



Montana Geospatial Strategic Plan

2006 - 2010

Created with Funding from the Federal Geographic
Data Committee to the Montana Department of
Administration, on behalf of the Montana Land
Information Advisory Council

May 9, 2007

FORWARD

The Montana Geospatial Strategic Plan creates a vision for the development, maintenance and dissemination of geographic information for the state of Montana. The Plan has been prepared in conjunction with the National States Geographic Information Council (NSGIC) Fifty States Initiative, which “outlines a fundamental change in the way all governments will work together in the future to build the National Spatial Data Infrastructure (NSDI)... The principal goals of the Initiative are to:

- Encourage implementation of statewide spatial data infrastructures through effective strategic and business planning efforts.
- Provide guidance on planning activities.
- Encourage the formation of partnerships and alliances that will improve the planning process.
- Provide a uniform national framework for strategic and business plans, so they can be compared and contrasted to reveal national trends.”¹

The Montana Geospatial Strategic Plan not only facilitates Montana’s participation in the development of the NSDI, but also provides overall direction for the entire Montana geospatial community, a system of Geographic Information System (GIS) technical specialists and users in both the public and private sectors. The Plan provides guidance for public policy decisions related to geographic information and a framework for annual State Geospatial Business Plans and the associated allocation of resources.

Part and parcel of our participation in both state and national efforts to plan for the management of geospatial data, is the development of a service oriented architecture and associated standards and protocols that will enable information to be shared across political, jurisdictional and organizational boundaries. Communication, coordination, standardization, access and education are the key components of our strategy and underscore each component of the Plan. The Plan includes goals and objectives as well as suggested implementation strategies that are intended to foster and support efforts to provide reliable, easily accessed information in more efficient ways for a variety of applications and shared uses aimed at the overall economic and community development needs of the state of Montana.

The Montana Geospatial Strategic Plan is intended to foster a “federated” model for sharing information among a variety of users, through data stewardship, education and collaboration. This approach reflects the transition from a system of isolated information nodes to a cohesive,

¹ NSGIC, February 28th, 2005

integrated federated system, made up of a variety of entities focused on providing service to users of geographic information.

GIS Applications ~ Case Studies

Geographic Information is critical to the business functions of both private and public entities. Imagine trying to design a school bus route, a real estate development or an emergency evacuation plan without the benefit of maps. As the people of Montana define the issues that are most critical to our state, they will rely on maps to help guide policy development. As we work to improve quality and accessibility of geographic products, we are helping the people of Montana and their elected officials to make informed decisions regarding key areas of concerns, including, but not limited to:

- Public Policy Development and Implementation
- Natural Resources Management
- Land Valuation
- Transportation and Housing

Case studies, included as chapter dividers in this document, illustrate how geographic information has been used to improve the quality of information that is used to set public policy in the fields of forest management, housing, land valuation and education.

ACKNOWLEDGMENTS

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Case Study #1 ~ GIS & Public Policy – Montana Legislature

One of the primary goals of those who work for lawmakers is to provide them with information with which they can make policy decisions. The Legislative Services Division and the Legislative Audit Division use GIS in a number of ways to accomplish this goal.

The Legislative Services Division has used GIS to provide analytical context for a wide range of public policy issues. The advanced analytical capability of GIS helps both staff and legislators understand and explain issues more fully.

Floodplain Mapping

Residential and other development within the floodplains of Montana's streams and rivers is a controversial issue in the state. Using cadastral data and federal floodplain maps, an analysis showed the number and value of homes already located within floodplains. The GIS analysis formed the basis of an article that outlined policy issues related to development in floodplains, including the environmental and financial consequences.

Sex Offender Locations

Many states now have laws restricting where convicted sex offenders may live once they are released from prison. The location of sex offenders and licensed daycares was geocoded using state transportation network data. A file of schools in the state was also used. The analysis showed areas where sex offenders would be banned from living if buffer zones in other states were adopted in Montana. The analysis formed the basis of an article that explored the policy decisions surrounding what to do with convicted sex offenders once they are released from prison.

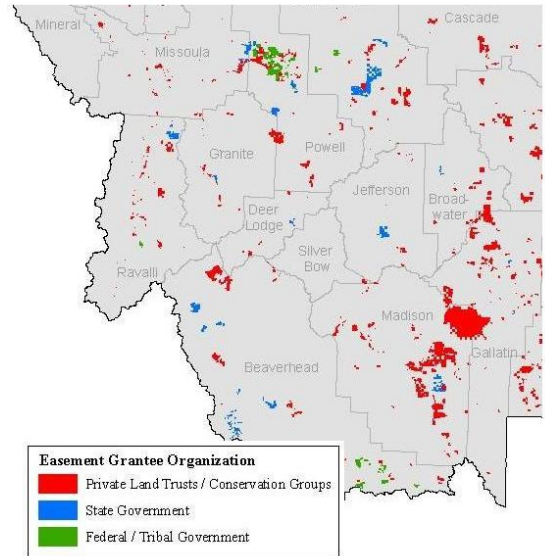


Effect Buffered Exclusion Zones Would Have in Billings, Montana

The Legislative Audit Division has employed GIS in a variety of different situations during the course of performance audit projects. Performance audits are designed to assess whether state agencies or programs are meeting their objectives and whether they can do so with greater efficiency or effectiveness.

Conservation Easements

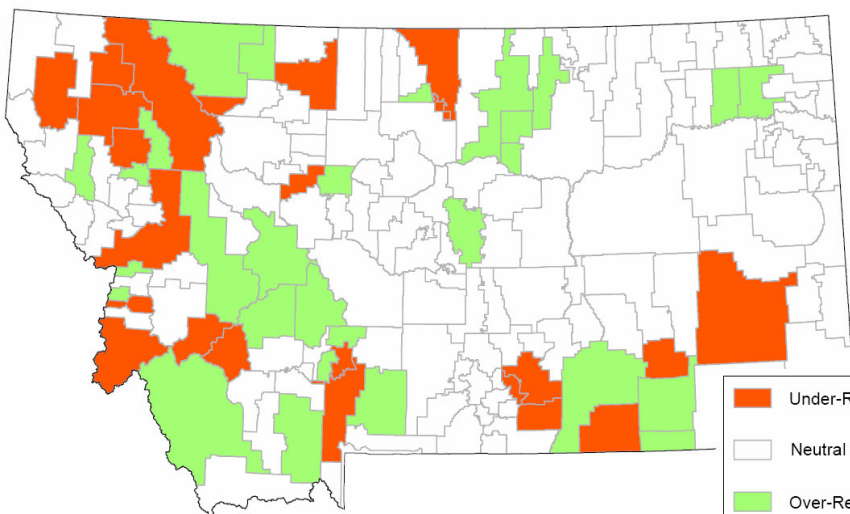
GIS was used extensively during an audit of conservation easements. Use of GIS helped provide important analytical insights into this issue. GIS use also allowed auditors to identify and physically locate lands subject to conservation easements. The audit report provided legislators with information on the location, extent and characteristics of conservation easements in Montana. GIS mapping and analysis capabilities allowed us to



Conservation Easements in Southwest Montana

At-Risk Youth Programs

During a performance audit of the Montana Youth Challenge Program, GIS was used to analyze recruitment to the program from the state’s population of at-risk youth. GIS analysis identified school districts where the program was either under or over-recruiting based on the number of high-school dropouts. This analysis helped program staff understand where recruitment efforts could be strengthened to better represent the target population from the state’s Indian reservations and urban areas.



Montana Youth Challenge Program recruitment patterns by school district

CHAPTER 1. INTRODUCTION

This Geospatial Strategic Plan has been prepared for the Montana Land Information Advisory Council (MLIAC) on behalf of the entire GIS community in Montana. MLIAC was created in July 1st, 2005, in accordance with the Montana Land Information Act (the Act) and replaced the Montana Geographic Information Council, created by executive order of the Governor in 1997 to provide policy level direction and promote efficient and effective uses of resources. The Act, in its statement of purpose, identifies the need “to develop a standardized, sustainable method to collect, maintain, and disseminate information in digital formats about the natural and artificial land characteristics of Montana. Land information changes continuously and is needed by businesses, citizens, government entities, and others...and [must be] made available in common ways for all potential uses and users, both private and public”. The Act defines the Geographic Information System (GIS) as “an organized collection of computer hardware, software, land information, and other resources, including personnel, that are designed to... efficiently collect, maintain, and disseminate all forms of geographically referenced information.”² The entire Act is included as **Appendix A** to this Strategic Plan.

Montana has continually been at the forefront of GIS development and is recognized nationally for its long standing efforts to employ GIS technology for use in a wide variety of applications. Successful collaborative efforts to effectively disseminate this technology are evident throughout the history of GIS in the state. Beginning at least five years prior to the introduction of GIS specific technology, there were a number of significant efforts to coordinate data management and sharing among government agencies, universities, and private sector groups at local, state, tribal and federal levels as noted in the following time line:

- 1982 – The Montana Governor's Council on Management, recognizing the growing amounts of natural resource data and the growing need for quick access to this data, called for greater coordination and information sharing among natural resource agencies.

- 1983 – The Montana Legislature created the Natural Resource Information System (NRIS) and the Natural Heritage Program: "...to be a comprehensive program for the acquisition, storage, and retrieval of existing data relating to the natural resources of Montana."

- 1985 – The Montana Interagency Information Processing Coordinating Group comprised of the Montana Department of Natural Resources and Conservation, the University

² Senate Bill No. 98, 2005 Montana Legislature, <http://data.opi.state.mt.us/bills/2005/billhtml/SB0098.htm>

System, U.S. Forest Service, the Federal Soil Conservation Service (now the Natural Resources Conservation Service), the Federal Bureau of Land Management and others was created.

➤ 1987 – Funding for the development of GIS capabilities at the State level was provided under the Federal Comprehensive Environmental Response, Compensation and Liability Act or CERCLA, commonly known as the Superfund Law in connection with remedial investigation activities in Butte and Anaconda, Montana, resulting in establishment of the GIS program at the Montana State Library – Natural Resource Information Program.

➤ 1988 -1990 –The Interagency Technical Working Group or ITWG was formed and charged with identifying critical statewide themes and mechanisms for their development; essentially establishing the framework for the current Montana Spatial Data Infrastructure (MSDI).

➤ 1988-1992 – The Montana GIS Users Group (MTGIS), a professional organization representing diverse GIS Users at the local, state, federal and tribal levels, was created, holding its first statewide conference in 1988. MTGIS was formally established in 1990 as a consortium of federal, state, local, tribal, university, and private organizations and individuals engaged in the use of and education about GIS technology. The Group's purpose was to provide a forum for exchanging information and ideas on GIS technology. The Users' Group was organized as a non-profit organization to serve the GIS community at large in Montana. The charter for the Montana GIS Users' Group was adopted in 1990 at the Montana GIS Users' Conference in Missoula. The organization operated for 14 years, co-sponsoring conferences with Idaho's GIS community, published a newsletter and provided support for various educational and community projects.

➤ 1995 – The Montana Local Government GIS Coalition (MLGGC) was initiated by local government GIS practitioners to facilitate and advance the implementation and development of GIS technology in city and county government through communication and data sharing.

➤ 1996 – The Montana Department of Administration (DOA) established the GIS Section within the Policy and Planning Bureau of the Information Technology Services Division (ITSD). When the DOA was reorganized in 2002, the GIS Section became a bureau under the Operations area of the ITSD Division.

➤ 1997 – The Montana Geographic Information Council (MGIC) was created by an executive order signed by Governor Racicot.

➤ 2003 – The Montana Legislature passed the Montana Information Technology Act placing the responsibility for information technology management and coordination including GIS in the Information Technology Services Division of the Montana Department of Administration.

➤ 2004 – The ITWG, the MLGGC and MTGIS joined forces to create the Montana Association of Geographic Information Professionals (MAGIP), a non-profit, volunteer professional association of diverse GIS users from federal, tribal and state agencies, local government, private industry, K-12 schools, and universities.³

➤ 2005 – The Montana Land Information Act was signed into law by Governor Schweitzer, creating the Montana Land Information Advisory Council (MLIAC). The Act is designed to provide a stable funding source to contribute toward the completion of the MSDI themes and provide financial resources to collaborative GIS projects.

➤ 2005-2006 – MLIAC initiated the preparation of a Geospatial Strategic Plan for the State of Montana

The Montana Spatial Data Infrastructure (MSDI)

The federal government, in cooperation with state, regional, local and private sector interests has identified seven geospatial “framework data layers” for the nation. Framework layers follow themes identifying geographic features or characteristics, relating to national, state or regional interests and needs. Geographic features may be either natural or manmade. These layers represent the primary spatial or geographical themes and can be overlaid upon each other to provide varying levels of detail. The seven layers include:

- Cadastral (or land parcels)
- Elevation
- Geodetic Control (a set of known positions with precisely determined locations from which other locations can be referenced)
- Government Units (boundaries of entities such as cities, counties or reservations)
- Hydrography (surface water features)
- Orthoimagery (aerial photographs and/or satellite imagery)
- Transportation

In addition, the state has added six framework layers as follows:

- Geology

³ Mike Sweet, *GIS Coordination in Montana*, a Power Point Presentation, 2004

- Hydrologic Units (sub-watersheds and drainages)
- Land Cover (Vegetation)
- Soils (Inventory and Classification)
- Wetlands
- Critical Infrastructure and Structures

Together, these 13 layers constitute the Montana Spatial Data Infrastructure or MSDI. These data layers are in various states of development and the completion, dissemination and ongoing maintenance of the MSDI had been identified as a top priority by the entire GIS community. In April of 2006, MLIAC prepared a directive on Theme Stewardship to offer an operational structure in which MLIAC can meet the goal of consistent, accessible, complete geographic data statewide called for in the Montana Land Information Act (Appendix A). The Directive identifies a methodology for the acquisition, formatting, dissemination and maintenance of each of the data layers and for coordination with the National Spatial Data Infrastructure (NSDI).

The Federal – State Partnership

United States Geological Survey (USGS)

Today, a primary mission of the USGS is to meet the Nation's needs for current base geographic data and maps. Through partnerships with federal, state, and local governments and the private sector, the USGS is committed to providing the Nation with access to current, accurate, and nationally consistent topographic maps and geospatial and remotely sensed data and information to help informed decision making by resource managers and the public. This synthesis of information, products, and capabilities, *The National Map*, will be a seamless, continuously maintained set of geographic base information that will serve as a foundation for integrating, sharing, and using other data easily and consistently.

In light of this, the USGS has entered into a Memorandum of Understanding with the State of Montana, specifically the Information Technology Services Division within the Department of Administration and the Montana State Library, in support of its mission to establish partnerships necessary and other collaborative efforts for the development, maintenance, dissemination, and use of *The National Map*. The activities covered by this MOU include but are not limited to:

- Data Development
- Data Maintenance
- Database Development
- Data Dissemination and Distribution
- Exchange of Geospatial and Remotely Sensed Information
- Feature Serving and Generalization

- Outreach and Education
- Research and Applications
- Standards Development
- Web Mapping Services and Applications
- Workshops, Training, and Technology Transfer

Case Study #2 ~ GIS and Wildland Fire

Montana Wildland Fire Base Map Project, by the National Center for Landscape Fire Analysis, University of Montana, College of Forestry and Conservation

The purpose of the Montana Wildland Fire Base Map project is to prototype the development of a base map data model, standardized map products, and distribution method to provide timely and accurate base data to wildland fire incidents. The NCLFA has developed a cartographic data model that encompasses the data mining, data generalization and representation, graphic refinement, and map compilation processes for the creation of a standardized base map. The implementation of this data model allows the GIS specialist to establish an accurate base map that is recognizable among multiple disciplines, quickly and efficiently; leaving them more time to focus on the creation, display, and analysis of incident and other value-added data. The sources for this base data include Montana and national framework datasets; thus, the data provided is the most accurate and up-to-date data available. The Montana Wildland Fire Base Map will be served to the wildland fire community through the use of an interactive web-based map viewer.

Base Map Data Include (See Following Pages.)

Montana Framework Datasets:

- Transportation—Highways, Ramps, Primary, Secondary and Forest Roads
- Administrative—Cities, County Boundaries, Montana Boundary
- Stewardship—Jurisdictional Boundaries, Special Management Areas, Wilderness
- Reference—Quad Index, PLSS

National Framework Datasets:

- Hydrography—Point Sources, Flowlines, Water Bodies
- Hypsography—Contour Lines, DEM, Hillshade



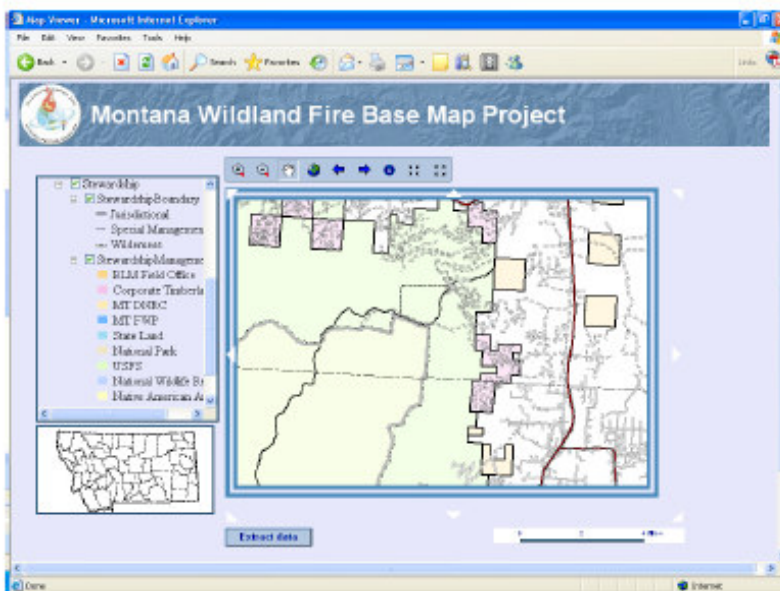
Montana Wildland Fire Base Map

Project Overview

The purpose of the Montana Wildland Fire Base Map project is to prototype the development of a base map data model, standardized map products, and distribution method to provide timely and accurate base data to wildland fire incidents. By focusing on the data infrastructure we will demonstrate how a standardized data model can easily adapt to changing needs and improved data sources while simultaneously improving accountability, reliability and consistency.

The typical wildland fire scenario involves the GIS specialist spending large amounts of time on data acquisition and re-formatting maps. The NCLFA has developed a cartographic data model that encompasses the data mining, data generalization and representation, graphic refinement, and map compilation processes for the creation of a standard base map. The implementation of this data model allows the GIS specialist to establish an accurate base map, that is recognizable among multiple disciplines, quickly and efficiently; leaving them more time to focus on the creation, display, and analysis of incident and other value-added data.

The information products of this project include standardized map products, data in the personal geodatabase format, and a set of layer files. The map products will encompass standardized map templates for the most commonly required wildland fire maps (ex, briefing, IAP, progression, and transportation maps). The personal geodatabase will include the feature classes, annotation, behavior, and rasters of the base map data model for the given extent. The layer files will reference this personal geodatabase and provide the GIS specialist with the data already generalized, symbolized, and labeled to replicate a standard topographic base map. The sources for this base



data include Montana and national framework datasets; thus, the data provided is the most accurate and up-to-date data available.

The Montana Wildland Fire Base Map will be served to the public through the use of an interactive web-based map viewer. This map will allow the user to visually identify their area of interest and extract the data and map products for the given extent with the click of a button.

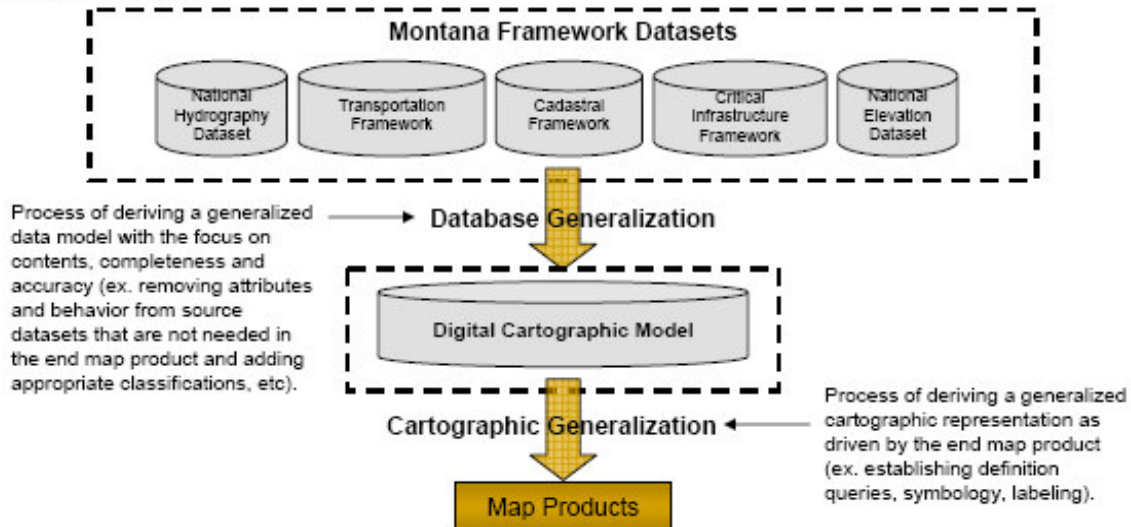
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Montana Wildland Fire Base Map

Project Process



Base Map Data Include

- Transportation
 - Highways, Ramps, Primary, Secondary, and Forest Roads
- Administrative
 - Cities
 - County Boundaries
 - Montana Boundary
- Stewardship
 - Jurisdictional Boundaries
 - Special Management Areas
 - Wilderness
- Hydrography
 - Point Sources
 - Flowlines
 - Water Bodies
- Hypsography
 - Contour Lines
 - DEM
 - Hillshade
- Reference
 - Quad Index
 - PLSS



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CHAPTER 2. THE STRATEGIC PLANNING PROCESS

Existing Conditions Review

The first step in preparing this strategic plan was to inventory existing conditions with respect to geospatial information management in the State of Montana. The existing conditions report, or “State of the State” document, prepared in 2005 is included as **Appendix B** to this document.

The “State of the State” includes a description of challenges and opportunities facing the state’s GIS community. In contrast with its relatively obscure beginnings and limited focus, geospatial technology is now experiencing rapid changes - as are information management systems in general. These technological developments are in turn spurring exponential growth in the demand for geospatial applications and their derived products by a wide variety of users. These factors present a unique set of challenges and opportunities to the technical specialists in this field and to the clients they serve. As the technology has advanced, there has also been a shift in the way data is collected and shared. This new system can be characterized as “federated”, where a series of independent entities form a cohesive data sharing system. Their connectivity enables them to create a better source of information overall.

The following list of challenges and opportunities was drawn from conversations with MLIAC members and other public and private sector GIS professionals.

The Changing GIS Environment

Geographic Information Systems are moving from isolated islands or pockets of technologies to a more integrated approach. Formerly, individual GIS specialists were responsible for collecting data and creating and hosting various products. In contrast, GIS personnel no longer work in isolation. They can easily access the state’s Cadastral mapping system or the National Map, for example, via their computer. The potential exists for data to be shared among users at all levels – local, state, tribal, and federal – in a system where everyone shares and contributes information and their connectivity enables them to create a better source of information overall.

This federated system, however, will require a great deal of coordination, collaboration, communication, and leadership with a focus on service. The capabilities of GIS need to be examined with an eye towards the restructuring of relationships across traditional agency/organizational boundaries. Properly positioning GIS in the overall Enterprise architecture for the State of Montana will be key to its success.

Changing Technology

GIS technology has, and will continue to, evolve over time. GIS has been changing at a fundamental level, from a database and data sharing approach to a knowledge approach. While Montana has in the past been at the forefront technological development related to GIS, that may currently be less true. In order to work collaboratively with federal, state, tribal and local entities, it will be necessary to adapt to new technologies such as web services and distributed data.

Communication and Collaboration

As GIS technology advances and its applications have become more diverse and widespread, the need for better communication and collaboration among data creation, application, maintenance and distribution specialists is clearly seen as paramount to its successful use. For the last 10 to 15 years, GIS specialists have been working on manipulating and reconfiguring data to make it work in a variety of contexts. In light of new technologies, specialists are now able to focus more on applications and analysis. However data is often developed for one product or application, rather than across a range of potential uses. This results in having to “start over” as new or similar applications are required within other agencies and organizations.

GIS professionals in Montana have long been aware of the essential need for coordination and have worked together for decades to improve cooperation and information sharing. Yet despite a history of collaborate efforts, there is substantial room for improvement. Chief among these is the need to work towards the elimination of duplication of effort. Strategic planning can help foster the development of mechanisms for information sharing.

Shareholder Meetings

Beginning in October of 2005, four shareholder meetings were held to identify issues and opportunities to be addressed in the Montana Geospatial Strategic Plan. Meetings were held with representatives from local, state and federal government entities and private sector GIS users and service providers.

The state and local government meetings were held in Helena with all participants present. The federal and private meetings were held using Web-Ex technology in association with a conference call. Generally, the meetings followed the same format. Following introductions, the meeting facilitator (Janet Cornish, CDS of Montana) provided an overview of the Geospatial Strategic Planning process. Then, through a series of round table discussions, participants identified issues and opportunities associated with geospatial information and its relationship to their business enterprises. If time permitted, the participants were also asked to draft general goal statements in response to the issue and opportunities identified.

Surveys were conducted using Survey Monkey © prior to three of the meetings (state government, local government and private sector) and for the tribal sector. No survey was conducted in conjunction with the federal government meeting. Survey results were summarized and presented to participants at the beginning of the meeting to help spur discussion and to provide a framework for organizing ideas.

A complete listing of identified issues, organized by shareholder group has been prepared as a separate document. This listing as well as complete transcripts for each meeting are in **Appendix C** of this document.

The following list of issues (needs, barriers, concerns) and opportunities summarizes the results of this effort by category

Education and Training

The need for educational programs was clearly articulated. Education tailored for GIS technicians as well as end users and the community in general was identified as critical. Specific comments included the need to:

- Learn from others' successes
- Provide education that is specific to users' needs
- Provide education regarding new technologies
- Provide GIS training for the layman (non-GIS technicians) – end users
- Offer general public education regarding the role of GIS
- *Professional Development*
- In addition to benefiting from specific training and education, GIS specialists are looking to enhance their roles as professionals in their fields. In particular, they identified the following concerns:
 - Additional forums are needed to exchange information
 - Expertise at the entry level is uneven
 - The appropriateness of certification programs for GIS technicians should be explored

Political Efficacy

The most commonly identified issue raised at shareholder meetings was the lack of a defined relationship between geospatial technology and the decision and policy makers who allocate resources in support of GIS. Those ultimately in charge of allocating resources to geospatial programs are often unaware of how critical this technology is to public policy making and program implementation. Shareholders identified the following issues:

- The lack of GIS Champions among those in leadership positions
- The fact that the benefits of GIS are not demonstrated to decision makers

- Entrenchment and Turf Issues
- The need for intergovernmental approaches to enhance efficient use of resources
- The need for the highest level of decision makers to be involved in GIS policy decisions
- The lack of a unified voice within agencies
- The need for decision makers to understand how GIS can be successfully applied
- Recognition that public expectations regarding GIS may not match reality
- The need for a voice in GIS policy making on behalf of small/rural communities
- The need for a voice in GIS policy making on behalf of tribal communities

Financial Resources

Clearly additional funding for GIS is needed. The following are issues related to the lack of adequate financial resources in support of geospatial programs:

- Staffing at all levels of government
- Addressing the mismatch between well-resourced efforts such as Google Earth and under-funded state support for these efforts
- Generating Data
- Addressing rural and small town GIS programs
- Reforming software licensing requirements to lower costs

GIS in the Mainstream

Meeting participants noted that in many cases GIS programs operated in isolation, further exasperating the problems associated with the general lack of political support for GIS. In order to address this problem, participants pointed to the need to:

- Incorporate GIS into the mission of our agencies
- Deliver services efficiently and effectively
- Incorporate GIS into IT generally
- Link GIS to statewide policy making

Coordination and Communication

The GIS community faces a series of issues related to the lack of coordination among users in all sectors. Coordination and efficiency would be greatly improved by better communication. The participants identified the following areas of concern related to data coordination and communication within the GIS Community:

- Duplication of effort
- The need for collaboration
- The need to share resources
- The lack of coordination across jurisdictional boundaries (e.g., city, county, tribal, state, inter-state, Federal and international)
- The need for support for a statewide data coordinator and a metadata coordinator

- The lack of awareness of GIS, particularly within the tribal sector
- The need for better communication among stakeholder groups
- The identification of partnerships among public and private entities to better serve the GIS community
- The need to clearly define the use and distribution of MLI funds

Technology

In addition to providing educational programs regarding advancements in geospatial technology, participants noted that there are a variety of tools available to help to better find and share information. However, these tools are often underutilized. They also noted that there were some difficulties associated with communicating among various software types.

Suggestions included:

- Making greater use of web based services
- Using Geo-Communicator to share information
- Using of Geospatial One-Stop to obtain information
- Encouraging software interoperability

Data Management

Shareholders identified a variety of issues associated with data collection, verification, distribution and maintenance. Issues identified include:

- Development of state data framework themes and layers with clearly defined responsibilities regarding their development and maintenance
- Common Protocols and Standards (national standards)
- Data Stewardship
- Data management geared to high priority issues – Indian assets, energy development, recreation
- Data management geared to business requirements
- Data distribution and sharing
- Easily understood data formats
- Data integrity and accuracy
- Integration of GIS with CAMA data
- The lack of GIS Applications and/or resources for implementation in certain fields (e.g. cultural resources management and tribal resources)
- Inconsistent address information
- Data complexity as a barrier to Enterprise System Development

Overall Management and Organization of Geospatial Information

As GIS technology has advanced, there has been a shift in the way data is collected and shared. This new system can be characterized as “federated”, where a series of independent entities

form a cohesive data sharing system. Their connectivity enables them to create a better source of information overall. In addition, participants noted that organizations were taking an integrated “enterprise” approach, looking at how computer based information systems can support the basic business processes, functions and organizational units of an entity. Issues related to these trends include:

- Lack of Expertise as a barrier to implementing an enterprise approach
- The critical role of data access vision in developing an effective enterprise approach

Tribal Issues Raised

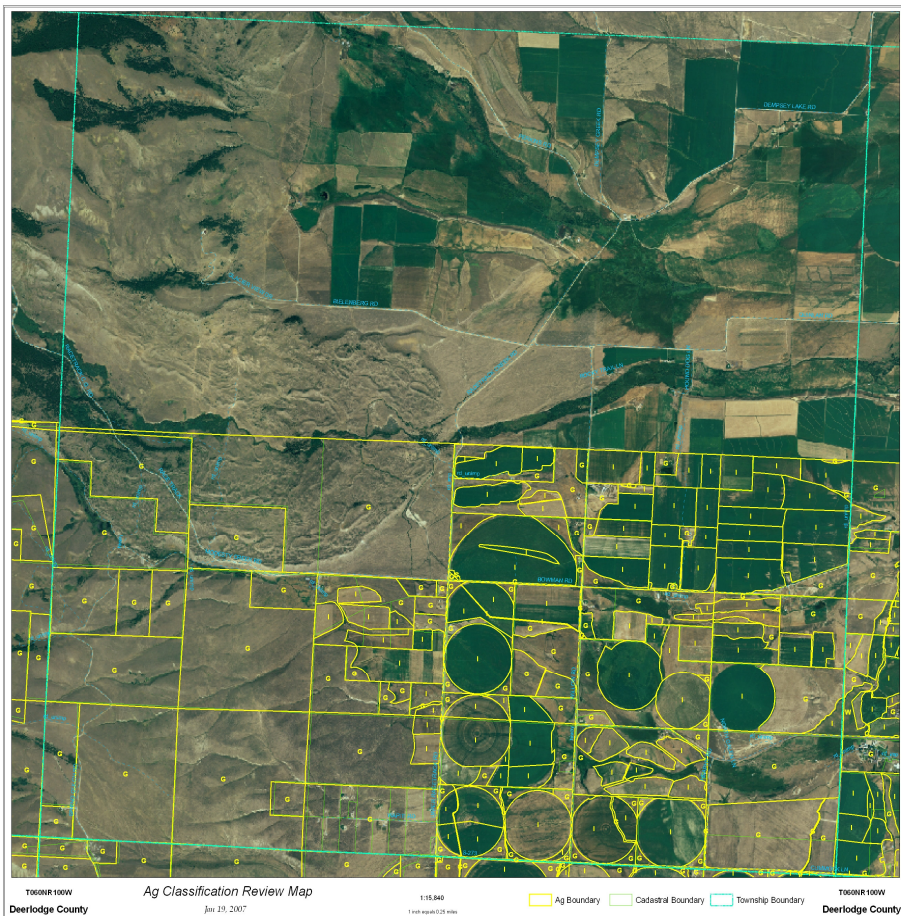
- Tribal members were surveyed using Survey Monkey © and identified the following issues:
- There are a great number of people on Montana’s reservations who are very excited about and interested in GIS.
- Tribal representatives don’t know what’s going on in GIS on other reservations or in the state generally.
- We need an updated list of those involved with GIS, including tribal leaders.
- While many are working on GIS, there is no coordinated effort.
- Staff turnover in tribal GIS offices is problematic.
- We must recognize the importance of each tribe’s hierarchy and associated respect for tribal leaders. Include these leaders in GIS policy discussions.

The results of the shareholder meetings were presented to MLIAC on June 27th, 2006. Council Members reviewed the key findings and identified additional issues and drafted preliminary vision statements. The results of the June 27th meeting are included in **Appendix C**.

Case Study #3 ~ GIS and Land Valuation

Maps and spatial data are essential in land assessment and valuation processes. Appraisers use maps to ensure all taxable properties are correctly identified and that all associated appraisal information with the property is correctly recorded.

The **Montana Department of Revenue** is using GIS data from a number of different GIS data custodians to value agriculture and timber land. The GIS data is being standardized and analyzed by the department to determine how an agriculture operation should be valued. Cadastral delineation, ag/timber operation boundaries, imagery, soil type and productivity are all reviewed in the process.



CHAPTER 3. THE GOALS OF THE MONTANA GEOSPATIAL STRATEGIC PLAN

The following goals have been drafted to facilitate the ongoing development of high quality geographic products in support of the business functions and decision making associated with achieving a promising future for our state. The potential strategies may be incorporated into Montana's annual Land Information Plans required by the Montana Land Information Act.

PRELIMINARY STRATEGIC PLANNING GOALS, OBJECTIVES AND STRATEGIES

PUBLIC POLICY GOAL – Incorporate GIS into Overall Public Policy Development and Decision Making

Objective #1 – Integrate geographic information into mainstream IT

Potential Strategies:

- Work with Montana's Chief Information Officer to develop a methodology for including GIS in overall IT management for state and local agencies.
- Work with the Montana CIO and state agency representatives to promote the integration of GIS and IT at the state agency level.
- Work with the Montana League of Cities and Towns and the Montana Association of Counties to promote the integration of GIS and IT at the local government level.

Objective #2 – Match geospatial information and data needs with public policy formulation (i.e., show how geographic products can inform public policy making)

Potential Strategy:

- Identify important policy issues at the regional, state, local and tribal levels (e.g., energy, housing, land use, economic development, transportation, public health and safety) and set priorities for data collection and management based on policy formulation needs. (relate to Data Stewardship Goal)

Objective # 3 – Increase support for GIS among decision makers and the public, emphasizing the role of GIS as a "tool" and not an end in itself

Potential Strategy:

- Demonstrate the use of geographic products for planning, policy formulation and design in all sectors by:
 - Using geographic products in presentations to policy makers and the public on critical issues
 - Using geographic products in conjunction with public meetings and other outreach efforts
- Provide enthusiastic GIS technical support for local, state and regional entities and personnel that require geographic products such as planners, city managers, county commissioners and land management agencies

Objective #4 – Obtain support for a sustainable GIS program

Potential Strategies:

- Demonstrate the return on investment associated with the allocation of resources for GIS programs
- Acknowledge and demonstrate how return on investment is a critical part of a sustainable funding strategy.

EDUCATION GOAL – Encourage the development of GIS education, outreach and training programs

Objective #1 – Foster programs at the elementary and high schools through community partnerships among geographic information professionals, post secondary institutions and local schools

Potential Strategies:

- Identify community liaisons within the GIS Community to work with local elementary and high schools to:
 - Offer curriculum tools (e.g. the “geospatial trunk”) to teachers
 - Facilitate student participation in MAGIP Conferences
 - Identify speakers, field trips and internships in the community to augment classroom programs in GIS
- Continue and Expand Grant programs to elementary and high school teachers working in GIS

Objective #2 – Promote the incorporation of GIS curriculums into colleges and universities

Potential Strategies:

- Establish a state-wide GIS faculty committee to
 - evaluate current curriculums with respect to geospatial offerings
 - make recommendations for submittal to the appropriate institution and the Montana Board of Regents as appropriate
 - identify resources for implementation of recommendations including funding, collaborations, distance learning, sponsorships and internships
- Continue and Expand Scholarship programs to college seniors and graduate students who use GIS as part of their studies.

Objective #3 – Develop continuing educational programs that support professional development and growth

Potential Strategies:

- Continue to offer conferences, technical workshops and other continuing education opportunities through MAGIP
- Encourage and support broader participation in regional and national GIS conferences and workshops
- Work with local universities, tribal colleges and colleges of technology to offer continuing education courses locally
- Explore a certification program for GIS professionals and make recommendations

DATA STEWARDSHIP GOAL – Support standardized and sustainable methodologies to collect, maintain and disseminate land information

Objective #1 – Establish clearly defined roles responsibilities for the development, maintenance and dissemination of each of the state data framework themes and associated layers

Potential Strategies:

- Implement the April 17th, 2006 Directive on MSDI Theme Stewardship prepared by the Montana Land Information Advisory Council (include this in the appendix of the Strategic Plan)
- Provide for ongoing support *to* and coordination *among* the various data stewards
- Review progress on a periodic basis
- Consult with the USGS regarding the development and maintenance of the MSDI with respect to the National Spatial Data Infrastructure and the National Geospatial Programs Office.

Objective #2 – Establish common protocols, standards and formats for data collection and management and associated metadata

Potential Strategies:

- Inventory the range of existing protocols, standards and formats currently in use by state and local government agencies.
- Review information gathered in comparison to national standards and guidelines
- Make recommendations for the MLIAC for implementation

Objective #3 – Disseminate Information regarding standardization of protocols, standards and formats

Potential Strategies:

- Convene a standards and protocols “summit” to discuss best practices and a schedule for implementation for standardization
- Publish an electronic newsletter informing the GIS community of standardization efforts
- Provide training through continuing education programs (conferences, technical sessions and distance learning) regarding standardization

Objective #4 – Reduce Redundancies in data collection management and promote sharing.

Potential Strategies:

- Create better pathways for data sharing between state and county agencies
- Encourage collaborative projects among local, state and federal agencies to collect and manage data jointly

COORDINATION, COOPERATION AND ACCESS GOAL – Foster Communication/ Collaboration/Cooperation across Jurisdictional Boundaries among local, state, federal, tribal and private sector entities, increasing the accessibility of geographic products for all users

Objective #1 – Inform all user groups and the public of GIS services and applications

Potential Strategies:

- Present GIS topics at professional conferences and technical sessions (e.g. engineers, planners, surveyors, real estate professionals)

- Prepare press releases for posting on government agency and organizational websites and in other print media about advances in GIS technologies and sources of information and products

Objective #2 – Develop and promote web based services

Potential Strategy:

- Conduct an analysis of web based opportunities associated with the dissemination of geographic information

Objective #3 – Provide for clear and easy access to geospatial data for all users

Potential Strategies:

- Develop and maintain a “one-stop” portal for access to all geographic products available for public use
- Work with existing web based services such as Google Map and Geospatial One-Stop to link Montana initiated web based systems with national resources.

Objective #4 – Achieve clarity of meaning with respect to GIS terms and jargon

Potential Strategies:

- Convene a “summit” on GIS terminology to develop standardized definitions for commonly used terms
- Work to replace “jargon” with more universally understood words where appropriate

Objective #5 – Develop and promote a federated GIS model

Potential Strategies:

- Work with USGS to identify a workable model based on the national experience (e.g. the National Map)
- Participate in and contribute to the National Map
- Identify geographic products common to a variety of business functions (e.g. growth policies, transportation plans, disaster and emergency service plans)
- Develop standardized map templates for commonly mandated policy tools

Objective #6 - Establish feedback loops

Objective #7 – Identify and address barriers to inter-jurisdictional cooperation and communication

Potential Strategies:

- Evaluate the existing GIS enterprise with respect to its interoperability among local, state, tribal, and national users and make recommendations accordingly.
- Explore the applicability of various incentives to encourage inter-jurisdictional cooperation such as availability of standard products, shared expertise and services and funding for efforts that utilize partnerships among various entities.

Objective #8 – Work “smart” to avoid duplication of effort (relate to objective #4 under Data Stewardship Goal)

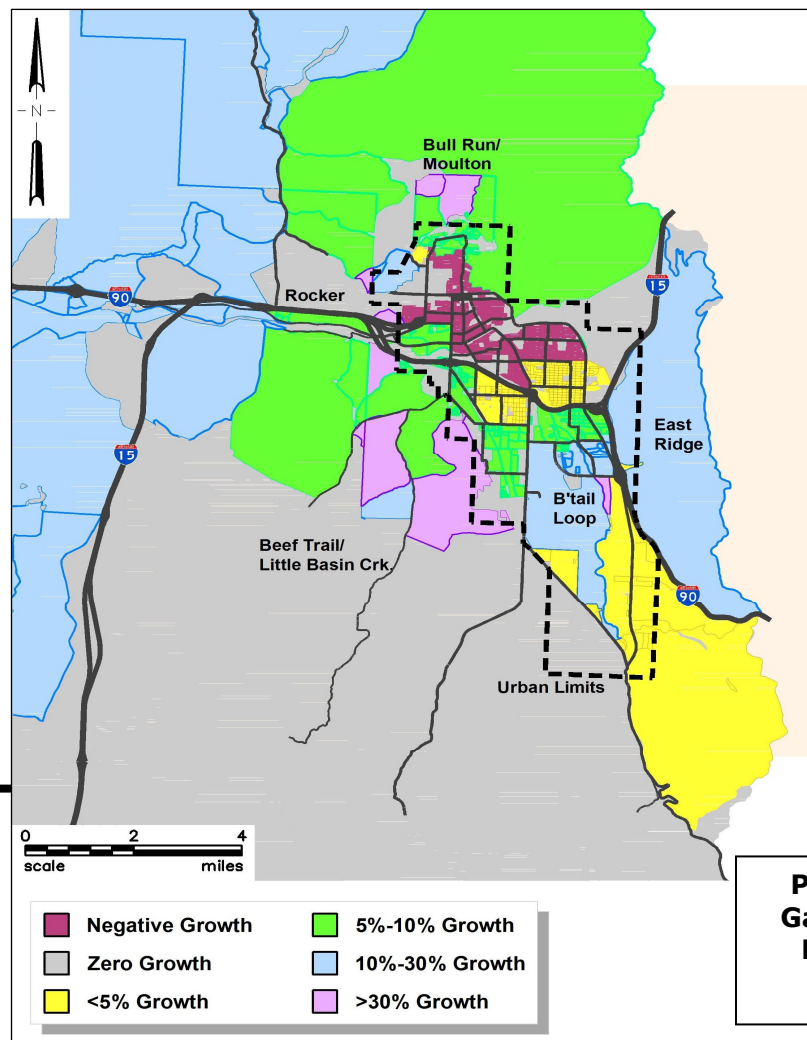
Potential Strategies:

- Maintain a central inventory of ongoing data collection activities
- Align with Objective # 2 under Public Policy Goal to set priorities for data collection and resources allocation

Case Study #4 ~ GIS and Community Planning

Land use planning and community development activities rely on the availability of maps. Plans for housing, economic development, transportation, infrastructure development and land use rely on the ability to produce informative maps. Maps are a critical component in the development of community policy and are essential to providing opportunities for thoughtful public input.

In **Butte, Montana** maps were used in conjunction with a recently completed transportation plan for the community. The ability to visually display socio-economic and housing data was particularly important in developing recommendations for the development of transportation infrastructure.



APPENDICES

APPENDIX A ~ THE MONTANA LAND INFORMATION ACT

90-1-401. Short title. This part may be cited as the "Montana Land Information Act".

90-1-402. Purpose. The purpose of this part is to develop a standardized, sustainable method to collect, maintain, and disseminate information in digital formats about the natural and artificial land characteristics of Montana. Land information changes continuously and is needed by businesses, citizens, governmental entities, and others in digital formats to be most effective and productive. This part will ensure that digital land information is collected consistently, maintained accurately in accordance with standards, and made available in common ways for all potential uses and users, both private and public. This part prioritizes consistent collection, accurate maintenance, and common availability of land information to provide needed, standardized, and uniform land information in digital formats.

90-1-403. Definitions. As used in this part, unless the context requires otherwise, the following definitions apply:

- (1) "Account" means the Montana land information account created in [90-1-409](#).
- (2) "Council" means the land information advisory council established in [90-1-405](#).
- (3) "Department" means the department of administration provided for in [2-15-1001](#).
- (4) "Digital format" means information that is scanned, electronically drawn, layered through the GIS, or digitized by other electronic methods.
- (5) "Geographic information system" or "GIS" means an organized collection of computer hardware, software, land information, and other resources, including personnel, that is designed to or assists to efficiently collect, maintain, and disseminate all forms of geographically referenced information.
- (6) "Land information" means data that describes the geographic location and characteristics of natural or constructed features and boundaries within or pertaining to Montana.

90-1-404. Land information -- management -- duties of department. (1) The department shall:

- (a) serve as the administrator of the account;
- (b) work with all federal, state, local, private, and tribal entities to develop and maintain land information;
- (c) annually develop a land information plan that describes the priority needs to collect, maintain, and disseminate land information. The land information plan must have as a component a proposed budget designed to accomplish the goals and objectives of the plan.
- (d) present the land information plan to the council for review and endorsement;
- (e) establish, by administrative rule, an application process and a granting process that must be used to distribute funds in the account. The granting process must give preference to interagency or intergovernmental grant requests whenever multiple state

agencies, local governments or agencies, or Indian tribal governments or tribal entities have partnered together to meet a requirement of the land information plan.

(f) review all grant applications from state agencies, local governments or agencies, and Indian tribal governments or tribal entities for the purpose of implementing the land information plan;

(g) monitor the use of grant funds distributed to a state agency, a local government or agency, or an Indian tribal government or tribal entity or to any combination of state, local, and Indian tribal governments or entities to ensure that the use of the funds complies with the purposes of this part;

(h) coordinate the development of technological standards for creating land information;

(i) serve as the primary point of contact for national, regional, state, and other GIS coordinating groups for the purpose of channeling issues and projects to the appropriate individual, organization, agency, or other entity;

(j) provide administrative and staff support to the council, including paying the expenses of the council;

(k) annually prepare a budget to carry out the department's responsibilities described in this section; and

(l) report to the governor and the legislature, as provided for in [5-11-210](#), on the progress made in the ongoing collection, maintenance, standardization, and dissemination of land information.

(2) To fulfill the responsibilities described in subsection (1), the department or any recipient of funds granted pursuant to this part may contract with a public or private entity.

90-1-405. Land information advisory council -- appointments -- terms -- vacancies -- compensation. (1) There is a land information advisory council.

(2) The council is composed of the following members:

(a) the director of the department or the director's designee who shall:

(i) serve as the presiding officer of the council; or

(ii) appoint the presiding officer from among the other members of the council;

(b) the state librarian or the state librarian's designee;

(c) to be appointed by the governor:

(i) the directors of four other departments established in Title 2, chapter 15. A director may designate a person to act in the director's absence.

(ii) three persons who represent county or municipal government, at least one of whom is active in land information systems;

(iii) two persons who are employed by the U.S. department of agriculture;

(iv) two persons who are employed by the U.S. department of the interior;

(v) two persons who are active in land information systems and represent public utilities or private businesses;

- (vi) one person who represents Indian tribal interests;
 - (vii) one person who represents the Montana university system;
 - (viii) two persons who are members of a Montana association of GIS professionals;
- and
- (ix) one person who represents the interests of a Montana association of registered land surveyors;
 - (d) one member of the Montana state senate, appointed by the committee on committees, who must be appointed prior to the appointment of the member described in subsection (2)(e); and
 - (e) one member of the Montana house of representatives, appointed by the speaker of the house of representatives, who may not be a member of the same political party as the member of the senate appointed under subsection (2)(d).

(3) Each council member is appointed for a 2-year term that begins on July 1 of the odd-numbered year and ends on June 30 of the succeeding odd-numbered year. A member may be reappointed to the council.

(4) A vacancy on the council must be filled in the same manner as the original appointment, and the person appointed to fill the vacancy shall serve for the remainder of the unexpired term.

(5) (a) A member of the council who is not a legislator or an employee of the state or a political subdivision of the state is eligible to be reimbursed and compensated, as provided in [2-15-124](#).

(b) A member of the council who is not a legislator but is an employee of the state or a political subdivision of the state is not entitled to compensation but is entitled to be reimbursed for expenses, as provided in [2-18-501](#) through [2-18-503](#).

(c) A legislator who is a member of the council is eligible to be compensated and reimbursed, as provided in [5-2-302](#).

90-1-406. Land information advisory council -- duties -- advisory only. (1) The council shall:

- (a) advise the department with regard to issues relating to the geographic information system and land information;
- (b) advise the department on the priority of land information, including data layers, to be developed;
- (c) review the land information plan described in [90-1-404](#) and advise the department on any element of the plan;
- (d) advise the department on the development and management of the granting process described in [90-1-404](#)(1)(e);
- (e) advise the department on the management of and the distribution of funds in the account;
- (f) assist in identifying, evaluating, and prioritizing requests received from state agencies, local governments, and Indian tribal government entities to provide

development of and maintenance of services relating to the GIS and land information;

(g) promote coordination of programs, policies, technologies, and resources to maximize opportunities, minimize duplication of effort, and facilitate the documentation, distribution, and exchange of land information; and

(h) advocate for the development of consistent policies, standards, and guidelines for land information.

(2) The council functions in an advisory capacity, as defined in [2-15-102](#).

(Parts 407-408 are reserved.)

90-1-409. Montana land information account. (1) There is established in the state special revenue fund a Montana land information account.

(2) All money received by the department of revenue pursuant to [7-4-2637](#)(3)(a)(iii) must be deposited in the account.

(3) Funds in the account must be invested pursuant to Title 17, chapter 6, part 2. All interest and income earned on funds in the account accrue to and must be deposited in the account.

90-1-410. Montana land information account -- distribution of funds. (1) The department shall annually prepare a budget to carry out the department's responsibilities described in [90-1-404](#). Money in the account may be used to fund all or a portion of the budget or to otherwise accomplish the purposes of this part.

(2) A state agency, a local government, or an Indian tribal government entity may apply to the department for funds in the account for the purposes described in this part.

(3) The department shall ensure that funds distributed under this section are managed by the recipient of the funds according to standards and practices established by the department to allow for the greatest use and sharing of the land information.

90-1-411. Montana land information account -- use of funds -- action by department -- hearing. (1) Money in the account may be used only for the purposes of this part, including purchasing technology to assist in collecting, maintaining, or disseminating land information and funding the budget required under [90-1-410](#).

(2) If the department determines that a recipient of funds from the account has not used or is not using funds in the manner prescribed by the department, the department may, after notice and hearing as provided for in Title 2, chapter 4, suspend further payment to the recipient.

(3) A recipient to whom the department has suspended payments under this section is not eligible to receive further funds from the account until the department determines that the recipient is using funds in the manner prescribed by the department.

(Part 412 is reserved.)

90-1-413. Rulemaking. (1) The department shall adopt rules regarding:

(a) designing and implementing the process to develop the land information plan described in [90-1-404](#)(1)(c);

(b) the application and granting processes provided for in [90-1-404](#)(1)(e);

- (c) the monitoring process provided for in [90-1-404](#)(1)(g); and
 - (d) the process for coordinating technological standards for creating land information provided for in [90-1-404](#)(1)(h).
- (2) The department may adopt other rules considered to be necessary for the effective administration of this part.

1 Introduction

The Montana Geographic Information Council (MGIC) was created in 1997 by an executive order of the Governor to provide policy level direction and promote efficient and effective uses of the State's infrastructure and resources for Geographic Information Systems (GIS). Since its inception, the Council has served as a platform for policy level discussions of GIS issues in the State, such as securing funding for the development of the framework layers of the Montana Spatial Data Infrastructure (MSDI), coordination of GIS activities between government entities and the private sector, legal issues related to GIS and surveying, and the need for administrative consistency and data standards.

As of July 1st, 2005, MGIC was replaced by the Montana Land Information Advisory Council in accordance with the Montana Land Information Act (MLIA) adopted by the 2005 Montana Legislature. In the MLIA, GIS is defined as "an organized collection of computer hardware, software, land information, and other resources, including personnel, that is designed to... efficiently collect, maintain, and disseminate all forms of geographically referenced information." ². Further, in its statement of purpose, the MLIA identifies the need "to develop a standardized, sustainable method to collect, maintain, and disseminate information in digital formats about the natural and artificial land characteristics of Montana. Land information changes continuously and is needed by businesses, citizens, government entities, and others...and (*must be*) made available n common ways for all potential uses and users, both private and public". The Montana Land Information Advisory Council membership as outlined in the legislation incorporates representation from State agencies, Tribes, Federal partners, universities and the private sector.

Prior to passage of the MLIA, MGIC initiated a strategic planning process, which included the development of this report. In the process initiated by MGIC and outlined herein, the newly appointed MLIA Council will complete this strategic planning effort intended to provide a common direction for future GIS activities by all participants in the Montana GIS community and users in both the public and private sectors, and their administrative and management counterparts. It is well recognized that the design and development of geographic information systems can determine how useful the data and products generated will be for activities such as maintaining transportation and critical infrastructures; managing natural resources, wildlife, water supplies, and other local

¹ This State of the State document was prepared as a draft, but never officially finalized.

² Senate Bill No. 98, 2005 Montana Legislature, <http://data.opi.state.mt.us/bills/2005/billhtml/SB0098.htm>

and regional land use planning issues that influence the overall economic and community development needs of the State of Montana. With this recognition, the planning effort proposed will identify goals and objectives as well as specific implementation strategies intended to foster and support efforts to provide reliable, easily accessed information in more efficient ways for a wide variety of applications and shared uses. The following five questions identified by the MGIC Strategic Planning Subcommittee will provide a framework for the overall GIS strategic planning effort.

1. What is the current environment for GIS in Montana (State of the State)?
2. Where do we need and want to be in the immediate (2-5 years) and long-term (5-10 years) future?
3. What are our strategies and methods for reaching our immediate and long term goals?
4. Who will be responsible for implementation of the plan (roles and responsibilities)?
5. How will progress toward meeting the goals and objectives of the plan be evaluated?

This State of the State report will answer question number 1 and provides a starting point for the planning process.

2 Historic Overview

Montana has been at the forefront of GIS development for over 20 years, and is nationally recognized for its long-standing efforts to employ GIS technology in a wide variety of applications. Successful collaborative efforts to effectively disseminate geographic information and its supporting technology are evident throughout the history of GIS in the State. At least five years prior to the introduction of GIS specific computer technology, there were a number of significant efforts to coordinate geographic land information data development, management, and sharing among government agencies, universities, and private sector groups at the local, State, tribal and Federal levels as noted in the following time line:

- 1982 – The Montana Governor's Council on Management, recognizing the growing amounts of natural resource data and the growing need for quick access to this data, called for greater coordination and information sharing among natural resource agencies.
- 1983 – The Montana Legislature created the Natural Resource Information System (NRIS) and the Natural Heritage Programs (NHP) within Montana State

Library: "...to be a comprehensive program for the acquisition, storage, and retrieval of existing data relating to the natural resources of Montana."

- 1985 – The Montana Interagency Information Processing Coordinating Group was created, which included the Montana Department of Natural Resources and Conservation (DNRC), the University System, the U.S. Forest Service (USFS), the Soil Conservation Service (formerly the SCS and now the Natural Resources Conservation Service, NRCS), the Bureau of Land Management (BLM) and other partners.

Following the initial introduction of GIS computer software, GIS related activities throughout the State began to take hold. For example:

- 1987 – Initial funding for the development of significant GIS capabilities at the state government level was provided by the EPA Superfund activities mandated by the Federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). GIS support to Superfund remediation activities by the EPA and the Atlantic Richfield Company (ARCO) in Anaconda, Butte and Milltown, Montana, resulted in GIS infrastructure and datasets being managed by the State and housed at the Montana State Library/NRIS. Although the initial funding for the NRIS GIS program was provided by the Superfund activities, the use of GIS resources was not limited to that purpose alone, and NRIS became the early focal point for GIS activities within Montana state government. The analytical capabilities of GIS were exposed by many of the projects conducted by NRIS for cooperating agencies and NRIS helped facilitate GIS development in other State agencies.
- 1988 -1990 –The Technical Working Group (TWG) and later the Interagency Technical Working Group (ITWG) were formed and worked to identify critical Statewide GIS themes, overlapping technical issues, and administrative and funding mechanisms to support GIS data development. Efforts of the ITWG established the framework for the current Montana Spatial Data Infrastructure (MSDI).
- 1995 Information Technology Advisory Council (ITAC) created to provide a forum for sharing information and to guide the development and deployment of information technology within state government.
- 1988-1992 – The Montana GIS Users Group (MTGIS) was formed by a loose-knit group of diverse GIS professionals working at all levels in local, State, Federal, Tribal government and the private sector. MTGIS held its first Statewide GIS conference in 1988 and in 1990 formally established the group as a non-profit consortium of federal, state, local, tribal, university, and private organizations and individuals engaged in the

use of, and education about, GIS technology. The primary goal of MTGIS was to serve the educational needs of the GIS community at large. For nearly 15 years MTGIS provided a forum for exchanging information and ideas on GIS technology by sponsoring workshops, training opportunities and community projects, publishing a newsletter, funding educational scholarships, and hosting annual GIS conferences.

- 1995 – The Montana Local Government GIS Coalition (MLGGC) was established by local government GIS practitioners to facilitate and advance the implementation and development of GIS technology in city and county government through communication and data sharing.
- 1996 – The Montana Department of Administration (DOA) established the GIS Section within the Policy and Planning Bureau of the Information Technology Services Division (ITSD). The agency first created and staffed a GIS Bureau when efforts to standardize a Statewide GIS coverage of cadastral information were supported by the Legislature.
- 1997 – The Montana Geographic Information Council (MGIC) was created by an executive order signed by Governor Racicot.
- 2001 - The Montana Legislature created the Information Technology Board to replace the Information Technology Advisory Council and advise the Department of Administration and the ITSD on key information technology issues.
- 2003 – The Montana Legislature passed the Montana Information Technology Act placing the responsibility for information technology management and coordination within State government on ITSD. When the DOA was reorganized in 2002, the GIS Section became a bureau under the operations area of the ITSD Division.
- 2003 – The roles of the ITSD and NRIS relative to GIS in Montana were clarified in a Memorandum of Understanding (MOU)³ which stated that the ITSD and the MSL “are the principle cooperating agencies, on behalf of the State of Montana, with responsibilities for promoting a well-coordinated GIS enterprise and providing Montana’s citizens with a functional, cost-effective, and coordinated approach to developing, maintaining, and delivering geospatial data that are essential to the GIS enterprise.” In outlining the specific areas of responsibility for each agency, the MOU further stated, “Cooperation between ITSD and MSL is essential to ensure an effective collaboration among all other parties who participate in the Montana GIS enterprise. As principle cooperators, ITSD is the agency with primary responsibility for providing coordination and technical support to the Montana GIS enterprise. MSL is the agency

with primary responsibility for ensuring that geospatial information is accessible to the Montana GIS enterprise, [defined as} a “clearinghouse function”.³

- 2004 – Following months of coordination meetings and deliberations, MTGIS was joined by members of the ITWG and MLGGC to create the Montana Association of Geographic Information Professionals (MAGIP), a non-profit, volunteer professional association of diverse GIS users from federal, tribal and state agencies, local government, private industry, K-12 schools, and universities.⁴
- 2005 – The Montana Land Information Act (MLIA) was signed into law by Governor Schweitzer. The MLIA is intended to prove a stable funding source that can contribute toward the completion of the MSDI themes and provide financial resources for collaborative GIS projects of Statewide priority.

3 The State of GIS in Montana - 2005

Over the past two decades, Geographic Information Systems (GIS) have become an increasingly critical component of public policy formulation in the State of Montana. The ability to geospatially present natural resource, land use, land ownership, demographic, cultural and infrastructure data has provided decision makers with powerful analytical tools that are being used by professionals in virtually every field. Community development specialists, land management agencies, realtors, engineers, emergency and disaster specialists – and many others now rely on GIS to evaluate conditions and allocate resources. The State is also experiencing rapid changes in GIS related technologies, spurred by an exponential growth in the demand for various GIS applications by a wide variety of users.

This section provides an overview of the existing situation in Montana and describes the roles played by the primary participants who are developing, managing, and using GIS data sets and infrastructure. Included are summary references to state, federal, local and tribal government agencies, educational programs, non-governmental organizations and the private sector.

Although GIS data, and the technology through which the data are utilized, and the community of GIS users are inextricably linked, for the purpose of this discussion it is useful to present these three topics separately.

³ Memorandum of Understanding between Montana State Library and Information Technology Services Division Regarding GIS and Geospatial Information, March 6th, 2003.

⁴ Mike Sweet, *GIS Coordination in Montana*, a Power Point Presentation, 2004

3.1 Geospatial Data

Although hundreds of GIS data layers (themes, coverages) have been developed in Montana – many Statewide, some covering large regional areas, and many more relating to specific geographic areas – this discussion of the GIS Enterprise in Montana will be primarily limited to what is known as the Montana Spatial Data Infrastructure (MSDI). Seven key layers have been identified by the Federal Geographic Data Committee (FGDC) as critical to GIS development and use, and are considered to be the basic foundation necessary for fundamental GIS data applications. With input from members of the Montana GIS community over the past five years, MGIC has formally expanded this set to include six additional data layers, for a current total of thirteen MSDI themes (see Appendix A).

3.1.1 Coordination/Creation

For many of the MSDI data layers, the coordination necessary to produce the data layer is minimal or is already being accomplished by an agency that has responsibility for its development. For example, the 1:24,000 scale SSURGO soils theme has long been the responsibility of the NRCS, the federal agency charged with mapping soils for the Nation. Although the USFS and BLM work closely with the NRCS under the National Cooperative Soil Survey (NCSS) to complete soil surveys on public land, the responsibility for meeting data standards rest with the NRCS.

For many other MSDI layers, multiple agencies and organizations are involved in the production of related data, with none naturally playing a lead role to assimilate the information into a true MSDI data layer. In these cases, the process of data development can benefit from assigning a coordination role to a single entity. For example, in the case of the cadastral and transportation data layers, coordinator positions within the ITSD have been staffed to champion the development of these important themes and as a result significant progress has been made.

Coordination relating to the creation and maintenance of MSDI data layers has been greatly facilitated in Montana through the creation of **I-Teams**. Working cooperatively with MGIC, in 1999, the ITWG completed a process recommended by the Federal Office of Management and Budget (OMB) for synthesizing information about each MSDI layer (i.e. current status, cost to complete, priority, custodian, etc.) and initiated a planning process to complete the MSDI. Included in this process was the concept of Implementation Teams (I-Teams) led by a data layer "champion" (an entity or agency that has assumed responsibility for ensuring that the planning process takes place). In 1999 I-Teams for the MSDI themes were formed by representatives from the ITWG, MLGGC and other GIS professionals who then worked together to prioritize,

coordinate, estimate costs, identify cost sharing opportunities; and develop implementation plans to complete each layer (See I-Team Summary Report Appendix xx).

3.1.2 Custodianship/Maintenance

Once MSDI data layers are completed they must then be actively managed and maintained or they will quickly become dated and of limited usefulness. In addition, data layers and applications developed from them should be archived for historic and practical reasons, such as enabling trend analysis. Again, as with coordination, some layers have 'natural' custodians (e.g. the SSURGO soil data). The long-term custodian of other MSDI themes however, is not always so clear cut. For example, the transportation theme includes numerous and multi-jurisdictional data developers and maintainers. In these cases it is critical for a Statewide custodian to be designated and supported. Through the I-Team process described above, over the past five years, potential custodians have also been identified for each of the MSDI layers; however long-term funding commitments have not yet been secured to provide the custodianship needed for all layers.

3.1.3 Dissemination

In order for digital geographic information to be useful to the widest audience and to prevent duplication of effort, data layers must be easily located, provided in common formats that serve user needs, and made readily available when and where they are needed. Many data creators and custodians have developed mechanisms to provide broad access to their data. For example, the Census and Economic Information Center provides comprehensive access to population census data and related interpretive products. However, in many cases, agencies and organizations that produce data do not have a mandate or the resources to disseminate the information.

The Montana State Library's NRIS program, in its role as the State GIS Clearinghouse, performs the modern library function of serving as a single point of access to the currently available MSDI layers, as well as hundreds of related data layers and associated attribute data. NRIS provides access to the raw data, access to preformatted maps based on the MSDI layers, and access to on-line interactive mapping applications that utilize the MSDI layers. Fulfilling this function has required that a reasonably current copy of each data layer reside at NRIS and be updated on a routine basis. More recently, some producers of GIS data layers have begun making their information available through the use of web services, which can provide knowledgeable users direct access to the most current information.

3.2 GIS Technology

3.2.1 Coordination

Under the Montana Information Technology Act (MITA) the responsibility for information technology coordination for State agencies is within ITSD, which staffs a GIS Services Bureau whose Chief is the State GIS Coordinator. ITSD also has review and approval authority for purchases of computer hardware and software by State agencies and the ITSD GIS Coordinator acts in an advisory capacity to agencies considering development or expansion of their GIS infrastructure. The Information Technology Board (ITB) advises the DOA and the ITSD on key information technology issues and provides guidance for the development and deployment of information technology in the State. Several other State agencies now have their own GIS coordinators which serve the needs of their GIS specialists.

3.2.2 Software/hardware platform(s)

The primary GIS software utilized within Montana government agencies is provided by the suite of products available from ESRI™ which are considered the industry standard throughout the U.S. and internationally. In general, the contracts covering software and hardware purchasing and licensing are managed on an agency-by-agency basis. There is limited use of other GIS software products, however engineers and surveyors often utilize software such as AutoCad™. Greater diversity is seen in the use of global positioning systems (GPS) software used for collection of field data often needed for GIS applications. In this case numerous systems and programs are in use, having varying levels of accuracy and compatibility with GIS hardware and software.

3.2.3 Technology transfer/resource sharing

Although state agencies and local government agencies in Montana are primarily responsible for developing and implementing GIS technology for their in-house use, Montana has been very successful in implementing technology transfer and resource sharing. Since the inception of its GIS program in 1987, NRIS has provided data development/augmentation support and data discovery/visualization/dissemination support to state and federal agencies, and, to a lesser extent, to local government, through interagency cost recovery agreements. These interagency partnerships has greatly facilitated the development of GIS within many state agencies, in the early stages providing access to technology that would otherwise be beyond the reach of some agencies, and in the later stages providing the basis for long-term staff and infrastructure sharing. The Fish, Wildlife and Parks Information Management unit (which includes the FWP GIS program) has been housed at the Montana State Library, collocated with the NRIS program, since 1998???. The Natural Resources Conservation

Service Montana GIS Program has been collocated with NRIS since ??????. The Department of Health and Human Services funds a full FTE housed at MSL to serve the needs of its Environmental Public Health Tracking Program. These and other cooperating agencies contribute to infrastructure costs, share a common data center (servers, storage and related equipment/software), and participate in a shared pool of GIS specialists, programmers, and other IT staff.

3.3 *The Montana GIS Community*

What we refer to as the Montana Geographic Information System community is a diverse group of individuals dedicated to cooperation on technical, administrative and fiscal issues as they relate to data development, standardization and dissemination. Members of the Montana GIS community represent a broad range of technical and analytical skills and include representatives from many areas of the public and private sector. The widespread sharing of ideas, technical advice and GIS data development have been key components in building the strong GIS infrastructure that the State currently enjoys.

3.3.1 **Councils/Organizations**

3.3.1.1 **Montana Land Information Advisory Council (MLIAC)**

Following passage of the MLIA by the 2005 Legislature, the Montana Land Information Council is now charged with providing oversight and advise to the DOA as it manages the funding generated for the purposes of supporting the creation, use and maintenance of priority State GIS data sets.

3.3.1.2 **Montana Association of Geographic Professionals (MAGIP)**

The mission of MAGIP is to stimulate, encourage, and provide for the advancement of an interdisciplinary approach to the use of geographic information. MAGIP sponsors educational workshops, conferences, forums, grants, and scholarships. MAGIP also works collectively with educators, data creators, data users, application developers and software vendors to foster technical cooperation and promote the development of sound management policy and practices that can support the efficient and effective use of geographic information system resources.

3.3.2 **The Education Community**

3.3.2.1 **Post Secondary Education**

The development of GIS programs within Montana’s post secondary institution has typically occurred on a departmental basis. Programs in natural resources management including forestry, land planning and geography, computer science and environmental sciences often have GIS support. The results of a recent survey of post-secondary GIS programs conducted by MAGIP is presented in Table 1-2.

Table 2-2 GIS Programs at Montana Colleges and Universities

College Name	Department	Program and Notes	2 year, full university	state/private
Montana Tech	Bureau of Mines	Courses include ArcView 1 and 2, GIS Software 3 and Data Acquisition	Both	State
Montana Tech South Campus - COT	College of Technology	Courses include ArcView 1 and 2, GIS Software 3 and Data Acquisition	Both	State
University of Montana – Missoula	Geology Geography	The Geology and Geography Departments provide GIS support to various programs.	Full University	State
University of Montana – Missoula	Department of Forest Mgmt. U. of M.	Through a contract with ESRI, GIS programs are provided to the Department of Forestry and Conservation	Full University	State
Montana State University - Billings	Departments of Env. Studies and Business	The Business school offers a minor in GIS. A variety of GIS courses are offered through Environmental Studies and the Business School.	Full University	State
Montana State University - Bozeman	Earth Sciences	The college offers a sequence of three GIS core courses serving undergraduate and graduate students in all departments.	Full University	State
Montana State University -- Bozeman	Land Resources and Environmental Science		Full University	State
Salish& Kootenai Kootenai College	CSKT Natural Resources Dept	Environmental Studies and Forestry Departments	4-year college	Tribal

3.3.2.2 K-12 Education

Teachers across Montana have been incorporating GIS technologies in their classrooms for over 10 years. Some examples include the Billings School District where high school students used GIS to map the Lewis and Clark Expedition. In Townsend, elementary school students used GIS to map noxious weeds and forest areas affected by fire. In Butte, middle school students have used GIS technology to display the results of water quality tests on Silver Bow Creek. Teachers and students attend GIS conferences and benefit from GIS training opportunities and curriculum grants through MAGIP. As part of the Upper Midwest Aerospace Consortium (UMAC) sponsored by NASA, the ED-PARC group has also been active in training Montana teachers and students in the use of GIS and incorporating access to satellite imagery and other remote sensing products.

3.3.3 The Private Sector

It would not be possible to provide an inclusive list of private companies and individuals throughout Montana who are and have been involved in GIS. However, in general it can be said that private sector GIS providers play a key role in all aspects of GIS, including active participation in coordinating bodies, the development and distribution of GIS data sets, data analysis, interpretations, and application development. In particular, GIS professionals in the private sector continue to bring to the forefront the need for, and examples of, the latest in technological developments. The private sectors plays an increasingly important role in bringing GIS to the public and private GIS businesses often provide support to State, Federal, Tribal and local government entities.

3.3.4 Tribal Entities

Limited information is available regarding the GIS programs and efforts of Tribes throughout the State and it is hoped that this strategic planning effort will provide a more comprehensive picture of Tribal GIS activities and needs. It is known that until recently, primary GIS support to individual tribal projects was provided by the Bureau of Indian Affairs (BIA). The BIA houses GIS specialists and data sets relevant to each reservation and in some cases provide support to Tribal land management activities that require GIS products, financial or technical support. For example, the Fort Peck Reservation recently completed a rangeland inventory for which the BIA developed critical GIS themes and interpretive maps. As the federal agency responsible for providing Tribes with technical support for natural resources conservation, the NRCS has also been active in using GIS for inventory and analysis on tribal lands in Montana. In 2004 the Fort Belknap tribe was able to hire a GIS intern with funding provided by

the BIA and training support from the NRCS. The Blackfeet, Fort Peck, and Northern Cheyenne tribes have also been active for several years in developing GIS data sets and applications for analyzing tribal lands and resources. There are currently seven tribal community colleges in Montana, the Blackfeet Community College, the Dull Knife Memorial College, Fort Belknap College, Fort Peck Community College, Little Big Horn College, Stone Child College and the Salish Kootenai College, each providing differing training opportunities related to GIS.

The Confederated Salish and Kootenai Tribe (CSKT) in west-central Montana has one of the oldest GIS systems in Indian Country. Established approximately 15 years ago (1990), the CSKT GIS program currently employs four individuals who provide support services to 25 regular users of GIS data and products, who work within various Tribal programs. In addition to providing GIS services to the Tribe, the CSKT GIS program contracts with non-tribal entities to provide GIS support. For example, the CSKT GIS program is providing services to Flathead Sub-Basin planning efforts for the Kootenai and Flathead Rivers.

In its' initial stages, the CSKT GIS program was provided with spatial data directly by the Geographic Data and Service Center (GDSC) of the Bureau of Indian Affairs. Today, the GDSC distributes GIS software and provides training and technical support, but no longer provides spatial data directly to the Tribe. The CSKT GIS office is currently conducting a user needs analysis through interviews with more than 80 people who either use or benefit from GIS technology. Generally, the trends survey indicates the need to an enterprise GIS system to support the needs of multiple users.

3.3.5 Government Entities

3.3.5.1 Local Government

Butte-Silver Bow and Anaconda-Deer Lodge were the first local government entities in Montana to establish GIS programs in conjunction with the previously mentioned Superfund activity in 1991 and 1992. Over the past two decades, numerous local government entities across the state have recognized the advantages of implementing GIS programs in their jurisdictions and many cities and counties have recognized that GIS can be used to electronically generate maps replacing hand drawn documents and thus increasing accuracy and efficiency while reducing costs. In conjunction with rural addressing and E-911 efforts, an increasing number of counties are also initiating GIS programs.

Some local government entities such as Helena, Missoula and Great Falls have created separate GIS departments while others have incorporated GIS into existing departments on an as needed basis or formed cooperatives with their county government partners.

In keeping with these diverse approaches, access to State and Federal GIS products via the Internet continue to make the technology more readily available for a variety of local uses. Many local governments take advantage of these systems to produce maps for various activities – land planning, capital improvements programming, parks and recreation, housing and economic development. In turn, much of the geospatial data that is being collected and digitized at the local level is now being used by state and federal entities, in a ‘bottom up’ approach to information collection and management. Likewise, the importance of using local data is reflected in the current design of the National Map and the Geospatial One Stop (described below), which rely in part on locally generated information in developing their systems.

3.3.5.2 State Government

The same diversity of organizational models found in local government is true for State government. For example, the Montana Department of Revenue (DOR) has established GIS programs in each of its offices at the local level. In contrast, Fish Wildlife and Parks (FWP) has taken a more consolidated approach and its GIS program provides support to all users in the agency. DEQ and DNRC staff GIS coordinators at the agency level who provide support to GIS specialists in located in programs throughout the agency.

3.3.5.3 Federal Government

As with State, local and Tribal government, it would not be practical to mention each and every GIS activity within Federal government in this document. The following is intended as a brief summary of activities within those agencies providing data for the MSDI and currently active in the Montana GIS community

3.3.5.3.1 The United States Geologic Survey (USGS)

In the early 1980's, the US Geological Survey (USGS) began digitizing its maps and experimenting with the digital data that ultimately was to become the backbone of Geographic Information Systems, as we know them today. Historically, the Federal Government employed a “top down” approach to the map-making process. Typically, federal map-makers would conduct the necessary field work, and then draw and digitize maps. By the early to mid-1990's however, it became increasingly obvious that local government entities needed to design and build their own digital geographic data to meet local planning and community development needs. Clearly the Federal Government could not be the only source of geospatial information.⁵

Today, a primary mission of the USGS is to meet the Nation’s needs for current base geographic data and maps. Through partnerships with federal, state, and local governments and the private sector, the USGS is committed to providing the Nation with access to current, accurate, and nationally consistent topographic maps and

⁵ Interview with Lance Clampitt, USGS, June 24th, 2005

geospatial and remotely sensed data and information to help informed decision making by resource managers and the public. This synthesis of information, products, and capabilities, *The National Map*, will be a seamless, continuously maintained set of geographic base information that will serve as a foundation for integrating, sharing, and using other data easily and consistently.

In light of this, the USGS has entered into an MOU with the State of Montana, ITSD and the Montana State Library (NRIS), in support of its mission to establish partnerships and other collaborative efforts necessary for the development, maintenance, dissemination, and use of *The National Map*. The activities covered by this MOU include but are not limited to:

- Data Development
- Data Maintenance
- Database Development
- Data Dissemination and Distribution
- Exchange of Geospatial and Remotely Sensed Information
- Feature Servicing and Generalization
- Outreach and Education
- Research and Applications
- Standards Development
- Web Mapping Services and Applications
- Workshops, Training, and Technology Transfer⁶

In summary, the USGS has become the “producer of last resort” for geospatial data and serves in a coordinating role to assist local communities and other federal government entities in collaborating to produce, maintain and distribute their data. In Montana, the USGS is working towards playing a larger role in coordinating Federal agencies with GIS interest in Montana.

Geospatial One Stop – The Geospatial One-Stop is an intergovernmental effort in support of the President's Initiative for E-government. One-Stop works side-by-side with the Federal Geographic Data Committee (FGDC) whose 20 participating agencies are cooperating to make the National Spatial Data Infrastructure (NSDI) a reality. The One-Stop program has been established by the OMB, to bring all of the GIS related programs within the Federal government together to a “one stop place” where everyone can access data and metadata. **The National Map** was recently made part of the Geospatial One Stop.

⁶ Memorandum of Understanding Between the USGS and the State of Montana for Coordination and Cooperation Pertaining to the National Map, 2003

The National Map is the interactive visual and download application of the Geospatial One-Stop. The National Map is a project of the National Geospatial Programs Office to provide current, accurate, and nationally consistent digital geospatial data and topographic maps derived from those data. In 2004 and 2005, NGPO worked in partnership with the National States Geographic Information Council (NSGIC) and the National Association of Counties (NACo) to further enhance development of *The National Map* and to improve collaboration among all levels of government.

3.3.5.3.2 *The Natural Resources Conservation Service (NRCS)*

The NRCS, in U.S. Department of Agriculture (USDA) is responsible for providing technical assistance to private landowners and Tribes for the purposes of promoting natural resource conservation. As the Federal agency responsible for mapping soils and delineating watersheds the NRCS has a significant investment in these digital data themes and has supported NRIS in making these MSDI themes available on the State GIS Clearinghouse. In addition, the NRCS has cooperated with the USGS in producing digital ortho-imagery and making it available through the NRIS Clearinghouse. Information about soils, in combination with high-resolution imagery, is used by planners, farmers and ranchers, biologists and other Montana citizens to answer a wide range of questions about site conditions, productivity, and suitability for development.

Resource specialists in local NRCS field offices use a full suite of GIS mapping tools and themes to work with private landowners in developing site-specific conservation plans. At the State level, the NRCS is actively acquiring and using satellite imagery and remote sensing technology in combination with GIS to conduct resource inventories, analyze resource conditions, and assist with identifying resource concerns. Most recently the NRCS, in coordination with the USDA Farm Services Agency (FSA), helped funded and coordinate the Statewide acquisition of one-meter resolution natural color aerial photography for the 2005 growing season. Access to accurate geospatial data is critical to the daily tasks of NRCS employees and the Agency works closely with GIS partners throughout the State to coordinate data development, acquisition and use. To support mutual interests in using GIS for evaluating natural resources, the NRCS State Geospatial Analysis program is co-located with the MSL Natural Resources Information System.

3.3.5.3.3 *Other Federal Agencies*

Most of the other Federal agencies in Montana – the EPA, USFS, BLM, the Bureau of Reclamation, and the National Park Service – employ specialists who use GIS in the course of fulfilling their agency missions. Representatives from some agencies work with the State of Montana, local governments, and private entities to assist in ongoing State-wide collaborative efforts and to provide technical support and information.

(as with State and local government sections, provide a complete Appendix and expanded discussion of Federal agency GIS activities. The above were included in greater detail as examples of how this information might be presented in summary form)

4 Challenges and Opportunities Regarding GIS in Montana

Section 4 is primarily at this time a summary of statements and opinions of various contributors. Much work needs to be done to fully identify the challenges and opportunities to set the stage for the planning efforts to come.

In contrast with a relatively obscure beginning and limited focus, Geographic Information System technologies are now experiencing rapid changes - as are information management systems in general. These technological developments are in turn spurring exponential growth in the demand for GIS applications and their derived products by a wide variety of users. This situation presents a unique set of challenges and opportunities to administrators, managers, technical specialists and the clients they serve. As the technology has advanced, not only has there been a shift in the way data are collected, created, and managed, but also in concepts and tools for data dissemination. The following is a summarization of the challenges and opportunities identified by members of the MGIC Strategic Planning Sub-committee and other public and private sector GIS professionals.

4.1 *The Changing GIS “Paradigm”*

The GIS paradigm is rapidly changing from a system of isolated islands or pockets of technologies to a more integrated approach. Individual GIS specialists responsible for collecting data and creating and hosting various products no longer work in isolation. For example, they can easily access the state’s Cadastral mapping system, the Montana State Library/NRIS GIS Clearinghouse, or the National Map, via their computer and more easily than ever send and receive data sets to and from users that once required cumbersome data transfer mechanisms. The increasing potential for data to be contributed to and shared among users at all levels – local, state, tribal, and federal – in a system where connectivity encourages a better source of information overall is both encouraging and daunting. Data sets that were recently considered state of the art are now viewed as unsatisfactory as the demand for increasing spatial resolution and detailed attribute information continues to grow in support of sophisticated analysis problems that GIS is uniquely designed to address.

The concept of a Statewide, 'federated' system where a series of independent entities form a cohesive data sharing system whose connectivity enables all participants to create and use information, has been introduced as a potential organizational model for the future. However, to be successful in any greater measure than past coordination efforts, this will require a great deal of coordination, collaboration, communication, and leadership with a focus on services. Without the benefit of seeing into future developments in technology or within government and business structures, it is extremely challenging to identify a successful future model for GIS that includes all sectors and participants in geographic information use and management in the State of Montana. Although Montana has been at the forefront of GIS technological developments in the past, in order to maintain this status it will require continuing innovative work to collaboratively incorporate and to adapt to new technologies such as web services and distributed data systems hosted and sponsored by Federal, State, Tribal and local entities. In developing a useful strategic plan it is clear that the present capabilities of geographic information and related systems need to be examined with an eye towards restructuring relationships across traditional agency and organizational boundaries. This suggestion also implies that the concepts of an enterprise, or 'federated' approach need to be clearly defined and the detailed implications, roles and responsibilities for all sectors and users be well articulated and understood.

4.2 *GIS and Information Technology*

GIS is increasingly becoming a part of the Information Technology (IT) mainstream. Geographic information systems have been changing from a fundamental database and data sharing approach to knowledge based approaches. This implies that those working in GIS must conform to overall IT standards and must leverage the time and talents of IT specialists whose venue goes beyond strictly geographic information. This can be unsettling to modern geographers who previously were able to manipulate the software but increasingly find themselves challenged to keep abreast of changes. However, resistance to these changes could result in a failure to apply GIS in new ways that might positively influence decision and policy makers and could, in turn, result in a loss of critical political support and associated funding.

4.3 *Communication and Collaboration*

As GIS technology advances and its applications have become more diverse and widespread, the need for better communication and collaboration among data creation, application, maintenance and distribution specialists is clearly seen as paramount to its successful use. For the last 10 to 15 years, GIS specialists have been working on

manipulating and reconfiguring data to make it work in a variety of contexts. In light of new technologies, some specialists are now able to focus more on applications and analysis while others find that data is often developed for one product or application, rather than a range of potential uses. This can result in having to “start over” as new or similar applications are required within other agencies and organizations.

GIS professionals in Montana have long been aware of the essential need for coordination and have worked together for decades to improve cooperation and information sharing. Yet despite a history of collaborate efforts, there is room for improvement. Chief among these is the need to work towards the elimination of duplication of effort. Strategic planning can help foster the development of mechanisms to do so.

4.4 GIS and Decision Makers

It is a common perception among GIS professionals that the policy makers who allocate the resources that are used to develop geospatial data layers and make them available to a wide variety of users do not always understand the value of GIS data sets, applications and uses of derived information, or how these products are important to the every-day functionality of the operations they manage. Specialists and practitioners in the Montana GIS community collectively and individually struggle at times to justify the importance of the technology to the various decision makers they must influence because these can include policymakers at all levels of government, senior managers and executives, and even the general public who may not be accessible to the specialist. This may be due to the fact that the value of GIS has not historically been properly understood, quantified, and communicated for these decision makers. In Montana today the real or perceived “chasm” that exists between GIS technical leaders and policymakers must be bridged to ensure the future success of fully implementing this powerful technology.

5 Closing Comments

It is important to note that this State of the State report is simply a snapshot of one point in time, and that the overall Strategic Plan will ultimately be modified to reflect the results of a proposed Statewide needs assessment designed for stakeholders to further define current conditions and future needs. In order to reach the larger GIS community, it is envisioned that the needs assessment will require a staged approach to identify stakeholders and solicit their input. While it may be difficult to determine the specific steps required to advance from the current conditions and to identify and accomplish a

shared vision of the future, this preliminary planning activity is critical. It is accompanied by the challenge of securing Statewide participation in the planning process by all stakeholders and segments of the GIS community who must be actively involved in identifying their role, responsibilities, needs and wants, and how they can contribute to the overall planning and implementation process. It is also important to recognize that it may not be possible to be all-inclusive, all at once. As each agency, level of government, or business might have its' own GIS strategic plan or business plan it will be necessary to incorporate an awareness of these guiding documents and take a hierarchical approach both administratively and geographically to be as all inclusive as possible. The GIS community in Montana has a proud and successful history of providing valuable information about our large and diverse State. It is our intent, in recommending the following strategic planning process, to carry that history forward into a strong and successful future.

APPENDIX C ~ SHAREHOLDER GROUP MEETINGS

Montana Geospatial Strategic Plan Shareholder Meetings ~ Issues Identified October, 2005 to June, 2006

Beginning in October of 2005, four shareholder meetings were held to identify issues and opportunities to be addressed in the Montana Geospatial Strategic Plan. Meetings were held with representatives from local, state and federal government entities and private sector GIS users and service providers. Following is the summary of the results of each of the meetings. Prior to the state agency, local government and private sector meetings, a survey was conducted to identify preliminary issues and concerns using Survey Monkey to help spur discussion. The state and federal agencies and private sector shareholders were also able to identify some preliminary goals. However, due to time limitations, the local government representatives were not able to identify any preliminary goals. A survey was also conducted to solicit input from Tribal GIS Users.

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Montana State Agency Representatives

October 6th, 2005

Wingate Inn, Helena, Montana

Meeting Attendees:

Kris Larson, Census and Economic Information Center, Department of Commerce

Lydia Bailey, Department of Fish, Wildlife and Parks

Susan Fox, Legislative Services Division

Stewart Kirkpatrick, Department of Administration, Information Technology Services Division

Zia Kazimi, Montana Department of Transportation

Sybil Govan, Montana State Library

Catherine Love, Department of Environmental Quality

Mike Sweet, University of Montana

Ted Chase, Department of Revenue

Sonja Hoeglund, Department of Natural Resources and Conservation

Ann Bauchman, Department of Natural Resources and Conservation

Jim Hill, Natural Resources Information Systems, Montana State Library

Jens Bolstad, Department of Emergency Services

Patrick Dougherty, Department of Agriculture

Bryant Ralston and Marty Balikov, ESRI

Janet Cornish, Facilitator, Community Development Services of Montana

Issues and Opportunities Identified by Category

Outreach, Education and Training

- We should learn from others and from others' successes.
- Education should be specific to user needs, i.e., appropriate – complex vs. simple.
 - GIS specialists or super users
 - Occasional users
 - Managers
 - Decision makers

Overcoming Barriers

- Social/Cultural/Political/Institutional barriers must be overcome.
- We must deal with entrenchment in order to move forward.
- We must address the lack of GIS champions.

Resource Allocation

- We must work toward consistent financial support.

- We must be adequately staffed.
- We must work to achieve overall stability.

Integration of Technology and Applications

- Benefits must be demonstrated to decision makers.
- GIS applications in agency services and businesses must be well demonstrated.
- We must take a “mission critical” approach in incorporating GIS into the activities of our agencies.

Working Smart

- We must work to avoid duplication.
- We should focus on collaboration and coordination.
- We should clarify our business functions and focus on delivering services efficiently and effectively.
- We should make greater use of Web based services.
- We should work to leverage other people’s work
- We must work at sharing resources

A Recognized, Formal Forum for State Agency GIS Professionals

- We should develop common protocols and standards.
- We need to foster professional development.
- We should work to bridge data with applications
- We can work with the MAGIP in promoting a forum for state agency GIS professionals.

Collaboration, Centralization and Coordination (The 3 C’s)

- The 3 C’s are needed both within agencies and state wide.
- The CIO can help with state-wide coordination.
- GIS should be coordinated with and incorporated within IT in general

Policy

- We must make a commitment to cooperation.
- We must identify champions within state agencies and at the state level.
- We must work at addressing issues related to licensing.
- We need to provide a direct link to statewide policy making regarding GIS.

Data Management

- We must work at the enterprise level.
- We must foster a federated system that emphasizes:
 - Data sharing

- Data stewardship
- Overall efficiency

Draft Mission and Goals

The meeting participants drafted the following draft mission and goal statements (in no particular order of importance).

Mission/Vision

It is the mission of the GIS professionals within Montana State Government to collaboratively develop and manage geospatial information technology to promote sound public policy making for the people of Montana and the missions of our agencies.

Goal 1:

Create a formally recognized forum of state agency GIS personnel that:

- Advances protocols & standards;
- Fosters collaborative efforts at a state enterprise level (application, affordable training, everything);
- Leverages resources;
- Recruits champions & advocates of our cause; and
- Engages in long-term planning.

Goal 2:

Educate and empower policy makers so they recognize and advocate the values of GIS technologies to achieve their policy objectives.

Goal 3:

Make GIS mission critical by embedding and integrating it in agency's core business processes.

Goal 4:

Identify/define each agency's responsibilities with respect to the state federated GIS enterprise:

- To avoid duplication of effort;
- To insure accountability;
- To make better use of resources;
- To assure efficiency; and
- To maximize return on investment.

Goal 5:

Identify and work to eliminate/overcome institutional, political and technological barriers such as:

- Agencies that don't have clearly defined authority;
- The Lack of Best Practices; and
- The Lack of Money

Federal Agency Representatives
December 12th, 2005
Conference Call/Web-X Meeting

Meeting Attendees:

Joe Gregson, National Park Service

Don Patterson, U.S. Forest Service

Rob Daley, National Park Service Monitoring Program

Lance Clampitt, U.S. Geological Survey

Mike Birtles, Bureau of Land Management

DeAnn Dutton (sp?) U.S. Geological Survey

Catherine Maynard – Natural Resource Conservation Service, USDA

Stewart Kirkpatrick, Montana Department of Administration, ITSD

Robin Wall, Geodata Services – Web X Support

Janet Cornish, Facilitator, Community Development Services of Montana

Issues and Opportunities Identified by Category

Data Complexity

- In some cases, the complexity of data at the federal level does not lend itself well to an enterprise system. For example, the Park Service is responsible for 388 National Park units in 50 states. Agencies are eager to work with other entities, but this complexity must be addressed.

Coordination and Communication (Avoiding Duplication of Efforts)

- It is critical that we work to coordinate the development of the state's framework themes and layers, e.g. the transportation layer and strive for an enterprise approach rather than "splitting" up our efforts.
- The acquisition and processing of data and images, such as Landsat data (remotely sensed data), should be coordinated to prevent duplication of activities at the state and federal levels.

- Coordination of data must address funding and distribution issues to avoid duplication of effort. We should create data once for many uses.
- It is important to coordinate with other users and agencies to create a better network of support.
- It is important to recognize the significance of coordination, production and standards associated with data related to high priority issues such as the fiduciary trust of Indian assets, energy development, recreation demands on public lands, off-highway vehicle recreation and noxious weeds.

Responsibilities for Data Layers/Themes

- We don't have an established or recognized data coordination path including an understanding of the assigned responsibilities associated with the development and maintenance of framework data.
- We have no formal structure for coordinating and communicating among agencies that are responsible for, or interested in working with, each layer. Individual agencies are not necessarily aware of who is responsible for which layer. Federal and State assignments under Circular No. A-16 a Federal Executive Order should be made clear. There are "I" teams established, but not everyone knows about them.
- In some cases, responsibilities have been assigned (for the development and/or management of framework layers), but these responsibilities have not been embraced primarily because agencies are not funded to take on these responsibilities.

Business Requirements

- It is important to work towards the effective development, exchange and use of geographic data to meet the business requirements of the agencies within the State of Montana.

Training Inadequacies

- Training is a key element. Some of the duplication problems have resulted because field office personnel aren't aware of existing data and therefore are recreating data sets that already exist.
- Often training needs are not met because of a lack of time.

Communication/Technology Tools

- The "geo-communicator" concept can be a powerful tool. For example the BLM is working in partnership with the U.S. Forest Service in developing the integrated federal lands program. This "module" enables the communication of data needs and geographic areas where certain work should be done. It also can

help identify specific data stewards, assist in project management and funding, and develop issues. For example, as a cadastral plan is put into place, the system could identify regions, associated stakeholders, funding mechanisms and program progress. The biggest limitation to coordination is the lack of communication. This system would enable us to share information about maps, project champions and stakeholders on-line, at any time.

- Geospatial One-Stop could really help in implementing a communications strategy. It provides a one-stop shopping place for data and provides a “market place” where people can identify geographic areas where they have data and areas of planned acquisitions. It can also serve as an information exchange.

Intergovernmental Strategies

- Intergovernmental strategic meetings might provide better leverage for accomplishing our goals if we diversify the attendees. We do not necessarily have to hold more meetings. Rather, we can seek broader representation to achieve better coordination.
- We need to leverage strategic government decision making at the highest level in the state (e.g. Dave White of NRCS should be communicating with the USFS chief for this region.) We must secure the support of the highest level personnel within our agencies, who in turn can bring our needs to the attention of the Washington DC folks, so that we can get funding and program development support. It may take “sitting” down with our own agency upper management to better inform them of the importance of GIS.

Data Acquisition and Coordination

- We should look at opportunities for sharing data with other federal agencies such as the Department of Defense, NASA and the National Geospatial-Intelligence Agency (NGA).
- It may be possible to fund the coordination of the framework data through the 2005 Montana Land Information Act. In fact, it is well within the intent of the legislation to do so. The Act provides a funding mechanism which is derived from transaction fees collected at the county government level.

Partnerships

- The Montana GIS community might consider contracting with a third-party private entity to implement the strategic plan. A private contractor would be obligated to get the job done. Volunteers from various agencies are not as likely to be able to commit the resources (time and money) to implement specific strategies. It would be difficult to monitor follow-through. A private contractor would be more accountable.

- In sharing and coordinating information among state, federal, local, tribal and private sector agencies, we can reduce the amount of duplicative work. Partnerships present a good opportunity to efficiently get the job done.

Montana Land Information Act of 2005 – Implementation

- Administrative rules must be written to empower the Montana Department of Administration to specifically engage in strategic planning and to provide the authority to fully fund the coordination responsibilities associated with the Montana Land Information Act of 2005.
- With the passage of the Act, the State GIS Coordinator's job has become huge. One person cannot manage all the framework layers without additional resources (people and money).

Responsibilities Associated with Framework Layers/Themes

- Without the assignment of responsibility and the associated authority (inter or intra-agency?), the Montana Spatial Data Infrastructure layers will not be addressed. Coordination of each data theme activity must be combined with a clear delegation of responsibility.

Information Technology

- Information technology can be a barrier as well as an opportunity. The pace of our jobs and our lives is out of control. We should focus on the scope of our activities to assure feasibility. The strategic plan should lay out a universe of issues and solutions, but the implementation scope should be achievable through incremental steps. There should be no hurry to get into "a bigger mess" than we are in. In fact, we need to slow down.

Turf

- Turf wars can present a significant barrier. We need to overcome the notion that we are competing for the same dollars. Rather we should recognize that we can gain from each other's efforts. As we set priorities and define goals, we can begin to counter this perception that one agency's gain is another's loss. As each framework layer is completed, by whomever is the best expert, we all benefit.

Draft Goals

Goal 1:

Establish a framework for the framework – in other words, the plan should provide a framework (structure) to build, maintain and distribute framework data at the state level in such a way that federal agencies can use this data in fulfilling their missions and mandates.

Goal 2:

Provide for a data stewardship framework – the Plan should detail roles and responsibilities related to the implementation of the plan including the framework data and business functions. Responsibility assignments should be specific to the agency and position (rather than to a specific person).

Local Government Representatives
April 4th, 2006
Great Northern Hotel, Helena, MT

Meeting Attendees:

Deborah Callender, Lincoln County GIS Programs Manager, dcallender@libby.org

Paul Spengler, Lewis and Clark County, pspengler@co.lewis-clark.mt.us

Leah Erickson, Valley County, Glasgow, MT Roads/GIS 911, lerickson@mt.gov

Pat McKelvey, Lewis and Clark County DES, McKelvey@co.lewis-clark.mt.us

Jon Henderson, City of Bozeman, jhenderson@bozeman.net

Brian Oevermann, Gallatin County GIS, Brian. Oevermann@gallatin.mt.gov

Allen Armstrong, Gallatin County, Allen.Armstrong@gallatin.mt.gov

Art Pembroke, City of Helena and Lewis and Clark County, apembroke@co.lewis-clark.mt.us

Mike Sweet, University of Montana/MLIAC (observer), Michael.sweet@umontana.edu

Stu Kirkpatrick, DOA/ITSD (observer), skirkpatrick@mt.gov

Jim Larson, Stillwater County, jlanson@co.stillwater.mt.us

Tom Reynolds, Flathead County, treynolds@co.flathead.mt.us

Annette Cabrera, Yellowstone County, acabrera@co.yellowstone.mt.us

Doug Burreson, Missoula County, dburreso@co.missoula.mt.us

RJ Zimmer, City of Helena, Lewis and Clark County, rjzimmer@co.lewis-clark.mt.us

Issues and Opportunities Identified by Category

Resources

- There is a lack of mobile equipment for emergency mapping requirements.
- There is a lack of funding for GIS(people – FTE's, and equipment). (4)
- Funding is required for acquiring up to date imagery.

- We need better cooperative/collaborative agreements for software licenses.
- We need a state-wide metadata coordinator.
- We need money and time to gather data.
- We lack staff resources to do “job add-ons” and the jobs of “others” including users. (2)
- There are limited resources to direct to education and outreach concerning changing GIS technologies.
- It would be useful to survey local governments to learn how local MLI funds are being used. (They should not be used to supplant local dollars. Rather they should be used to enhance existing GIS services.) (2)
- We need to look at how MLI funds will come back to the local governments.

Working Smart – Coordination and Communication

- There is duplication of effort in mapping – CAD and GIS.
- There is no coordination between the state (the Department of Revenue) and the county.
- We should avoid duplication at the state and local levels.
- We should take advantage of state wide participation opportunities and cost-sharing (e.g. Farm Services Administration – FSA program)
- We need a forum for sharing expertise and information, perhaps through the MAGIP web site.
- There is a lack of coordination and thinking across jurisdictional boundaries.
- It is often cumbersome to upload data to state and federal agencies who in turn may not use or disregard the information.
- There is a lack of a unified voice from state and federal agencies, making it difficult to follow directions.
- We need better lines of communication to let the GIS Community know what is being addressed.
- Members of the GIS Community should become “involved” (conferences, organizations, etc.) to learn the latest information.
- We need to integrate county and city efforts such as in addressing, particularly as our rural population (outside incorporated limits) increases.
- We need to communicate more clearly with non-GIS “Techies”.
- We need to improve all inter-agency coordination, communication and planning to facilitate better understanding of technical issues, project development and resource sharing.
- We need better understanding oh how the state is using and managing MLI funds.
- We need a stronger state role in overall GIS management.

Quality, Accuracy and Standardization of Data

- Emergency personnel need user friendly and easily accessible information.
- Data formats should be easily understood.
- We lack a commonality of approach from one jurisdiction to the next with respect to emphasis.
- Standardization of data management is needed.
- We need better unilateral baseline data for cross county and state use.
- Data integrity and accuracy is critical. (2)
- We need assistance in data conversion.
- Integration of GIS with CAMA data is critical.
- We lack data for Canada, our very near neighbor.

Education and Training

- Training and help are needed for products that are available to users
- “GIS for the Layman” – What should we (non-GIS technicians) ask for?
- Lack of buy-in at the executive level is symptomatic of an “education failure”.
- We need to provide management personnel education regarding GIS capability.
- We need to respond to constantly changing technologies.

Policy

- We tend to provide services based on jurisdiction rather than geography.
- Assistance should be provided to user entities in understanding GIS.
- The more information we can provide to the public and policy makers, the better our public decision making process will become.
- We need to improve access (provide easy access) to GIS for public policy and decision makers.
- We must identify better ways to involve decision makers in GIS policy making. (2)
- The public is expecting an increasingly higher level of service.
- The Montana Association of Counties (MACo) and the Association of Clerks and Recorders must see successful applications/implementation of GIS rather than just software demonstrations in order to recognize the important role that this technology plays in providing service to the public.
- The State 911 Board should be driving and promoting GIS in Montana.
- Overall there is a lack of executive direction and buy-in for the GIS overall.
- We need to get things rolling overall with the Montana GIS Strategic Plan.
- Our strategic planning effort must survive changes in administrations.
- GIS technology alone cannot sell itself. We need political clout and access to policy making. (2)

Provision of Services to Users (Public and Departmental Users)

- It is important for users to recognize that spatial data is not always “survey accurate”
- Public perception and expectation is that we are removing uncertainty from the information we provide.
- Both data and data formats should be immediately available (2).
- It is not always clear how much burden should be placed on GIS staff in responding to customers. What should the customer be required to provide? (2)

Relationship to Overall IT Services

- While we are striving to integrate GIS into other local government business applications, there are often turf battles – “are you taking over my information?”
- It is important to integrate GIS into all types of end-uses.
- We need leadership and organizational efforts to foster the relationship between GIS and IT.
- There is no overall IT plan.
- It is important to sell the “enterprise” approach.
- We must clarify mission statements with respect to how ITS and GIS work together – who does what?
- Tools are needed for integrating GIS into other applications.

Barriers to Achieving a Better Condition

- Communication Failures
- Political Naiveté (2)
- Funding for FTE’s (3)
- Lack of Funding for IT Program Support and data integration into GIS
- Lack of Standardization
- Geographic Restrictions to Coordination
- Lack of Personnel Expertise
- Lack of Personal Initiative and effort to achieve implementation
- Ego and Turf Issues (3)
- Lack of Legislation at the state level to address standards
- Control Issues
- Fragmentation
- Lack of Recognition of GIS Role by County Officials
- Lack of a “voice”
- Lack of Recognition of Need for and Importance of GIS
- Potential to Sacrifice the Needs of Small Communities in favor of Larger Communities in the Strategic Planning Process, resulting in alienation
- Overall Funding

Private Sector Representatives
April 26th, 2006
Conference Call/Web EX Meeting

Attendees:

Joe Glassy, Lupine Logic
Kim Tintinger, RTI
Mark Sommer, American Public Land Exchange
Fred Gifford, Maxim Technologies/Tetra Tech
Ed Janney, HKM Engineering
Andy Rahn and Tom Kingsberry, Norman C. Wheeler
Jason Horning, Bulberry Systems
Ken Wall, Geodata Services
Mike Beltz, GCS Research
Stewart Kirkpatrick, ITSD, MDOA, Host
Janet Cornish, CDS of Montana, Facilitator

Issues and Opportunities Identified by Category

Professionalism

- GIS is evolving, moving towards a new level of professionalism and associated certifications.
- The barriers to enter the GIS field are low. In other words, expertise among GIS practitioners is uneven and/or area specific.
- We have difficulty keeping people with expertise in positions. Once they have the expertise, they move on to better paying positions.
- We are not implementing enterprise systems because, in part, we don't have the expertise to do so.

Education and Training

Training is needed in response to rapid changes in technology.

- Training should be focused on developing expertise in the GIS field with an eye to certification.
- We need to provide educational opportunities at the community level. Often people are not aware of the technology and its applications.

Advocacy and Communication

- There is a cultural/sociological issue between the GIS profession and the non-GIS side of the world. We must be ambassadors to the world for GIS.

- We may be guilty of displaying a “chauvinistic” attitude as GIS practitioners. The us vs. them mentality creates a barrier between GIS the greater community.

Funding

- Funds are needed for data and staffing.
- Funding is needed to obtain, maintain and manage data.
- There is no funding for cultural resources applications in GIS.
- GIS needs support funding.
- We need to keep funding levels adequate as the GIS database expands.
- There is a lack of funding to support GIS personnel and data development at all levels of county and city government. Larger towns have GIS personnel and good data, but in rural areas the resources are limited. We need more funding to provide more consistent quality.

Information Sharing/Enterprise Approach

- Data distribution is critical.
- The challenges associated with the transition to enterprise GIS and implementing federated models can be addressed, in part, by statewide cooperation and redundancy elimination.
- Sharing of data among all sectors, particularly with respect to big tasks is critical.
- As we move to an enterprise system, we must clarify the role of the clearinghouse.
- We need to eliminate redundancies and focus our information in one place.

Interoperability and Standardization

- There is a mismatch in the pace between fast, well-resourced efforts such as Google Earth, which are changing the way we view and use geospatial data, and often under-funded state efforts which actually provide the raw data for Google Earth.
- There should be strong relationships among other states’ data.
- We should be able to interface with neighboring states such as Wyoming and Idaho.
- We need to accelerate USA wide adoption of a common National Grid style coordinate system, to smooth out/lessen the need for constant reprojection of federated geospatial datasets.
- National data standards are needed to support application development.
- Total reliance on ESRI Software can sometimes cause trouble in the private sector. For example, large private entities, such as engineering firms use Auto Desk rather than ESRI.

Partnerships

- Larger companies should be involved in the state enterprise GIS discussions on an ongoing basis.
- We need to team with people to assist in data validation.
- We should work on appropriate roles of the private sector with respect to NRIS and its relationship to state agencies. Should NRIS confine itself to serving as a clearinghouse? Is it appropriate for NRIS to be an application developer for state agencies?

Data Acquisition, Accuracy and Management/Spatial Infrastructure

- SHPO (the State Historic Preservation Office) does not have the “geometry” for mapping; although NRIS may (Kim believes) host the database. This makes it difficult for cultural resources firms operating in the state.
- The implementation of the Geodetic control layer is very important – 2
- The development of the cadastral layer is seen as the most important. Yet the development of this layer is dependent on developing the control layer.
- Data accuracy is critical.
- Higher quality imagery should be available. – 2
- Data completeness and integrity is critical, e.g. individual county cadastral data.
- The validation of content is often in the hands of people who do not know the technology that was used to create the data. So they need simple tools to enable them to validate the data.
- There is a lot of information “out there” that is not being put into the GIS system.

Addresses

- We need good address information, a problem that is particularly difficult in rural areas. Urban areas tend to have more addresses information..
- The lack of good address geocoding capability is the main limiting factor to widespread use of GIS in the state.
- Many large companies have information stored, primarily address information.
- Address information, particularly in rural counties, is organized by the ESN (Emergency Service Number).

Barriers to Implementation

- **Communication/Education**
 - There is a lack of education and resources to brainstorm and accomplish good ideas.
 - We lack awareness in non-GIS community of how much GIS is already involved (in a variety of applications) and where there are opportunities to expand.
 - There is a lack of education that would lead to understanding the need for funding.

- **Attitude**
 - Provincialism and territorialism can inhibit efforts to work cooperatively among various entities.
- **Information Sharing**
 - State and local government agencies often do not share data which in turn makes it difficult for the private sector to obtain information.

- **Recognition**
 - Until GIS is considered fundamental to a local government's operation, we will continue to have data gaps and data currentness issues.
 - We need to increase the use of GIS at the state and local government level. Greater use will increase the need for the services provided by the private sector.
 - Agencies do not necessarily appreciate the value of GIS and the associated applications. Why aren't the applications built? Why isn't the technology used more?

- **Resources**
 - GIS applications require funding and expertise.
 - We must assure access to the data needed to implement the applications.

Draft Goals

Goal 1.

Making a Case for GIS

- We need good tools and methods to engage non-geocentric users in the access and validation of GIS data; e.g., the digitization of precincts to engage legislators.
- Those knowledgeable in GIS should make a business case for the technology within their organizations so that support can be justified. Leading GIS organizations can assist with this.
- The more GIS users you have, the more value it will have to more people.

Goal 2.

Standardization

- We should work towards the broad adoption of address standards and the associated necessary data.
- We should coordinate with FGDC to finalize data standards for the most desirable datasets.

- Standardization is needed for critical infrastructure projects. This is not necessarily a matter of money, but rather the need for institutional “tweaking” to facilitate data integration.

Goal 3.

Funding

- We must expand funding sources and partnerships, e.g. NAIP.
- More people using GIS creates more pressure on legislators and program administrators to fund GIS.
- Consider a subscription fee to NRIS/GIS data to create a funding source.
- We must demonstrate to decision makers who control funding that they get a return on their investment in GIS in terms of saving money and lives.

Goal 4.

Applications and Data

- We should continue to geo-enable business processes.
- More datasets should be published as web services.
- We need to provide information on a state-wide basis. For example, we need a state-wide grid system for parcels, available to everyone. While large counties have the ability to track information geospatially for parcels, water and sewer, but small towns and rural areas do not.

Goal 5.

Interoperability and Partnerships

- We should create pathways – back and forth between state and county systems. If the information has been developed, why can’t it be uploaded. This would eliminate the need for counties to re-enter parcel data.
- We should foster public-private partnerships.

Goal 6.

Institutionalizing GIS

- Every county should have a GIS Coordinator, just as they have a tax assessor.
- There should be a GIS Coordinator within each state agency.
- Coordinators can work together to leverage activity overall.

Summary of Survey Monkey Results for Tribal Shareholders June 22nd, 2006

Number of Respondents – 4

- Three respondents were not aware of the activities of the Montana Land Information Advisory Council prior to being contacted by Lorin Peterson, IT Specialist for the Confederated Salish-Kootenai Tribe.
- Three respondents were not familiar with MAGIP and how to become a member.
- Three respondents were not familiar with the Montana Land Information Act.
- The respondents were asked to rank the importance of services typically provided by local governments. The ability to download statewide and local data sets, the vertical integration of data to enhance accuracy and the coordination of partnerships to standardized data were viewed as extremely valuable. Web mapping services and the maintenance of data were viewed as somewhat less valuable.
- With respect to where the Council should be devoting its efforts, data access and obtaining new funding for geospatial activities were identified by all respondents as extremely important. Data collection, maintenance and integration and communication among stakeholder groups was viewed as somewhat less valuable.
- Regarding MADI themes in relationship to the respondents' business, cadastral and digital Ortho-imagery were considered most important.
- Three respondents noted that the tribal sector does not have an adequate voice in matters related to geospatial development.
- Training, the rapid advancement in technology and funding were identified by all respondents as limiting factors in the use of geospatial technology.
- The respondents were asked to identify the number 1 issue that should be addressed in the Montana Geospatial Strategic Plan. These issues are:
 - Assistance with funding/training to keep up with technological changes
 - GIS Mapping of Reservations and associated technology
 - Current data on land resources and environmental planning
 - Release of data sets for and from all entities, reflecting a common format for data collection.
- Additional issues identified by respondents included:
 - Addressing the overall IT needs of the Tribes
 - Coordination with other Tribes and the state on the use of GIS
 - A statewide depositor of all collected data in a unique common environment, to avoid duplication