when needed.

There is demand for training in using ARC/INFO from state agencies, federal agencies and local government. However, training is not available locally from other sources. AGR's strategy should be to develop a training program that meets the needs of both beginning users and advanced users and that addresses the full range of hardware used from pc to workstation to mini.

If AGR is organizationally placed in the DDP, the ARC/INFO training could be placed within that structure. ESRI supports that idea of our providing training and is willing to work with us; we would be able to use ESRI training materials for a fee per student. The fee structure will have to be worked out and should be competitive with ESRI rates.

Staff responsibilities will have to be reviewed as the training program is developed since training will take time away from other activities such as projects, user support and R&D. An additional benefit to developing a training program that is approved by ESRI is a closer working relationship with ESRI. The closer exchange of information will aid AGR in keeping current with what is happening at ESRI.

Distribution of pc ARC/INFO software

There is an opportunity for AGR to distribute pc ARC/INFO software. As part of our effort to provide leadership in GIS, AGR often provides demonstrations using ARC/INFO. In the pc area ESRI supports this activity and has provided AGR with pc software at no cost. As we encourage agencies to implement GIS, we also encourage compatibility between system. Compatibility provides for more cost effective sharing of information and expertise. ESRI distributes pc ARC/INFO in Utah from their Colorado office; they have indicated that since AGR is usually working with potential users, they would like AGR to distribute pc ARC/INFO. The workstation version is being distributed by Alpine but they told ESRI that they are not interested in distributing the pc version. This opportunity should be pursued.