State of Wyoming

Strategic Plan
for
Statewide
Geographic Information Systems
Coordination

Developed and adopted by the

Wyoming Geographic Information Advisory Council
November 2004

Revisions:
State of Wyoming
Office of the Chief Information Officer
February 2006

and

Wyoming FGDC CAP Grant Fifty States Initiative
Project Team
March 2007

Preface

This document was originally published in 2004 under the title **Recommendations for Wyoming Statewide Geospatial Data and Technology Coordination**. The document was developed in 2003-2004 by a subcommittee of the Wyoming Geographic Information Advisory Council (WGIAC) at the request of Larry Biggio, Chief Information Officer for the State of Wyoming from 2003 through 2006. Members of the 2004 WGIAC subcommittee included (in alphabetical order by last name):

- Alan Frank, Albany County
- Rob Geringer, CBM Associates
- Jeff Hamerlinck, University of Wyoming (July 2004-November 2004)
- Beth Hoobler, Wyoming State Engineers Office
- Joseph Huss, Wyoming State Geological Survey (Co-chair)
- Carol Norris, Legislative Services Office (through August 2004)
- Jim Oakleaf, University of Wyoming (through June 2004)
- Ben Saunders, Wyoming Department of Transportation (Co-chair)
- Mary Wilson, Bureau of Land Management

The document was completed in October 2004 and endorsed by the Council membership in November 2004 in a 17-0 vote (with two abstaining) and delivered to the CIO's office.

Over the following 15 months, the *Recommendations* document was shortened and generalized to a certain extent with respect to identifying specific implementation options. A February 2006 version was widely distributed and formed the basis for the CIO's FY 2007 and FY2008 budget request. Details on the outcomes of these efforts are found in Section V of this document.

Most recently, the *Recommendations* document was revisited by the members of the project team for the State of Wyoming's National Spatial Data Infrastructure Cooperative Agreements Program (CAP) Fifty States Initiative Grant (Award Number 06HQAG0095). One of the goals of the grant was to "reformat" the *Recommendations* document into a statewide geographic information systems (GIS) coordination strategic plan, following the new Federal Geographic Data Committee / National States Geographic Information Council (FGDC / NSGIC) strategic plan template.

Members of the CAP Grant project team include (in alphabetical order by last name):

- Joe Ahern, Deputy CIO, State of Wyoming (since 1 January 2007)
- Larry Biggio, CIO, State of Wyoming (retired 31 December 2006)
- Jeff Hamerlinck, University of Wyoming
- Bob Nicholls, Office of the CIO, State of Wyoming (thru 23 March 2007)
- Cathy Raney, Campbell County
- Barbara Ray, US Geological Survey
- Ben Saunders, WY Department of Transportation
- Randy Wiggins, US Natural Resources Conservation Service

This document is the result of the CAP Grant project team's "reformatting" effort. An extensive reorganization of the content into a new structure proved challenging and ultimately not worthwhile. Nevertheless, this document is valuable in two important ways. First, it carries forward both the original WGIAC recommendations and State CIO's streamlined action items for coordinated geospatial efforts across the State. Second, it establishes the *Recommendations* document - developed through an extremely thorough 18-month effort involving extensive research and input from the Wyoming GIS user community – as the most current and accepted strategy for improving coordination of statewide GIS efforts in Wyoming, and the foundation for the State's current GIS coordination business planning efforts.

It should be noted that the CAP Grant Team did not make any modifications to the original WGIAC / CIO recommendations or any substantive changes to the remainder of the plan narrative, other than adding a new section on the current status of the original recommendations and updating the Executive Summary. Also note that Section II.B – Existing Conditions-has not been updated and reflects the status of GIS use in Wyoming circa 2004. The appendices to the original November 2004 version of the document which contained data from the 2003 WGIAC membership survey have not been carried forward in this revision, but may be viewed at:

http://www.wsgs.uwyo.edu/surveys/WGIAC2003/WGIACresults.aspx
(last accessed 8 March 2007)

Finally, the CAP Grant team recommends that this document be revisited and updated via a new formal strategic planning process once the goals of the current business planning effort have been achieved or deemed in need of revision.

Wyoming GIS Strategic Plan:
Recommendations for
Wyoming Statewide Geospatial Data and Technology Coordination

Executive Summary
(2004 version with new 2007 update)

The State of Wyoming is facing many challenges including increased development of energy resources, homeland security, and environmental protection. The State finds itself working with various levels of regional and local governments interlaced with private industry on an ever growing scale. All of these groups use geospatial data and technology. This information and technology, or geographic information systems (GIS) has proven to be an effective tool in policy development, decision-making, management, engineering and research in almost all state, local and federal government agencies and private industry. Many agencies have a long history of using GIS in a wide variety of projects, and Wyoming has made great strides in building a strong GIS base for the state. However, the tremendous demand and growth in geospatial data and technology use has out grown current coordination efforts. With funding issues facing all levels of government, coordination among government agencies, and between government and private entities is critical to the well being of Wyoming's counties, cities, and the state itself. Thus geospatial data and technology use will greatly benefit from a statewide coordinated effort to streamline government use, expand agency cooperation, take advantage of grant opportunities and cooperative leveraged funds, and save tax money in the end.

This plan identifies the current status of GIS and users in the State of Wyoming. It looked at the interaction of all levels of government and private industry and identifies the issues and needs surrounding GIS use in Wyoming. The plan proposes a goal of creating a centralized mechanism for coordination of all GIS activities including geospatial data and information sharing, and recommends the structure and authority of that entity. Specifically, this plan recommends the following actions:

  ➢ Rescind Executive Order 1994-3, which created the Wyoming Geographic Information Advisory Council (WGIAC).
  ➢ Appoint an executive-level Oversight Committee for geospatial activities.
  ➢ Establish a Technical Advisory Group (TAG) from GIS professionals within the state.
  ➢ Create a Geographic Information Officer (GIO) position located under the authority of the Wyoming Chief Information Officer (CIO) with responsibility to support the Oversight Committee and Technical Advisory Group.

➢ Create a Geographic Technical Services Program overseen by the GIO and to provide technical support for coordination.

2007 Update

Two and one-half years after its initial publication, the WGIAC Recommendations document remains the most current and accepted strategy for improving coordination of statewide GIS efforts in Wyoming. To date, three of five major recommendations of the plan have been implemented. Executive Order 1994-3 was rescinded with Governor Freudenthal's signing of EO2006-1, which also created a five-member, Governor-appointed Oversight Committee and a 14-member Technical Advisory Group. The 2004 WGIAC recommendations continue to serve as the foundation of statewide GIS strategic planning. The recommendations to create a State Geographic Information Officer and GIS Technical Services Program are being addressed in the current GIS business plan development activities of the State of Wyoming's National Spatial Data Infrastructure Cooperative Agreements Program grant.

Wyoming GIS Strategic Plan:
Recommendations for
Wyoming Statewide Geospatial Data and Technology Coordination

I. **Introduction**

All levels of government utilize geospatial data and geographic information technology as a tool for decision-making. Specifically geographic information systems (or GIS) are used to assemble, store, manipulate, analyze, and display geospatial data, i.e. geographically referenced information or data identified according to spatial location. GIS is utilized throughout Wyoming in a wide variety of ways including but not limited to permitting for mineral extraction, funding allocation for police departments and fire districts, setting hunting areas and quotas, creating legislative districts, directing the repairs and construction of new roads, and addressing emergency management and 911 systems.

Since the early 2000s, Wyoming geospatial data users have been asking for better communication, coordination and technical support among state, federal and local agencies. In 2003, the Wyoming Geographic Information Advisory Council (WGIAC) conducted a survey of Wyoming GIS users. The outcome of that survey led the WGIAC leadership into discussion with the Wyoming Chief Information Officer (CIO) concerning state-level coordination of GIS. All involved agreed that there was a need for coordination between entities involved in creating, maintaining, and using geographic information throughout the State of Wyoming, and that coordination at the state level would best serve all involved. The CIO then requested that a recommendation plan be written for implementing Wyoming GIS Coordination. The Chair of WGIAC created a committee representing all levels of GIS use, from the private sector and government. This committee was tasked with creating a plan for Wyoming statewide geospatial data and technology coordination. The group looked at various documents from state agencies in Wyoming, as well as many coordination plans and models from other states. In fact, many other states are confronted with similar challenges that we address in Wyoming. Other states' models for coordination that have been implemented provides assurance that this proposal has good success potential as it incorporates "best practices" used all over the United States. The recommendations in this document serve to build a foundation for establishing responsibilities for coordination of Wyoming's geospatial data and technology resources.

The goal of this document is to recommend a plan for an organized, coordinated structure that provides oversight, efficient use of resources, and a single point of contact and representation for the State of Wyoming in all matters of geospatial data and technology, i.e. GIS.

Sections follow on the "state-of-GIS" in Wyoming in 2004, a discussion of issues and needs impacting better statewide GIS coordination, and a series of recommendations for addressing them. With the document's latest revision, a new section has been added on the current status of the original WGIAC recommendations and the interim actions proposed by the State CIO in 2006.

II.   Current Status of GIS in Wyoming

A. Existing Agencies and Organizations

State Government: State government was one of the earliest user groups of geospatial technologies in Wyoming, dating back to the mid-1980s. Until recently, most state agency GIS use has been task and project-based. This is rapidly evolving to the use of GIS in such activities as inventory workflows, infrastructure management, environmental assessment, and mineral extraction permitting.

Local Government: Though implemented more recently than in state government, the utilization of geospatial technologies in city and county government constitutes the largest potential user base in the state and is the fastest growing sector of GIS users in Wyoming. Typical users include assessors, clerks, engineers and planners.

Federal Government: Many federal agencies' offices based in Wyoming utilize GIS technology on a daily basis, particularly those involved in natural resource management activities. Examples of advanced implementations of this technology include the Bureau of Land Management, the Forest Service and the Natural Resources Conservation Service. Many federal and local agencies work together with state and private industry on specific projects that may include common interests to all entities, such as oil and gas well permitting.

Private Sector: During the past decade, Wyoming has seen GIS become a critical and valuable information technology tool for private entities. The private sector plays a multi-faceted role in GIS at many levels in Wyoming. They provide and consume data; and also supply and take advantage of training. Some examples of private entities are utility companies, ranches, mining companies, real estate consultants, and marketing firms.

Academia: GIS is also being utilized in all levels of education in Wyoming, from K-12 to community colleges and the University of Wyoming. Applications include the use of GIS for teaching math and science concepts, basic and applied research, and professional workforce training.

Geospatial Data and Technology User Profile. Prior to the development of this document, a survey was conducted of state GIS users representing all of the

above users groups. With respect to state government, results indicate 73% of state agencies in Wyoming (that responded to the survey) currently use GIS technology. Of the state agencies 75% use Environmental Systems Research Institute (ESRI) software. Of the remaining state GIS users, three use a combination of GIS software, and three use something other than ESRI products. Although software is compatible between vendors, not all agencies follow the same standards for creating data. Various formats, projections and software versions can lead to extreme incompatibility among agencies.

State agencies should be able to share their geospatial data with other state agencies, federal agencies and local governments. However, not all agencies have the capability of efficient data distribution. 58% of the state GIS users that responded use the Internet to disseminate their data; the remaining users continue to use hardcopy maps and CD's to distribute their work on a request basis.

83% of state GIS users make some type of GIS training available to their staff; however, only 38% conduct the training themselves.

Other needs included more affordable software licensing, more training, more funding, updated contact information, data accountability, better communication and coordination.

B. Existing Coordination

1. Wyoming Geographic Information Advisory Council (WGIAC)
    WGIAC was created by Executive Order 1994-3 signed by then Governor Sullivan on April 8, 1994, and adheres to its set of bylaws. The executive order is still in effect. WGIAC is comprised of the following:

    o most state agencies
    o University of Wyoming (UW)
    o federal agencies
    o Wyoming Association of Municipalities (WAM)
    o Wyoming Association of County Officials (WACO)
    o private sector
    o State of Wyoming's Chief Information Officer (CIO).

    The Council's mission is to "promote statewide interests and requirements for mapping data... serving where possible, as a focal point for coordination between federal and state agencies for mapping programs and products, encouraging input from county, local and private parties". Objectives include the following:

    o provide access to GIS data for WGIAC members and the general public
    o oversee the development of statewide base themes

- o address the issues of data archival, backup, and recovery
- o determine the feasibility of marketing GIS data in Wyoming
- o develop and maintain minimum software and hardware capabilities required for GIS
- o participate in the oversight of state agency purchases
- o support the FGDC Content Standard for Digital Geospatial Metadata
- o promote cooperative development of new data and collection of existing data
- o promote a spirit of cooperation between entities involved with GIS (that extends beyond written agreements)
- o promote GIS awareness
- o improve GIS literacy
- o participate in regional and national arenas regarding GIS issues
- o develop and provide listings of GIS knowledge sources and professional affiliations
- o develop recommendations for general criteria for GIS professionals in Wyoming

2. <u>Wyoming I-Team</u>:
The I-Team Geospatial Information Initiative (I-Team Initiative) is a joint project of the Federal Geographic Data Committee (FGDC), Federal Office of Management and Budget (OMB), and other strategic partners. This initiative addresses the institutional and financial barriers to development of the National Spatial Data Infrastructure (NSDI). The results of these efforts will help provide integrated information for analysis of issues and decision-making at federal, state, local, and tribal levels of government. Further, it will provide a common frame of reference for communicating information and concepts of complex issues to citizens.

Wyoming's I-Team provides the regional component to the national initiative. Each I-Team must be adaptive, collaborative, flexible, and most importantly, locally responsive. It is on the regional, state, and local levels where the most accurate spatial data is produced, maintained, analyzed, and distributed, thus the national effort benefits by tapping directly to the best sources of information. Additionally, the local level benefits by tapping into the coordination of standards, technologies, financial assistance, and other trusted data sources from all levels of government and the private sector nationwide.

3. <u>User Groups</u>:
In the State of Wyoming, there are several regions that have active GIS User Groups. For example there is the Big Horn, Northeast Wyoming, Casper/Natrona County, and Southeast User groups. These groups consist of local, federal and private organizations in the hopes of technical and data coordination. This coordination results in cost savings through technical exchange and direct data exchange. Presently the user groups do not

regularly attend WGIAC meetings due to distance, dissatisfaction, and lack of representation.

4. Geospatial Data Clearinghouses:
   Currently within Wyoming there are two recognized NSDI Geospatial Data Clearinghouses: the Wyoming Natural Resource Data Clearinghouse (WNRDC) (http://www.wygisc.uwyo.edu/clearinghouse/) maintained by WyGISC at the University of Wyoming and the Wyoming Spatial Data Clearinghouse (WSDC) (http://wgiac2.state.wy.us/) maintained by the Wyoming Department of Administration and Information for WGIAC. Both clearinghouse sites have extensive data holdings and provide the public with the tools necessary to search, understand, and retrieve data.

   In addition to these two sites, there are a number of other entities distributing geospatial data in Wyoming. At the federal level, some of the agencies providing data are the US Geological Survey (USGS), the Natural Resource Conservation Service (NRCS), the Bureau of Land Management (BLM), the US Forest Service (USFS), and the US Census Bureau. This by no means is a complete list and many times within each agency there can be several different groups providing geospatial data. At the state level, geospatial data is disseminated by several agencies such as:

   - Wyoming Department of Administration and Information
   - Wyoming State Engineer's Office (SEO)
   - Wyoming Department of Environmental Quality (WyDEQ)
   - Wyoming Game and Fish
   - Wyoming State Geologic Survey (WSGS)
   - Wyoming State Historic Preservation Office (SHPO)
   - Wyoming Oil and Gas Conservation Commission (WOGCC)
   - Wyoming Department of Revenue
   - Wyoming Department of Transportation (WyDOT)
   - University of Wyoming CBM Information Clearinghouse
   - University of Wyoming, Water Resources Database (WRDS)
   - University of Wyoming, Wyoming Natural Diversity Database (WYNDD)
   - University of Wyoming, WyGISC, Wyoming Natural Resources Data Clearinghouse
   - University of Wyoming, WyGISC, Wyoming View
   - University of Wyoming, WyGISC, Greater Yellowstone National Spatial Data Infrastructure Initiative
   - University of Wyoming, WyGISC, Wyoming Digital Atlas

   At the county level, examples include:

   - Cheyenne/Laramie County Cooperative GIS Program

- Teton County
- Sublette County

Most state agencies distribute geospatial data related to their business practices, which they create and maintain "in-house". For example, the WSGS distributes geologic maps and data of Wyoming whereas SHPO provides users with the ability to view cultural resource data through an Internet mapping application. More recently, counties and municipalities throughout Wyoming are starting to distribute geospatial data referencing their extent of influence. Many of these local groups require fees or limit access to their data due to the cost associated with maintaining highly accurate and changing data such as parcels.

Geospatial data being distributed by these agencies exist in many geospatial formats. Besides paper maps, the majority of digital geospatial data being distributed is in a vector or raster GIS format. A number of challenges face users who try to mix data from different agencies due to discrepancies in standards used while creating the data, the projection and units associated with data, the scale of the data, and the accuracy of the data. Even if two data providers are using identical or compatible GIS software and provide data in the same projection and units, the user could be confused with the different proprietary formats being distributed. For example, ESRI has three vector data formats for which it supports –shapefiles, coverages, and the geodatabase. All three ESRI formats require a different skill set to effectively utilize the data. So even within an agency solely using proprietary GIS software, users are faced with issues limiting their ability in using GIS.

Actual access of geospatial data from any of these Wyoming geospatial data developers and disseminators can involve a wide variety of methods. Some have elaborate web pages interacting with an FTP data server. Others have a simple ftp site. Most still rely on users contacting them directly and requesting data. These requests may be handled by e-mailing the data or by saving the data directly to a media (such as CD-ROM) and physically mailing the information.

5. Mapping Services:
One technology that has had tremendous growth within the GIS data dissemination arena is Internet mapping. There is a growing number of Internet maps and mapping services that provide online spatial data. Many of these sites display similar reference data such as roads, streams, and boundaries, etc. Differences in how these groups display this data and which data version each are using can cause difficulties with users. Presently there is growth in the number of state agencies adding Internet mapping services for public access. Additionally, WyGISC provides a large inclusive service accessing both state and federal data sources augmented by their large data warehouse.

Mapping services allow the creators or stewards of their particular data to serve out the information real-time without having to distribute updates to multiple organizations via CD or FTP download. Instead, anyone may access this information via the internet without having to store the information locally. This saves money and time by not having to contact organizations for data, by not storing it locally and not having to reprocess the information for use.

The major organizations with mapping services for Wyoming (as of 1 June 2004) are:

- Cheyenne-Laramie County Coop
- Teton County Map Service
- Wyoming Oil and Gas Conservation Commission (WOGCC)
- Wyoming State Geologic Survey (WSGS)
- Wyoming State Historic Preservation Office (SHPO)
- Wyoming Department of Transportation (WyDOT)
- US Geological Survey (USGS), National Map
- University of Wyoming
  - Wyoming Geographic Information Science Center (WyGISC) (4)
  - Wyoming Water Resources Database (WRDS)

III. Issues and Needs

The issues which present barriers to more effective GIS implementation in all user groups in Wyoming may be grouped into four categories: (1) lack of coordination; (2) duplication of effort; (3) insufficient training opportunities; and (4) lack of standards.

A. Wyoming GIS Coordination is Ineffective

Issue: WGIAC is not able to conduct efficient or effective GIS coordination for Wyoming. WGIAC has an Executive Order to exist but does not have any full time personnel, funding, or oversight of its policies and actions.

WGIAC has been the primary group responsible for statewide coordination of GIS activities in Wyoming for the past decade. With the lack of support staff, this volunteer organization does not have the ability to initiate partnerships across all levels of GIS users, or pursue alternative funding methods, nor is it able to conduct outreach to the GIS user community to aid with standards and education. The lack of staff also discourages coordination and communication. Finally, WGIAC does not have any policy authority to carry out GIS coordination for the state. WGIAC has been successful bringing GIS technology and personnel to Wyoming and providing many government layers, but has lived beyond it usefulness.

Due to the inability of WGIAC to conduct GIS coordination, agencies, organizations, and industry continually work around the council. As WGIAC has no authority or staff to conduct coordination, the spatial data community continually works to find data and information from any source that can be located. This limited coordination and communication results in an unorganized exchange of spatial data.
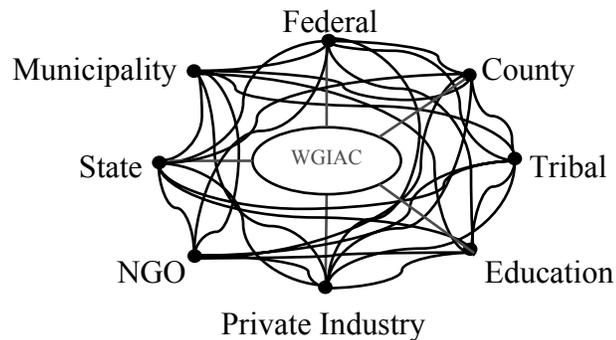
In the summer and fall of 2003 an anonymous Internet survey was conducted to determine direction for WGIAC officers to gain a better understanding for the need and direction of WGIAC and GIS in Wyoming. The survey provided insight to GIS coordination through a few specific questions.

The need for statewide GIS coordination is evident from the response to question 25 **"Do you agree that Wyoming needs a GIS coordinator/organization?"**

Multiple Choices	Percent of Responses
Strongly Agree	63
Somewhat Agree	27
Neither Agree nor Disagree	6
Somewhat Disagree	2
Strongly Disagree	2

Of the respondents, 90% agreed at one level or another that Wyoming needs a GIS Coordinator or organization. This prompted WGIAC officers to further investigate the need for GIS Coordination.

Question 10 **"Do you agree that WGIAC should continue to exist?"** 76% of those surveyed reinforced the need for a coordinating committee by responding "Strongly Agree" or "Somewhat Agree".

Multiple Choices	Percent of Responses
Strongly Agree	44
Somewhat Agree	32
Neither Agree nor Disagree	15
Somewhat Disagree	6
Strongly Disagree	2

Question 9 "**Do you agree that WGIAC is doing what it was set forth to do?**" demonstrates a weak vote of confidence of WGIAC's activities. This negative response may be due to the volunteer nature of the organization, lack of executive and administrative backing, weak leadership, and/or lack of direction.

Multiple Choices	Percent of Responses
Strongly Agree	10
Somewhat Agree	22
Neither Agree nor Disagree	42
Somewhat Disagree	18
Strongly Disagree	8

Question 11 **"Do you agree that WGIAC should be focused on State Government GIS issues only?"** demonstrated a majority view that coordination efforts through WGIAC and possibly a GIS Coordinator should look at coordination at all levels.

Multiple Choices	Percent of Responses
Strongly Agree	5
Somewhat Agree	13
Neither Agree nor Disagree	15
Somewhat Disagree	35
Strongly Disagree	32

Finally, question 24 **"What suggestions or improvements would you like to see happen with WGIAC?"** resulted in a wide variety of comments. Some want WGIAC terminated, while others want to see a fulltime GIS coordinator position in place. Others commented that they want to see coordination address local needs; not just state government needs. The WGIAC Survey Results contains a full listing of these responses.

Need: A single GIS contact is needed to organize, catalog, and offer Wyoming geospatial data, information, contacts, partnerships and training for all GIS users. In order for this coordination to be successful, it requires support from the Governor's office and appropriated state funding.

B. Duplication of Effort

Issue: A duplication of effort is occurring in GIS activities at many levels of government throughout Wyoming. Duplication occurs through application and data development, and data delivery. All these duplications lead to inefficiencies in government and cost tax payers more money than necessary.

Duplication of efforts has been seen in GIS data production for many years. One example is the creation of road data within Wyoming. Wyoming Department of Transportation (WyDOT), counties, cities, BLM, and USFS all maintain and use varying levels of road data. This has led to each of these agencies digitally recreating the same information. This type of duplication occurs among numerous agencies and with many other thematic data layers.

Duplications are also occurring with GIS data delivery and distribution. This has led to issues for Wyoming on both the dissemination and access side. Both the WGIAC and I-Team are trying to address this issue, but have had limited success. In 1997, the University of Wyoming's Spatial Data and Visualization Center (SDVC; now WyGISC) tried to fill the role as the centralized GIS data repository through the creation of the WNRD Clearinghouse and a metadata outreach program. This activity was funded via a federal grant with no long-term commitments guaranteeing the maintenance and growth of this Wyoming service. This data service is no longer federally funded and is maintained with limited resources. Additionally, the State of Wyoming tried to foster this coordination through the creation of an Office of GIS in 1996. However, funding was limited to a coordinator's salary (no technical support staff), which made it impossible to accomplish the mission of the office.

Without coordination and funding directed toward data stewardship and dissemination, the state of Wyoming will run the risk of spending more money on collectively funding each agency to perform this activity versus having one group provide this service for all agencies. Currently many agencies are moving forward in providing Internet access to their data. For each agency to accomplish this goal, they will have to purchase the hardware and train employees to support this activity. Additionally, as these agencies move toward Internet mapping even more hardware and human resource skills are needed. All of this will lead to an increase in staff and hardware directed toward supporting external data requests, and limits the time to support agencies internal business practices.

In contrast, some other data providers lack the capability to disseminate their data to users. These organizations may not have the technical or financial resources necessary to create and maintain data distribution sites. Additionally, they may only have one or two data layers to make available.

The problem in Wyoming is specifying appropriate outlets for distribution of their data. Currently, there is no mechanism for inexpensive distribution, nor a single recognized authority for distribution of geospatial data for Wyoming.

From a user's perspective all of these issues affect their ability to access and utilize data efficiently. Without coordination supported by technical resources, users will continue to be faced with accessing data via interaction with several different agencies. For example if the BLM wanted to perform a site analysis on a proposed well location, it would be necessary for them to access data from a variety of agencies. At a minimum, BLM would contact WOGCC to obtain well information, SHPO to look at cultural resources, Wyoming Natural Diversity Database (WYNDD) to examine endangered species, Wyoming Game and Fish for critical habitat, the State Engineers Office (SEO) for water quantity information and Wyoming DEQ for water quality information. Currently this assembly of data would require several days of work.

Additional issues for users may center on not knowing who to contact for data. Currently within Wyoming there is no accurate and up-to-date database cataloging who maintains what data layers for what extent of Wyoming. This requires users to make several inquiries before finding the appropriate data. Even if data are available, it may not be the most current and accurate data, requiring the user to still contact an agency.

As more users start utilizing internet mapping applications, issues will arise with them having to view several different sites. By having several different sites, application functionality differences and thematic display differences may lead to confusion, frustration and more use of time and money.

Need: A single funded coordinated distribution source for all Wyoming geospatial information is needed. This one source will offer GIS data, contacts and information regarding ongoing projects, and will follow a single set standard to distribute this information.

C. Training

Issue: Many administrators and organizations have pursued GIS without having clear objectives and expectations. Great variation exists both within and between agencies in terms of GIS literacy and skills. This often results in great difficulties for technical communications to occur between personnel within the same agency, not to mention between differing levels of government. In addition, many GIS staff have multiple responsibilities – GIS is just one component of their overall job.

There is no shortage of GIS training opportunities, both technical and managerial. However, few opportunities exist within Wyoming, forcing organizations to invest in out-of-state travel. Faced with this challenge, groups

often do not take advantage of training because of the extra expenses and time accrued with out-of-state. With access to educational and training opportunities, GIS users in the state would be better equipped to handle special projects and to set more realistic expectations and goals for projects and funding.

Need: A collaborative education and training system for GIS personnel in the state that can provide assistance in publicizing, organizing, and conducting training at all levels of GIS education. Agencies could combine resources to offer educational opportunities in a local arena instead of sending only a chosen few out of state for training.

D. Standards

Issue: At present, the WGIAC Standards committee has set standards only on software and metadata. However, there are a wider variety of standards, particularly those related to data development, that need to be addressed for all levels of government to increase their efficiency with utilization of spatial data. Many agencies, not to mention some offices within the same agencies, consistently use multiple coordinate systems, projections, etc. when creating new data. The current technology of GIS software does allow for changing data properties, however, slight to major errors can occur during the transformations and create larger problems for the end users.

Need: New standards should expand beyond the two WGIAC standards and should include both the basic GIS technical specifications (e.g. topology, clean linework, attributes, etc.) as well as detailed data layer specific content standards for important new data sets – such as land ownership, land use, and elevation. These types of expanded standards are absolutely essential for any new statewide data layers that are to be developed. Standards should be seen as the foundation that makes multiple efforts useful for all users at regional and statewide levels. Development of these new standards should be pursued as a distinct project under the direction of the proposed GIO (see section VI. Recommendations for Implementation of GIS Coordination). The overall objective of state standards is to facilitate the sharing of GIS data, improve transferability of GIS data, and improve supportability of GIS application software. These standards are expected to increase interoperability between state agencies through the use of common GIS data formats. Increased efficiency and common standards at the state level will also increase efficiency and cooperation among GIS partners at the private, federal, and local levels.

IV.   Recommendations for Implementation of GIS Coordination

A. Restructure

The GIS coordination team, through response from the GIS community, government needs, WGIAC Survey, and overview of existing states' coordination efforts, recommends the addition and restructure of existing organizations within the state. A new organizational infrastructure is needed to support the ever-growing use of GIS and spatial data. Additionally, to ensure success, it is imperative that these recommendations have statewide representation of GIS users and organizations.

The restructuring and recommendations of this committee follow the "Coordination Criteria" set out by the National States Geographic Information Council (NSGIC) white paper, "State Model for Coordination of Geographic Information Technology". This 2002 study of successful state GIS coordination efforts determined the following nine "Coordination Criteria" to create success in GIS Coordination.

  a. A full-time, paid coordinator position is designated and has the authority to implement the state's business and strategic plans.
  b. A clearly defined authority exists for statewide coordination of geospatial information technologies and data production.
  c. The statewide coordination office has a formal relationship with the state's Chief Information Officer (or similar office).
  d. A champion (politician or executive decision maker) is aware and involved in the process of coordination.
  e. Responsibilities for developing the National Spatial Data Infrastructure and a State Clearinghouse are assigned.
  f.   The ability exists to work and coordinate with local governments, academia, and the private sector.
  g. Sustainable funding sources exist to meet projected needs.
  h. Coordinators have the authority to enter into contracts and become capable of receiving and expending funds.
 i.   The Federal government works through the statewide coordinating authority.

When applying the criteria to Wyoming we find that the same shortcomings noted by the geospatial community here in our State are also documented by NSGIC. Presently Wyoming's coordination relates to the above criteria as such:

  a. No full-time, paid coordinator.

b. No clearly defined authority (WGIAC).
c. Limited interaction with the CIO.
d. No named political or executive champion.
e. Partially guided NSDI data and infrastructure with the I-Team and two uncoordinated NSDI nodes.
f. Weak local coordination, as county and municipal geospatial users have minimal representation in WGIAC.
g. No funding for coordination.
h. No contract authority.
i. No coordinating authority for the Federal government, though there is Federal interaction.

Recommendations:

1. Remove WGIAC, the existing GIS coordination structure in Wyoming.
   Why: See Issue 1, Wyoming GIS Coordination is Ineffective
   How: To remove existing coordination structure, WGIAC Executive Order 1994-3 signed by Governor Sullivan on April 8, 1994 for the creation of WGIAC will have to be rescinded. The rescinding of this order will dissolve the present WGIAC organization and establish a representative system with executive and administrative backing. Additionally it will remove the present WGIAC website as the State of Wyoming GIS website and allow consolidation of Wyoming spatial data to a single website.

2. Create a new GIS coordination structure.
   Why: See Issue 1, Wyoming GIS Coordination is Ineffective
   How: Create a new Wyoming GIS Coordination Structure that consists of four organizational entities: an Oversight Committee, a Technical Advisory Group (TAG), and a Geographic Information Officer (GIO) with the Wyoming Geospatial Technical Services Program.
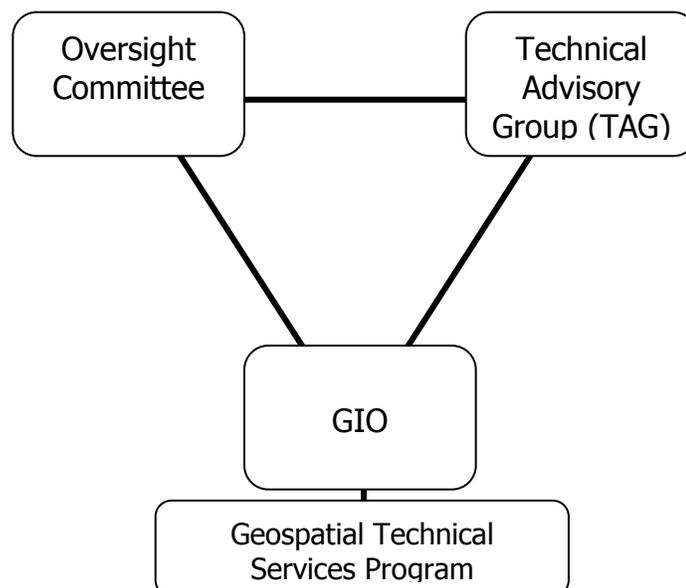
This structure will provide checks and balances along with information flow to and from the user community through the TAG and GIO to the Oversight Committee and back.

The **GIO** will be located under the authority of the Wyoming CIO and will conduct day-to-day operations of GIS coordination, communication, and education. The GIO will have the following responsibilities:

    a. Acts as ex-officio on oversight committee
    b. Acts as facilitator for TAG
    c. Acts as GIS advisor to the CIO
    d. Acts as ITCC representative for GIS community
    e. Oversees Wyoming Geospatial Technical Services Program
    f. Attends user group meetings within Wyoming
    g. Acts as State GIS representative for Wyoming
    h. Acts as I-Team coordinator
    i. Coordinates Inter-agency partnerships
    j. Facilitates and coordinates GIS education and outreach
    k. Develops and maintains relationships with other professional organizations
    l. Develops a biennial review and strategic plan for the office of the GIO
    m. Maintains and provides single consolidated data clearinghouse/website
    n. Conducts spatial data archival and backup
    o. Coordinates training and educational support
    p. Coordinate with federal GIS initiatives such as the NSDI, the National Map, Geospatial One Stop, Federal Emergency Management Agency (FEMA) Flood map modernization, Census TIGER Modernization, Future Directions Initiative, and the National GeoSpatial Programs Office (NGPO)

It is proposed that the GIO's technical service activities be provided via an inter-governmental partnership agreement with the Wyoming Geographic Information Science Center (WyGISC) at the University of Wyoming. The partnership contract, renewable on a biennial basis, would create and fund the **Geospatial Technical Services Program**. This program could operate in a similar fashion to the Water Resources Data System (housed in the UW Department of Civil and Architectural Engineering), which supports the activities of the Wyoming Water Development Office and Commission. Such an arrangement would capitalize on WyGISC's existing expertise and infrastructure, with broad opportunities to leverage these resources for cost-effective technical support for statewide coordination activities. Functions of the program would include:

a. Provides centralized GIS web portal for Wyoming
b. Coordinates tool development and maintenance
c. Provides spatial data clearinghouse
d. Provides centralized web mapping service
e. Offers training
f. Is a mechanism for technology and knowledge transfer
g. Completes project-specific applications
h. Develops metadata and "search" applications

Similar to the WRDS operational model, the majority of these tasks would be completed at WyGISC with resources allocated in a base budget, while certain projects would be conducted with cost-sharing resources and/or other external funds.

The **Oversight Committee** will provide executive direction to the GIO. The Oversight Committee will be chaired by the State CIO, and would include the GIO (ex-officio), and five Governor appointed agency executive level decision makers, and one TAG Member. The TAG member is determined or elected by the TAG members. Thus, the structure includes technical and user guidance from the TAG member and the GIO but has the administrative objectives from the appointed members and the executive guidance from the State CIO. The Oversight Committee will have the following responsibilities:
a. Ensures executive branch's priorities are known and met
b. Makes and approves GIS policy
c. Approve biennial review and strategic plan
d. Approves GIS agreements and contracts
e. Conducts GIO performance evaluation
f. Meets minimum twice per year

The **Technical Advisory Group (TAG)** will communicate GIS user needs and technical advice to the Oversight Committee and the GIO. The TAG could have as many participants as willing to attend, but only 14 voting members. This would consist of two representatives from each of the following levels: Municipalities, Counties, Federal, State, Private Industry, Tribal, and Education entities.

Members of the TAG would be chosen by popular vote from the above-mentioned representative groups. Their election would occur through functions such as the Wyoming Association of County Officials (WACO) for county representatives or Wyoming Association of Municipalities (WAM) for the municipality representatives. The Federal, State, Private Industry, Tribal and Education representatives would have to develop an annual mechanism for election of representatives. The TAG will have the following responsibilities:
a. Represents user community
b. Provides technical guidance to Oversight Committee and GIO

> c. Identifies GIS issues and reports to GIO
> d. Helps develop data standards
> e. Provides communication link between coordination and users
> f. Provides outreach
> g. Researches and recommends policy to Oversight Committee
> h. Ensures GIO Services are being accomplished
> i. Conducts biennial review of technical services
> j. Aids and approves the Wyoming GIS Strategic Plan
> k. Meets a minimum of twice per year
> l. Provides representative to Oversight Committee
> m. Reviews Proposed GIS Implementation Plans
> n. Helps set priorities for the Wyoming Geospatial Technical Services Program

B. Benefits of Recommendations

1. Remove the existing GIS coordination structure in Wyoming
   - Benefits
     1. Eliminates inefficiencies of the volunteer effort
     2. Addresses negative local government views towards WGIAC
     3. Gives a fresh start with renewed support
     4. Streamlines and strengthens geospatial data access and management

2. Create new GIS coordination Structure for Wyoming
   a. Create new GIO position under the CIO
      - Benefits
        1. Is a single officially recognized GIO for Wyoming
        2. Provides dedicated full-time position who is not a volunteer and can concentrate on coordination
        3. The authoritative location of the office within the Governors Office will give it executive backing to conduct business
        4. Will be a direct aid to streamlining and strengthening efforts for the Wyoming government
        5. Is not funded from a state agency that must conduct cost recovery or fund the position
        6. Mechanism to pursue and coordinate partnerships and alternative funding from other governmental entities or the private sector

   b. Create the Wyoming Geospatial Technical Services Program to provide technical support and services to the GIO.
      - Benefits
        1. Provides dedicated technical staff support to GIO and associated responsibilities
        2. Provides a funded mechanism for implementation of technical components of state geospatial information policy

       3. Establishes a single point of contact for state geospatial technical service and training resources
       4. Establishes coordinated access and delivery for geospatial metadata and data

  c. Create Oversight Committee
    ▪ Benefits
      1. Provides checks and balances of executive oversight
      2. Executive backing
      3. Gives Executive guidance

  d. Create TAG
    ▪ Benefits
      1. Representative participation for Wyoming
      2. Increase user knowledge by representation
      3. Increase GIS coordination responsiveness
      4. Provides checks and balances

With this coordination plan, Wyoming will be able to efficiently and effectively coordinate geospatial information and technology. By implementing the recommended structure and organization, Wyoming will fill all or the majority of the "Coordination Criteria" as documented by NSGIC and allow Wyoming to leverage our limited resources by providing a conduit for agencies, organizations and industry.
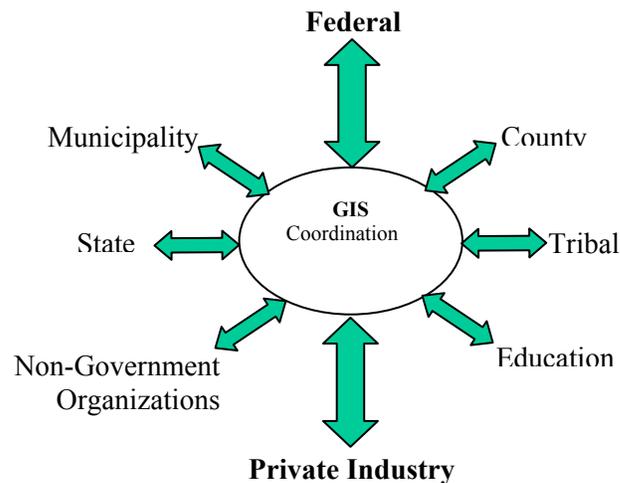
C. Mechanisms for Accountability

Tracking of the GIO will be required biennially to ensure coordination efforts are a benefit to all GIS users in Wyoming. This review will also ensure that both the executive guidance and user community needs are carried out by the GIO.

To conduct the tracking of GIS coordination, the GIO will conduct a biennial "Needs Assessment". This will be regularly reviewed and regularly updated. The "Needs Assessment" will review organization requests and status of fulfilling those needs by the GIO. Additionally, a Wyoming GIS Strategic Plan should be created and updated in each biennium to reflect the goals as reported from the "Needs Assessment". The CIO will review the Strategic Plan as necessary to ascertain if the GIO is meeting the goals.

D. Funding

Specifics on funding mechanisms for implementation of the coordination recommendations are beyond the scope of this document. Consideration should be made of external grant opportunities as well as agency budget allocations. The following listing is an attempt to characterize the cost of each of the major actions outlined above:

- ➢ Creation of Oversight Committee – no cost
- ➢ Creation of Technical Advisory Group – no cost
- ➢ Funding for GIO position and base operating budget -
  - ▪ Estimated salary and benefits $65-90,000 annually
  - ▪ Estimated operating expenses (office space, travel, phone, etc.), $20-50,000
- ➢ Funding of Geospatial Technical Services Program –
  - ▪ Is estimated from $150,000 to $250,000 annually pending requirements, business model and services provided.

Thus to effectively streamline geospatial data and technology coordination, with an oversight committee, technical advisory group, one state position and an experienced technical service program, Wyoming will need an estimated $235 to $390,000 annually.

E. Proposed Action Items

The new GIS coordination structure for the State of Wyoming should be implemented by the start of the 2007 state fiscal year. While budget appropriations may not be addressed until the 2006 legislative budget session, many actions can be addressed prior to funding – i.e., an existing budget is not a requirement for implementing parts of this plan. The proposed timeline for executing the recommendations is as follows (responsible entities shown in parentheses):

- By January 1st, 2005
    - Appoint/create the Oversight Committee (CIO and Governor's Office)
    - Rescind Executive Order 1994–3 (April 8, 1994) which created the Wyoming Geographic Information Advisory Council (Governor's Office)
- By June 30th, 2005
    - Appoint acting/interim GIO (CIO) to assist with implementations of these recommendations
    - Create the Technical Advisory Group (TAG) (acting GIO)
- By September 30th, 2005
    - Develop statewide GIS strategic plan (Oversight Committee, TAG and acting GIO)
    - Develop budget request for Geographic Information Officer position and Wyoming Geospatial Technical Services Program (CIO and acting GIO with input from TAG)
- July 1, 2006
    - Hire GIO (CIO)
    - Initiate Wyoming Geospatial Technical Services Program (GIO)

Rescinding Executive Order 1994–3 and establishment of the Oversight Committee and TAG may take place immediately as they do not require funding. However, their existence and activities are only part of this overall plan. If a GIO is not funded and established, then only a partial implementation has taken place. A partial implementation means only a partial solution to the coordination issues identified, thus leaving Wyoming in its present state of inefficient and ineffective GIS coordination.

F. Summary

Within Wyoming, the use of GIS in the public and private sectors continues to grow at an extreme rate. All levels of organizations are making and will continue to make large investments in geospatial data, training and infrastructure. The Wyoming geospatial community of government and industry continue to show the necessity for coordination of data, technology, training and standards. Through recent responses and previous requests for GIS coordination, the state geospatial community has continued to express the need for coordination. Even members of WGIAC have pointed out that this organization is ineffective and does not have the ability to coordinate the greatly growing needs of the GIS community.

This document has reviewed the current status of GIS and users in the State of Wyoming, including government and industry. It has identified the issues and needs surrounding GIS use in Wyoming. It proposes creating a centralized

mechanism for coordinating all geospatial activities and information within Wyoming.

The proposed coordination structure will strengthen the use of the State of Wyoming's geospatial data and technology through the creation of a Geographic Information Officer and a geospatial technical services program that will be held accountable by both policy and oversight bodies. By investing in these efforts, the state will be able to maximize the collective investment of public funds to coordinate geospatial activities throughout Wyoming. The question is not "Will GIS be used in Wyoming?", but "How efficiently will resources be applied to GIS activities across Wyoming?" This proposed coordination plan can provide the mechanisms to maximize the return on the State of Wyoming's resources for all levels of geospatial data and activities, benefiting both government and industry in the creation, management, and maintenance of geospatial information. Additionally, it fulfills all of the coordination criteria laid out by successful state coordination efforts throughout the United States.

V.   Current Status of Recommendation Implementation

The original November 2004 version of this document formed the basis of a preliminary CIO GIS coordination status report to Governor Freudenthal in May 2005 and the development of an exception budget request shortly thereafter. The budget request was given a low priority by the CIO and therefore the Governor did not recommend the item. This was primarily because the immediate need for GIS coordination was not as strong as other projects requested by state agencies.

In March 2006, the CIO's Office was awarded a $50,000 National Spatial Data Infrastructure (NSDI) Cooperative Agreements Program (CAP) Grant as part of the joint Federal Geographic Data Committee / National States Geographic Information Council (FGDC / NSGIC) Fifty States Initiative. The purpose of the grant was to carry out strategic and business planning activities associated with statewide GIS coordination in Wyoming.

One objective of the grant was to implement those WGIAC recommendations which did not require additional funding. These included:

- Modification of Executive Order 1994-3 which created WGIAC in 1994
- Appointment of an executive-level Oversight Committee for geospatial activities
- Establishment of a Technical Advisory Group (TAG) from GIS professionals within the state

In April 2006, Governor Freudenthal signed Executive Order 2006-1, which rescinded the 1994 executive order creating WGIAC and replaced the Council with a two-tier GIS governance structure consisting of a five-member, Governor-appointed Oversight Committee and a 14-member Technical Advisory Group.

The CIO's Office also allocated 50% of an existing OCIO position to support the Oversight Committee, the Technical Advisory Group, and state government GIS coordination activities. This position was occupied for approximately ten months (May 2006 through March 2007) and was instrumental in development of the grant's business plan product and in raising awareness among government personnel and elected officials throughout the State.

In September 2006, the CIO's request to the Governor's supplemental budget again included provisions for state GIS coordination, including creation of the GIO position and Technical Services Program (this time ranked as the number one information technology priority). Due to the non-budgetary focus of the pending legislative session, the budget item was once again not included in the Governor's final budget request for FY2008. However, the issue of GIS coordination was the subject of considerable discussion by the Joint Appropriation Committee prior to the 2007 legislative session, resulting in a recognized need to address these issues in the near future. Thus, the 2004 WGIAC recommendations continue to serve as the foundation for statewide GIS strategic planning and business plan development.

VI. Appendices

A. Web resources accompanying original 2004 *Recommendations* document
(last accessed September 2004)

Governance Model, Wyoming CIO,
http://cio.state.wy.us/charters/charters.htm
Information Technology Coordinating Council (ITCC)
http://cio.state.wy.us/charters/charters.htm
Information Technology Policy Council (ITPC)
http://cio.state.wy.us/charters/charters.htm
OGIS Contract,
http://www.wsgs.uwyo.edu/GIS_Coord/Excerpt_from_Office_of_GIS_Contract.doc
Proposal for Development of a State of Wyoming GIS Technical Services
Program at the University of Wyoming, WyGISC, 2001
http://www.wsgs.uwyo.edu/GIS_Coord/UW_OGIS_Proposal.doc
State of Maine, GIS Needs Assessment and Requirements Analysis and
Strategic Plan to Develop The Maine Public Library of Geographic
Information
http://www.wsgs.uwyo.edu/GIS_Coord/StatePlans/ME_Assement_Final_Report.pdf
State of Wyoming, Executive Department, Executive Order 1994–3
http://wgiac2.state.wy.us/html/order.asp
State Model for Coordination of Geographic Information Technology (GIT)
http://www.nsgic.org/hot_topics/model_states/GIT_Coordination_final.pdf
Values Statement, Wyoming CIO
http://cio.state.wy.us/charters/charters.htm
Vision Statement, Wyoming CIO
http://cio.state.wy.us/charters/charters.htm
WGIAC Strategic Plan, v.2.9
http://wgiac2.state.wy.us/html/strategicplan2000.asp
WGIAC Survey Results
http://www.wsgs.uwyo.edu/surveys/WGIAC2003/WGIACresults.aspx
Wyoming I-Plan
http://gis.dot.state.wy.us/iteam/I-Plan_2003-12-11.pdf
Wyoming Statewide Policy on Geographic Information
http://wgiac2.state.wy.us/html/policy_index.asp

B. Existing State GIS Coordination Efforts Reviewed
(last accessed September 2004)

Kansas Geographic Information System Initiative's Annual Report
http://www.wsgs.uwyo.edu/GIS_Coord/StatePlans/KS_AnnualReport4DASC02.pdf
Kansas Strategic Management Plan for Geographic Information Systems
Technology
http://www.wsgs.uwyo.edu/GIS_Coord/StatePlans/KS_Strategic_plan.pdf
Maine GIS Needs Assessment and Requirements Analysis and Strategic Plan to
Develop The Maine Public Library of Geographic Information
http://www.wsgs.uwyo.edu/GIS_Coord/StatePlans/ME_Assement_Final_Report.pdf

Maine, A program for Building The Maine Public Library of Geographic
Information
http://www.wsgs.uwyo.edu/GIS_Coord/StatePlans/ME_ProposedBudget.htm
Montana Natural Resource Information System 2002 Report
http://www.wsgs.uwyo.edu/GIS_Coord/StatePlans/MT_02NRISAnnRep.pdf
National States Geographic Information Council (NSGIC), Guidelines for
Coordination of Geographic Information Technologies
http://www.wsgs.uwyo.edu/GIS_Coord/NSGIC_model_states05-03.pdf
National States Geographic Information Council (NSGIC), Statewide Leadership
and Coordination of Geographic Information and related technology in the
50 states
http://www.wsgs.uwyo.edu/GIS_Coord/StatePlans/All_50_State_Summaries.pdf
New Jersey Office of GIS
http://www.state.nj.us/ogis/gis_office.html
New Jersey Executive Order
http://www.state.nj.us/infobank/circular/eow122.htm
New Mexico GIS Strategic Plan Calendar Years 2001-2003
http://www.wsgs.uwyo.edu/GIS_Coord/StatePlans/NM_StrategicPlan01to03.pdf
Texas 2002 Biennial Report on Geographic Information Systems Technology
http://www.wsgs.uwyo.edu/GIS_Coord/StatePlans/TX_2002Report-lowres.pdf
Geographic Information Framework for Texas
http://www.wsgs.uwyo.edu/GIS_Coord/StatePlans/TX_99FrameWork.pdf
Utah Automated Geographic Reference Center, Geographic Information System
Data Sharing Conformity Bill
http://agrc.utah.gov/agrc_aboutagrc/historyagrc/historyintro.html
West Virginia Technology Strategic Plan, Information Technology Planning
Database: Geological and Economic Survey-GIS Coordinator's Office
http://www.wsgs.uwyo.edu/GIS_Coord/StatePlans/WV_StrategicPlan03.pdf
Wisconsin Land Council, Wisconsin Land Information Board Report to the
Governor and Legislature
http://www.wsgs.uwyo.edu/GIS_Coord/StatePlans/WI_LandInfoBoard_LegReport02.pdf