Exemplary Enterprise GIS - AGRC Case Study for ESRI Conference
(Draft 7/1/2002)

Question #1: What issues caused your agency to develop an enterprise GIS? Give us a little history on your path to a GIS?

In Utah, the notion of an enterprise GIS has been around for 25 years. In May of 1977, Governor Scott Matheson requested a study be done to develop recommendations for a centralized database management system. At that time, an inter-agency committee was formed to determine statistical and geographic data needs of each agency. The needs were documented in a data dictionary completed in November of 1978. This committee also established a set of goals and objectives emphasizing the need for a geographic database to be used for resource management, planning, and inter-agency coordination. GIS pilot projects and existing departmental functions during 1979 and 1980 reinforced the need for a statewide Geographic Database. (1)

In 1980, Environmental Systems Research Institute (ESRI) was hired as a consultant to assist with a plan for GIS implementation for the State. ESRI developed a report that recommended a centralized computer facility to serve all State agency's GIS needs. Part of this function would include the development of a statewide database that "would provide for a standardized approach for data format, uniformity of scale and compatibility of data elements".(2) A contract was signed in May of 1981 between the State of Utah and ESRI for the purchase of hardware, software (GRID, PIOS, TOPO, Automap II, and digitizing software), and training. Installation took place in June of that year. With this pioneering effort, the State set out to create and maintain an enterprise GIS solution.

Late in 1981, several tasks that needed to be achieved were identified. These included creation of a state-wide catalog of existing and desired data, automated support for this catalog, capability of capturing additional data, and addition of a geographic component to existing state agency data. It was recognized at this time that an Automated Geographical Referencing System was needed for implementation of these tasks. Early in 1982, the Automated Geographic Reference (AGR) was established in the Department of Natural Resources. Here AGR focused on natural resource issues only. In 1983, a State GIS Steering Committee was created to assess the utility of GIS in state government. This Committee identified three actions deemed necessary for the effective implementation of GIS technology in state government: the formation of a single, functional GIS work unit; the purchase of state-of-the-art hardware and software; and the relocation of AGRC to Capitol Hill.

As a result, in 1984, AGR purchase ARC/INFO on a PRIME minicomputer and entered a new era. Staff from the Governors Office of Planning and Budget, the Division of Information Technology, and the Department of Natural Resources joined forces to create the AGR Taskforce, which would have a focus on statewide issues.

Also in 1984, Price-Waterhouse was contracted by the State to prepare a "Strategic

Approach" for implementation of GIS in Utah. Their recommendations included successful completion of project work as means to promote the AGR Taskforce and create data for subsequent uses; provide additional support and training for the user community; and develop the database architecture and standards. They also stressed the inappropriateness of a decentralized database because of the high cost, the risk of incompatible data sets, and problems this would create for the state planning efforts.(3) Once more, the State was being pushed to create an enterprise solution for GIS.

By the mid-1980s, the AGR employed several individuals with backgrounds in GIS, automated mapping, traditional cartography, and data processing. There was sufficient interest, as well as the ability to create the enterprise GIS database people had been talking about for almost ten years. The AGR was reorganized under the Office of Planning and Budget in 1986, however, and placed most of its emphasis on sales of service. In this move AGR, lost most of its legislative appropriation and had to depend on contract project work for revenue generation.

With the emphasis on making money for cost recovery, very little time was available for database creation. However, efforts were made to continue database development and not abandon the process entirely. A database team was established from the existing staff with regular meetings to examine a number of issues. These included user's needs, assign AGR's database responsibilities, defining alternative designs, identifying database administration duties, and preparing documentation on standards. Although not all ideas were implemented, the AGR staff developed some innovative approaches to database design and implementation.

In 1989, the AGR Center (AGRC) was created in the Department of Administrative Services, Division of Information Technology Services, thereby moving the staff one more time. This change brought new priorities for AGRC. First among these was the creation of the State Geographic Information Database (SGID). In less than a year, the SGID infrastructure was complete. The SGID consisted of four parts; the database itself, a menu driven query interface, a set of software tools for database administration, and a published SGID Users Guide. The Users Guide was distributed to all state, federal, and local agencies involved with GIS in Utah, and provided an off-line data dictionary and catalog along with instructions for using the menu query system and ordering data. This Users Guide was also the first attempt to inventory all data available from other GIS sites in the state.

During the interim period that followed the 1990 General Legislative Session, the mandate for a study of natural hazards translated into the assignment of the topic to the State and Local Affairs Interim Committee. The topic of natural hazards was then researched extensively by the staff of the Office of Legislative Research and General Counsel. This research resulted in a list of legislative options that highlighted the need for GIS data and capabilities. Over the course of multiple committee meetings and presentations by the legislative staff and staff of the AGRC, it became clear that geographic based data provided the best source of information for natural hazard preparedness and response.

As a result, a subcommittee was formed to look extensively at the issues of information processing using GIS. The subcommittee hearings which then took place focused on the establishment of the GIS databases and the statutory creation of an executive branch entity to set policy and manage the database. Following the subcommittee hearings, legislation on GIS systems and databases was proposed and sent to all thirty-six executive branch departments for comment. The notion of an enterprise GIS solution was unopposed by this group. Senate Bill 21 (SB21 - Geographic Information Systems Data Sharing and Conformity) received strong support throughout the legislative process. It passed unanimously in the House and Senate standing committees and on the floor of the House and Senate.

The Bill created a State Geographic Information Database (SGID) and the Automated Geographic Reference Center (AGRC) by statute. The center shall: (a) provide geographic information systems services to state agencies under rules and policies…; (b) provide geographic information services to federal government, local political subdivisions, and private persons under rules and policies…; (c) manage the State Geographic Information Database; and (d) establish standard format, lineage, and other requirements for the database. The database shall: (a) serve as the central reference for all information contained in any GIS database in any state agency; (b) serve as a clearinghouse and repository for all data layers required by multiple users; and (c) serve as a standard for geographic information acquired, purchased, or produced by any state agency. Each state agency that acquires, purchases, or produces digital geographic information shall: (a) inform the center of the existence of the data layers and the their geographic extent; (b) allow the center access to all data classified public; and (c) comply with any database requirements established by the center. (4)

In the years following the passage of SB21 the Legislature appropriated funding for administration of the SGID. This included funds necessary for administration, coordination with partners, and purchase of critical base layers. An average of $500,000 a year for the next ten years has been spent on the SGID. The result of this is data and required documentation (metadata) for approximately 180 data layers.

This activity was further focused in 1987 when Governor Michael Leavitt signed a Memorandum of Understanding for Data Sharing and Integration. Along with the Governor, nine federal agencies signed this agreement to coordinated data acquisition and distribution activities in the state. At the signing ceremony, Governor Leavitt declared that this agreement "is a victory for common sense" since state federal, and local agencies commonly need the same data. John Moeller, Staff director of the Federal Geographic Data Committee indicated the "MOU is the first of a kind signed at such a high policy-level among so many agencies and a Governor". (5)

The state of Utah's primary GIS coordinating group is the GIS Advisory Committee. Its mission is to "recommend GIS policy and standards, encourage GIS use and education, and promote data collection and dissemination among all GIS users. Collectively, these activities promote increased productivity, better decisions, and improved services to

customers". GISAC is made up of representatives from state, federal, local, and tribal governments and also universities. This group operates at the policy level developing recommendations, policies, and legislation to enable data acquisition and sharing.

In October of 2000, the GIS Advisory Committee began a process of creating a Framework Implementation Plan in response to a new effort of national coordination initiated by the U. S. Office of Management and Budget. Utah published the First state Framework Implementation Team Plan (http://agrc.its.state.ut.us/i_team/i-team.htm) in April, 2001. This Plan describes the strategy to coordinate the creation of the eighteen framework or foundation data themes. Ronald Matzner, the national I-Team Coordinator acknowledged Utah's leadership in this area by writing the following: "I would like to share with you my appreciation for the yeoman work performed by your staff on the Utah I-Team Plan. It has had an enormous impact throughout the country. Nearly all currently operating I-Teams are using it as a model for their planning. In addition, at the recent NSGIC conference, the state coordinators in attendance decided the Utah plan should be used as a template by other I-Teams. This will encourage consistency and allow us to aggregate numbers and compare plans across jurisdictions."

25 years after that initial recommendation the State Geographic Information Database (SGID) is one of the most complete and sophisticated Geographic Information data clearinghouses in the nation. The state profile written about Utah by the Western Governor's Association said that "Utah has perhaps the strongest direction for geographic information and related technology among the western states, established by a series of legislative and executive actions over 20 years"(6) This series of events recognized the need for, and caused the State of Utah to develop an enterprise GIS. Without the SGID, users could have created redundant or conflicting data. The State began building an enterprise model before this condition reached a critical juncture. The enterprise solution implemented in Utah best meets the needs of a large GIS user/client base.

Question #2: Describe your organization, its size, who it serves, its mission, etc.

The State of Utah, Division of Information Technology Services, Automated Geographic Reference Center (AGRC) is the recognized leader in Utah for GIS implementation. AGRC provides GIS services to state agencies, federal government, and local political subdivisions. In addition to providing products and services to a growing customer base, AGRC has the responsibility to maintain the State Geographic Information Database (SGID).

AGRC has been actively involved with GIS for over twenty years, being one of the first ARC/INFO installations in the nation. AGRC has a staff of fourteen with over 120 years cumulative experience in GIS representing one of the most experienced organization in the region.

AGRC mission is to "encourage and facilitate effective Geographic Information System (GIS) implementation in Utah and to direct this process in State government".

Question 3: Include a working definition of what constitutes an enterprise GIS at your agency. Should be relative to organizational diagram.

Utah's enterprise GIS can be defined at several levels:
Organization: Organizationally the central GIS office is nested in the Division of Information Technology Services within the Department of Administrative Services. This provides the context for AGRC being a support/service agency to other state agencies. However, because of specific statutory responsibility AGRC has the responsibility to coordinate and promote the use of GIS in the State of Utah, administer and be the repository for the state's enterprise-wide GIS data library. The long history of GIS in Utah is based on coordination and sharing of data among all creators and users of GIS information in the state. This cooperation continues to develop data layers based on enterprise priorities.

The AGRC also works closely with the Office of the Chief Information Officer who develops the enterprise strategies and policies for the state's information technology. Utah's CIO views GIS as an important component in the state's information management strategy, supports the efforts of AGRC and has assigned a staff person to assist AGRC in identifying and implementing enterprise GIS initiatives. Utah's approach to GIS fits well into Governor Leavitt's enterprise vision of information technology.

The AGRC relies on the GIS Advisory Committee for focus and direction. The GISAC was created in 1991 as a subcommittee of the Information Technology Policy and Strategy Committee (ITPSC). The ITPSC was created in State Code (U.C.A. 63D-1-302) to:

- Evaluate and approve or disapprove recommended information technology policies, procedures, and standards to govern the operation of information technology in the executive branch;
- Act as a high-level forum for information technology issues;
- Act as an advisory committee for the chief information officer, Division of Information Services, and state agencies; and
- Create and receive recommendations from, multiagency work groups on specific information technology issues.

Coordination:
AGRC is well established and respected in the state's GIS community. In addition to chairing the State GIS Advisory Committee, the AGRC is active in many multi-agency groups and facilitates cooperatives data development efforts. These efforts are critical to meeting data needs in a cost effective way.

Technical Resources:
The State Geographic Information System (SGID) is maintained as an enterprise resource and is architecturally structured to provide easy access to users and easy loading of data by creators. The ArcIMS server is offered as an enterprise resource to support agencies providing interactive maps to the public.

GIS Expertise:
The AGRC provides technical expertise and consulting to assist agencies. Working with agencies promotes data standards and facilitates integration of their data into the SGID.

Question 4: What departments, groups, etc. within the organization participate in the enterprise GIS? Any outside entities that you share with as well?

The enterprise GIS solution in Utah has been implemented at the broadest possible level. All state agencies are involved through various executive branch requirements, all twenty nine counties are involved through the states County GIS Assistance Program, most federal agencies are involved through the Data Sharing MOU described above and other activities, and eight Tribes are involved through a newly formed Utah Inter-Tribal GIS group.

A number of state agencies participate in the enterprise GIS at a very high level, some of these include the Department of Natural Resources, the Department of Community and Economic Development, and the Department of Environmental Quality. There are many divisions within each department that contribute data to the SGID.
(Please see diagram titled AGRC Enterprise GIS Partnership)

Technically, sharing is being made very user friendly. Once the data is incorporated into the SGID any agency will have access to the SGID though an ArcGIS product. The data will be stored in Arc SDE these agencies will be able to search the data using the ArcIMS Metadata Server. All this data is also available to the general public through standard static downloads of data layers over the internet; currently the ArcSDE connects are for government agencies

Question 5: Provide an overview of the system including what ESRI products and versions you are using. The description should be relative to the system diagram.

See attached diagram.

Question 6: What is your agency doing with GIS and the problems it is solving.

Here are examples of what is done with the Utah enterprise GIS.
Land Exchanges in Utah

> Problem: Exchange state school sections for BLM parcels where revenue can be generated for School Trust. The State owns scattered parcels throughout Utah. Many in National Parks, Monuments, and Indian Reservations.School revenue is difficult to generate in many of these protected or inaccessible areas.
> Without GIS: Long time period for assessment of tradeoffs between state and federal parcels. Valuable time spent determining what resources exist on candidate parcels, their extent, and coming to an agreement on their value. The problem of assuring citizen involvement during the entire process.
> With GIS:Decisions made based on statewide data that is available to anyone (public, private, government), with parcel value and identification open to

scrutiny by all interested parties. Tradeoffs and parcel delineations more quickly put on the table for discussion. GIS helps in analyzing, comparing, and resolving conflicting options. The tools are also there for analyzing the effects of land exchanges on adjacent areas (wilderness, development, sensitive species, etc.).
Results:Utah and the Interior Department closes one of the largest land exchanges in the history of the US. The state receives revenue-generating parcels, while the BLM consolidates is holdings in reserved areas. 400,000 acres are exchanged, $200,000,000 is generated for the state, with $70,000,000 already in the bank.
"Without good tools and data this deal would not have happened" - Brad Barber, State Planning Coordinator

Acquisition of DOQQs and DLGs for Utah

Problem: How to finance the purchase of Digital Orthophoto Quarter Quads (DOQQS) and Digital Line Graphs (DLGs). No state or federal agency in Utah has the resources to acquire what they need. Different agencies have different planning priorities. County and City governments are in the same situation.

Solution: Through cooperative data agreements and cost sharing agreements, AGRC and federal agencies are able to put in place the organizational structure for the pooling of resources. County and City governments reap the benefits also.

Results: Over a three year period, 3,312 DOQQs are delivered. The State of Utah has access to $2,650,000 worth of data for a $330,000 investment.
Over the same three year period, 930 DLGs are delivered. The State of Utah has access to $1,676,800 worth of data for an investment of $480,000 and staff time.

County Road Claims Against Federal Government

Problem: Counties want to assert claims to roads on federal lands. Federal government wants to settle these title issues in a way that preserves federal interests.

Solution: Federal government provides funds to counties for gathering evidence (digital data) in order to support their assertions.

Results: State of Utah passes funding to counties earmarked for acquisition of software, hardware, and roads centerline data collection.
Data collection standards developedt for road centerline capture with GPS.
Training classes held for county staff involved in data capture and processing
Standards and procedures for processing and QA/QC of GPS data from the field.
High resolution transportation database being built as a side benefit.

<u>GENERAL OVERVIEW:</u>
Support for other state agencies in implementing and using GIS.
Applications development for other State agencies, Federal agencies, and local govt. (Tax, Legislative Research, BLM,)

Data development and maintenance for other State agencies, Federal agencies, and local govt.
Standards development for local and national issues (transportation, hydro, cadastral, etc.).
Project management for other State agencies, Federal agencies, and local govt.
Suitability/Impact analysis for other State agencies, Federal agencies, and local govt.
Software training using ESRI Certified class materials as well as our own specialized training materials.
Oversight for funding of GIS activities for local government (pass-through dollars from the state or federal level)
Coordination with federal agencies for data sharing, cost-sharing, standards development, etc.
Coordination with, and support for regional user/interest groups.
Coordination with education groups throughout the state for development of GIS curricula in primary, secondary, and college levels (see "Public Education" below).
Development of statewide Cadastral data layer from BLM GCDB data.
Coordination on Cadastral data with federal agencies, Western Governor's Association, and other states.
Provide experienced staff for agencies during "crunch" times.

SPECIFICS:

Utah State Tax Commission
MATT

State History
DEBBIE

Grand Staircase-Escalante National Monument management plan
Provided data development services to BLM for new or inadequate data, and conversion from GRASS to ARC.
Provided programming services for duration of Monument planning process
Provided technical support for analysis processes, results reporting, etc. for duration of planning process

U.S. Fish and Wildlife Service:
Data collection, analysis, and map products for Seedskadee National Wildlife Refuge plan in southwest Wyoming, for lead consultant.
Interpretation of various planning scenarios (statistical analysis and map production).
Database creation and documentation for Refuge staff.

Ogden Valley Master Plan
Data development and collection
Support of consultant for development of analysis processes.
Analysis of development/open space suitability models
Interpretation of GIS analysis results for public meetings and hearings

Redistricting Operations:

- Legislative Research and General Counsel:
  Support to legislative staff in software and commercial application selection
  Training of staff in various nuances in the software application
  Technical support during redistricting process
  Applications programming for operations streamlining during redistricting process
  Applications development for map generation during documentation and publication process.
- State School Districts:
  Technical and data support for various school districts for redistricting of school board members.

State Attorney General's Office:
(MATT, DEBBIE)
RS-2477 Assertions Project - Support of Attorney General's office in county road claims suit against the federal government (BLM and Forest Service)
Data collection standards development for road centerline capture with GPS
Training classes for county staff involved in data capture and processing
Processing of GPS data from the field
QA/QC of GPS data using Digital Orthophotos
Demo development for demonstration to federal and local officials and lawyers, of relevant data and techniques.
Application development for rapid assessment and prioritization of road claims, and display of data in court proceedings.

Homeland Security/2002 Winter Olympics:
Worked with Utah Olympic Public Security Command (UOPSC), Salt Lake Organizing Committee (SLOC), SAIC (private contractor), Defense Threat Reduction Agency (DTRA), along with Secret Service, FBI, and Dept. of Defense in evaluating digital data availability, supplying more current data, and evaluating GIS readiness.

Cadastral Data Layer Creation Project:
Creation of a statewide cadastral data layer under a grant from FGDC.
Based on BLM GCDB database, augmented with data from cities and counties.
Will become the cadastral FGDC framework layer

Cadastral Data Collection Grant Program:
Management of data collection program for counties to collect priority corner coordinates using survey-grade GPS.
Administration of pass-though funding from State legislature to counties.
Funding is based on proposals submitted by county GIS staff.
Collected data feeds into BLM GCDB database and to Cadastral Layer project above.

State Addressing Project:

State Department of Health:

Determination of spatial characteristics of accessibility to rural health care in Utah, based on drive times to/from healthcare services.

State School Board:

Application programming for school bus routing operations.
Development of application; training of staff; and continued support of data and application.

Quality Growth Efficiency Tools (QGET):

A set of spatial analysis tools developed by AGRC and a private consultant to assess the effects of various growth scenarios along the Wasatch Front in Utah. Based on varying zoning and planning strategies, growth patterns and their impact on infrastructure and the physical environment are evaluated and made available to the public and local planners. Carried out in association with the Governor's Office of Planning and Budget (GOPB).

Public Education:

AGRC has been working with the State Board of Education, through the Social Studies and Educational Technologies Dept. to introduce both spatial information and the use of GIS into the K-12 classroom. In the fall of 2002 ArcView will be put into every school in the state, to be used in a new Technology, Life, and Careers (TLC) course. Coordination on the coursework is with Utah State University and the Utah Geographic Alliance.
AGRC is also working the Salt Lake Community College and the College of Eastern Utah in developing an Associates Degree in GIS. An extensive program to begin to training teachers will begin this summer. This will include how ArcView can be used in all classrooms as a teaching tool, along with spreadsheets and the word processing.

Question 7: Does your agency provide public access to the data?

Online maps

http://maps.utah.gov, Utah's map portal is featured on Utah's home site utah.gov. "Maps.utah.gov" provides the public with a single point of access to maps pertaining to Utah; both static and interactive maps are included. The maps are indexed by category, area, and creator to make it easy for the public to find maps they are looking for. A dynamic list of "frequently requested" maps creates another category for users to quickly find maps. The public can also access digital data maintained in the SGID from this site. This technology is integrated into Utah state government to provide an enterprise resource for geospatial data and creates a tool that all state agencies can utilize and benefit from.

Online GIS Data

The public interactive map interface is utilized for a number of state agencies' ArcIMS sites and the SGID interactive map (http://atlas.utah.gov/sgidmap) which provides links to the SGID dataset download index. The SGID interactive map enables users to view and download, via links to the AGRC ftp site, all file-based GIS datasets available for individual USGS quads and counties within the state.

As part of its responsibilities, AGRC is the administrative steward and repository (U.C.A.63A-6-203) for Utah's State Geographic Information Database (SGID), the state's enterprise-wide GIS data library. The SGID database consists of approximately 180 thematic GIS data layers that describe land use, demographics, environmental, infrastructure, historical, and political features throughout the State. These layers are provided free of charge to government agencies, the private sector, educators, and the general public via the Internet.

Since its inception, the SGID has benefited greatly from a multi-agency, collaborative effort in building & maintaining the data layers that make up the SGID. Current cooperative efforts include an I-Team data development plan and a Federal/State data sharing and integration Memorandum of Understanding. The breadth and depth of the SGID is dependent on this cooperation between federal, tribal, state and local agencies. However, the distributed nature of the stewardship for individual data layers and the variety of source scales, together with the demands for near-real time download access to the SGID present many ongoing complexities.

In order to improve the operational efficiency and effectiveness of the SGID, AGRC set out to design a distributed system for storage, retrieval, and integration of large amounts of geospatial data that would also provide for central access point to search and download GIS data sets from the SGID database. The solution selected was ESRI's ArcSDE 8.2 software using an Oracle database, and the new metadata services now available on ArcIMS 4.0. ESRI product line was first licensed in Utah in 1981 and has been the state standard in Utah since 1987 so it was natural for the state to look to them for a clearinghouse solution.

The process of converting existing SGID data into ArcGIS feature classes, organizing these into feature datasets, loading the data into ArcSDE/Oracle, and associating metadata with the new feature classes consisted of simple 'drag and drop' operations within ArcCatalog. Since FGDC-compliant metadata had been previously created and maintained for most of the SGID datasets, AGRC was able to take advantage of the search and thumbnail-style preview capabilities of Metadata Server within a few days after the installation had begun.

AGRC plans to use the multi-user editing features in ArcSDE to allow each data steward that contributes to the SGID to edit the data for which they are responsible and post updates to the ArcSDE database. This process will allow end users of the SGID to have access to the most current data, as opposed to the yearly or semiannual update formats

that were previously available. ArcMap Server will also be used access live, dynamic data so users always have the most up-to-date information.

In addition to the SGID data layers available online through the Metadata Explorer site, AGRC has developed several custom ArcIMS and Internet mapping related sites. AGRC has developed an HTML interface for ArcIMS that is designed for use by the general public. This public interactive map interface is utilized for a number of state agencies' ArcIMS sites and the SGID interactive map (http://atlas.utah.gov/sgidmap) which provides links to the SGID dataset download index. The SGID interactive map enables users to view and download, via links to the AGRC ftp site, all file-based GIS datasets available for individual USGS quads and counties within the state.

AGRC also utilizes ArcIMS to host a web-based mapping application that is designed to enable the creation of simple, easy to use, web-based maps of important locations in Utah (http://mapit.utah.gov). This site was developed as a distributed solution to a request by the Utah Chief Information Officer's office for every address on a State website to be linked to a map. Using the mapit site, State website authors can interactively build a map request URL, complete with custom map extent, label location, and label text, for use with their own websites.

Question 8: Provide an overview of your system design, including parameters on your database including: RDBMS vender, version, operating system; number of data layers; type of data; size of database in vector and raster.

See attached diagram.

Question 9: Describe if you edit against a central database of does each agency participate and maintain their own data stored in a data warehouse that everyone in the organization has access to - is the database distributed or centralized?

AGRC has enabled some participants to update and edit their own databases. This process is accomplished by creating versions of the database. The participant edits and/or updates the versioned database and then reconciles that particular version with the default version. There is also participating staff that edit into personal geodatabases. Their data that is created is then assimilated into the versioned enterprise geodatabase. This method allows the data to be QA/QC'd before being entered into the enterprise geodatabase.

If the participant is satisfied with all of the changes, that version is then posted to the default version. The database then reflects the most current updates and/or changes to the data. The Antiquities Section of the Division of State History, Department of Community and Economic Development has implemented this process to keep their statewide database current for it's users. At AGRC when a feature class within a feature dataset needs to be updated, a version is created and then reconciled with the default version. The updates are then available to our clients through ArcSde 8.2.

The previously mentioned databases at this moment are centralized. We do have one agency with their own SDE instance. This agency houses the special taxing districts and municipal boundary data. Whether this instance is rolled into the main instance at AGRC or remains separate is still being determined. Perhaps it is strictly used for Intra-Agency work and when a layer is complete it is transferred to the main machine by the end of the calendar year. In the future we hope to have more agencies accessing the SGID to update their agencies data.

Question 10: What other applications does the GIS interface with (for example a customer relationship management system; work order management system, etc.).

At this time, the only application the GIS interfaces with is another Oracle instance. By the end of the year an application currently being developed to interface with multiple air quality monitoring and reporting processes will be complete.

Question 11: What are the benefits or business results from implementing your enterprise GIS?

There are a variety of benefits to implementing an enterprise GIS. This implementation will allow AGRC to keep updated accurate data, and will no longer only update data once a year. AGRC will be able to train other agencies to utilize ArcGIS to update their data on the database. In short this will allow AGRC to have an up to date database with each agency being responsible for its own data.

AGRC is noticing closer cooperation with other state agencies that had previously preferred a more isolated operational mode.
Economies of scale are being manifested in costs for data maintenance and staffing.
Federal agencies (FEMA, DTRA, DOD, etc) seem more willing to share and enter into cooperative ventures because they can see that by working with AGRC as a state agency, they are automatically reaching nearly all affected players in the state.

Utah is using its enterprise GIS as a means of integration for diverse information systems maintained by many state agencies. In response to Governor Leavitt's creation of a State Office of Homeland Security, AGRC was able to quickly identify GIS resources in support of the effort, and is working with that office to develop GIS integration plans that will meet their needs.

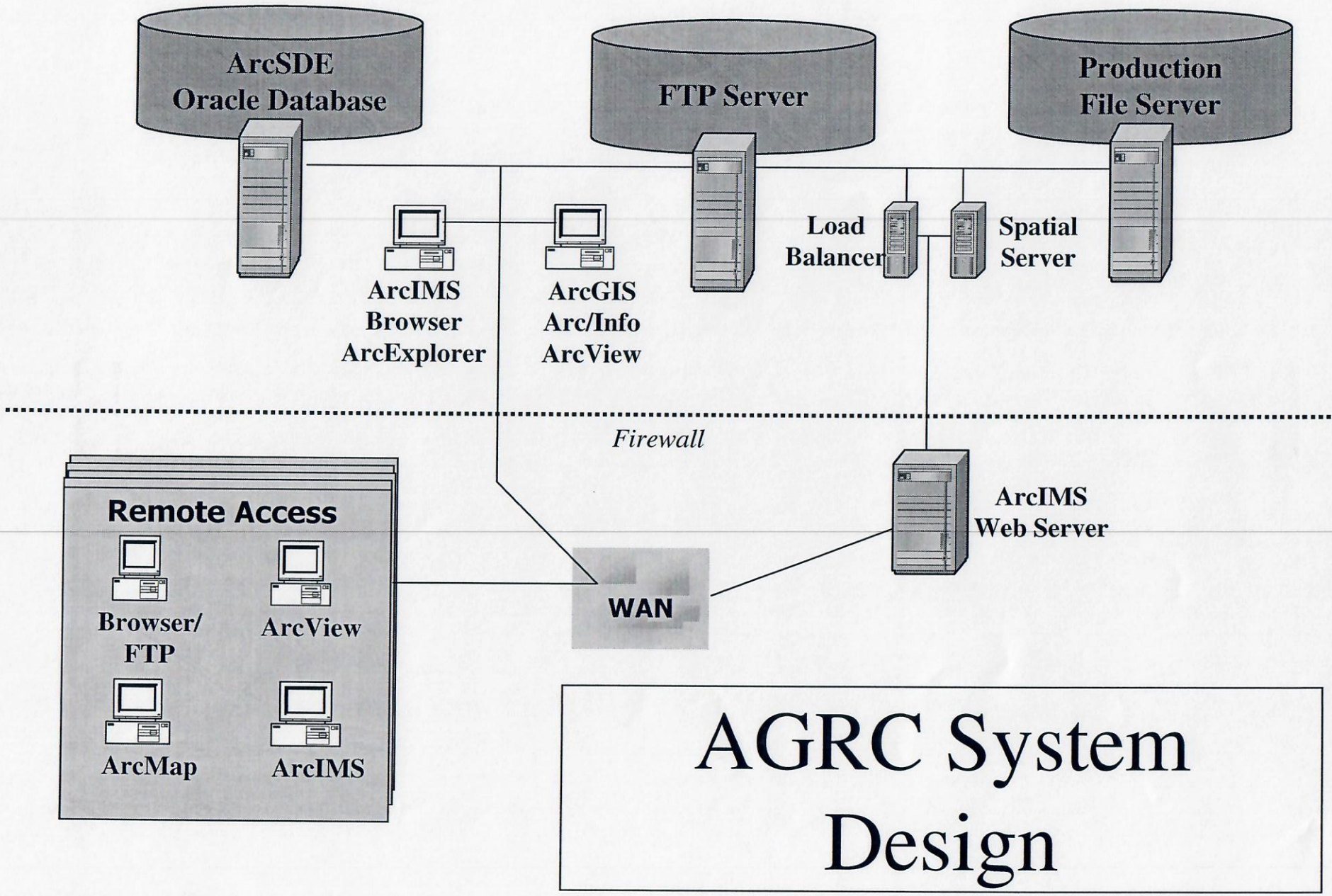
Over the years, Utah has realized many benefits from implementation of GIS as illustrated through the examples below.

- Better Decisions: The State along with federal and local partners have used GIS for many land management and planning resulting in more credible decisions and better acceptance by the public.
- Cost Savings: An analysis by the Department of Environmental Quality, Division of Environmental Response and Remediation indicated that the assessment maps required for potential superfund sites took approximately 35 hours to complete traditionally and 1.5 hours with GIS – with data available through the SGID.

- Income Generation: 400,000 acres of federal and state lands were exchanged in 1999. As part of the swap, the State also received $200,000,000 for the School Trust Fund. Brad Barber who helped negotiate the agreement said, "Without good tools and data, this deal would not have happened".
- Emergency Response: On 8/11/99 a tornado hit Salt Lake City. FEMA put crews into the field to assess damage immediately. Within 24 hours the damage inventory was complete and within 48 hours it was addressed matched and overlaid on DOQs.

References

(1) ESRI Conference Paper (1991)
(2) ESRI Study (1980)
(3) Price-Waterhouse Study (1984)
(4) SB21 (1991)
(5) NAPA Report (1998)
(6) NSGIC State Summary (1999)



AGRC System Design

SDE Server
SUN 220R
1.5G RAM
450Mhz Processor
~100G SAN Disk
Solaris 2.7
Oracle 8.1.7

SDE Info
140 Vector Layers
~30G Vector
~60G Raster (Projected)

FTP Server
SUN Enterprise 450
~100G SAN Disk
~3000 File Downloads/Week

File Server
Sun Enterprise 450
2.5G RAM
4x300Mhz Processors
~180G Internal Disk
~300G SAN Disk
Solaris 2.7
ESRI License Mgr.

Office Clients
Compaq EVO W6000
1G RAM
1.5Ghz P4 Processor
18G Internal Disk
Windows 2000 Pro
ArcGIS 8.2

Load Balancer
Compaq DL-320
1G RAM
1Ghz Processor
~18.5G Internal Disk
Windows 2000 Server
ArcGIS 8.2

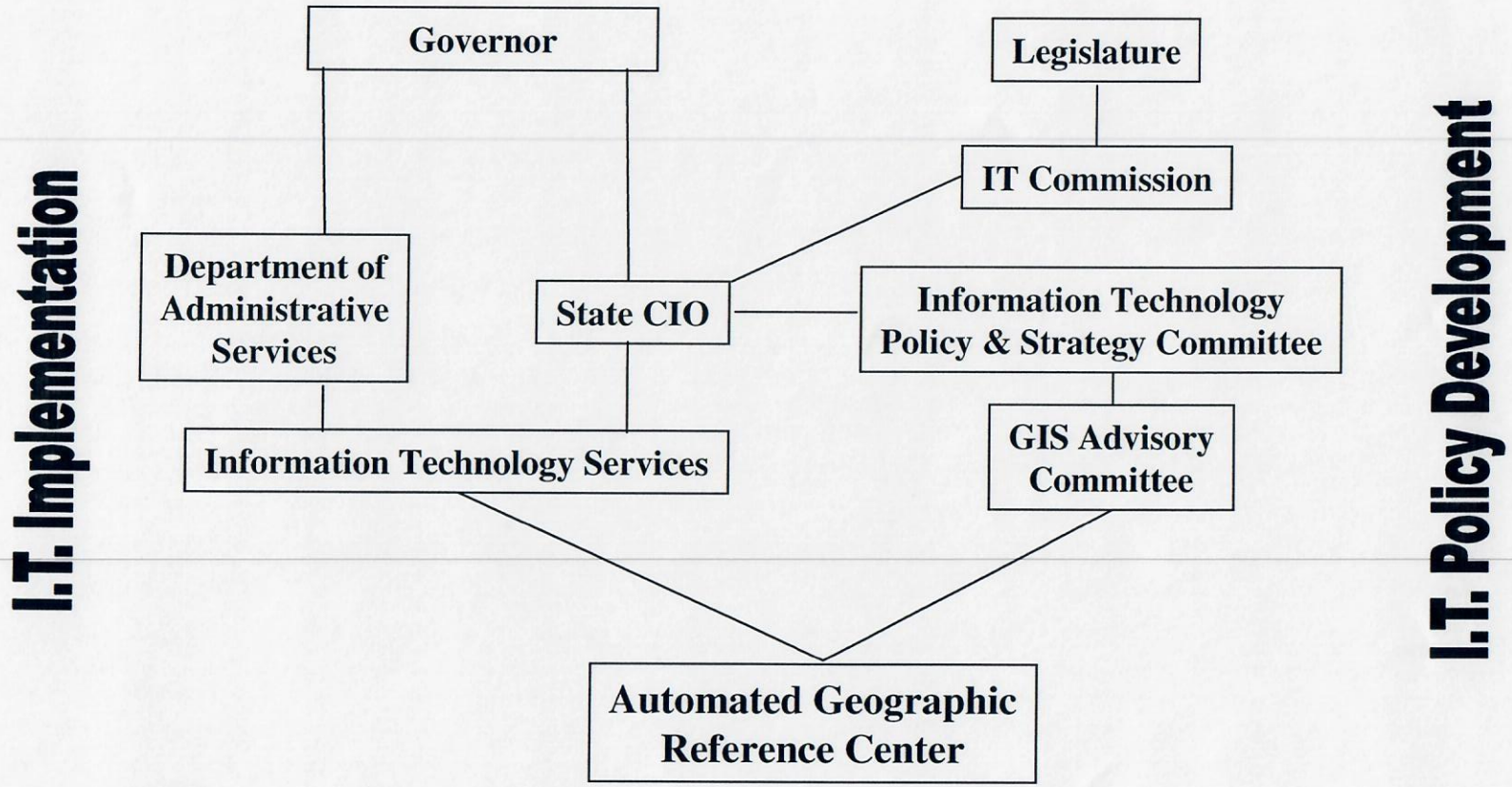
Spatial Server
Compaq DL-380
2.25G RAM
2x1.4Ghz Processors
~70G Internal Disk
Windows 2000 Server
ArcIMS 4.0

Firewall

AGRC System Details

ArcIMS Web Server
Sun Ultra5
256M RAM
333Mhz Processor
~8G Internal Disk
Apache
Tomcat
Samba

GIS Responsibility Diagram



AGRC Enterprise GIS Partnerships

Automated Geographic Reference Center

State

Tax Commission
Dept. Environmental Quality
State & Institutional Trust Land Adm.
Public Safety/Homeland Security
Natural Resources
Utah Geological Survey
Utah Olympic Public Security Command
Attorney Generals Office

Local Government

Counties
Cities
Utah Assn. Counties
League of Cities & Towns
Association of Governments

Coordinating Groups

GIS Advisory Committee
Utah Geographic Information Council
Technical Interchange Group
Canyon Country Partnership
Utah Metadata Discussion
Utah Mapping Group
Utah Aerial Photography Consortium
Intermountain Hydro User Group
Colorado Plateau Data Committee
Uinta Basin Users Group

Education

Higher Education
Utah Geographic Alliance
K-12

Federal

Bureau of Land Management
Forest Service
Park Service
Natural Resource Conservation Service
US Dept. of Transportation
US Geological Survey
Bureau of Census
Bureau of Indian Affairs

Tribal

Goshute Indian Tribe
Navajo Nation
Navajo Nation EPA
Northern Ute Indian Tribe
Northwestern Band of Shoshoni Nation
Paiute Indian Tribe of Utah
San Juan Southern Paiute Tribe
Skull Valley Band of Goshute Indians
White Mesa Ute Tribe

Please Note: These lists are not all inclusive.

From: Marj Dougherty <marj_dougherty@esri.com>
To: <MichaelFoulger@utah.gov>
Date: 6/24/02 2:55PM
Subject: FW: ESRI CASE Study

> Hello Michael, It was really great to speak with you. We would be very
> excited to spotlight the ARGC as an exemplary enterprise GIS case study.
> You are one of 7 sites selected nationwide and we anticipate 8 total.
>
> So, we will need a lot of information from you here, and we have templates
> and examples to help you understand what we are hoping to achieve.
>
> 1. I have a set of questions to start with, that are enclosed - these
> questions will be the basis of the study. Included in the Questionnaire
> is a link to the "NRCS Lighthouse" case study as an example of what we
> hope to achieve with your information...not to the letter, but pretty
> close.
>
> Keep in mind that any previous articles written about your
> enterprise solution, or previous Power Points you have done, may be of
> help here in crafting a story.
>
> 2. Diagrams - we would like two diagrams from you. I have enclosed two
> examples for you...
> a. The PowerPoint is one slide of a system configuration diagram.
>
> b. The PDF is a organizational diagram drawn this morning by Jack
> Dangermond (sorry for the format), that shows the structure of your
> organization , i.e. what is the relationship between a CIO (chief
> information officer) or GIS management, and the departments or other users
> (even outside of your agency), that participate in the "enterprise
> GIS".
>
> If you would just sketch your 2 diagrams and email them to me in PDF
> format we will put them into the appropriate format for our website and
> the article.
> The 2 diagrams may take us awhile to design, so if you can get those
> to me ASAP, we can be working on those.
>
> And, keep in mind which of the Virtual Campus classes you are interested
> in - as a Thank You, ESRI will provide you $500 credit towards Virtual
> Campus offerings.
>
> I look forward to speaking with you as we move through this process,
> please give me a call with any questions, although email is probably best.
>
>
> <<Questionnaire.doc>> <<JD org chart.pdf>> <<Enterprise Example ppt>>
>
>
> Marjorie Dougherty
> ESRI Reference Manager
> VM: 501-745-3950
> Fax: 501-745-3960
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