



Business Plan  
*For the*  
Statewide Geospatial Clearinghouse

Approved by the  
Arizona Geographic Information Council

Date Approved:  
25 February 2010

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Advancing Statewide Spatial Data Infrastructure in Arizona

# Business Plan for the Statewide Geospatial Clearinghouse

With Input from Stakeholders in the Arizona Geospatial Community

Produced for the Arizona Geographic Information Council (AGIC) with funding assistance from the Federal Geographic Data Committee's (FGDC) Cooperative Agreements Program (CAP), Category 3: Fifty States Initiative

**Contract Number:** LAND-2009-808

Prime Contractor:



Subcontractor:



## Foreword

The Strategic and Business Planning Process was initiated by the Arizona Geographic Information Council (AGIC) to promote innovative thinking and discussion on solutions that meet the geospatial requirements and needs of Arizona. The planning process set out to help define the organizational structure and business model that helps meet those needs, and for this purpose, relied heavily on outreach to the geospatial community in Arizona. It also set out to identify how an Arizona Geospatial Clearinghouse can share geospatial data and GIS services in ways that help the state and its constituents benefit.

Stakeholders from around the state expressed what they thought was important in these matters, and this plan reflects their input. Input was captured through multiple means during the second half of 2009, primarily relying on a series of Workshops held around the state, and an online survey. The planning process was open and transparent, but not rigidly scientific in terms of guaranteeing that all possible perspectives were equally represented. Nonetheless, a broad and diverse spectrum of the GIS stakeholder community was invited to advocate for their views, and a variety of perspectives are certainly represented. Full details of the Strategic Planning Methodology are in Appendix A of the Strategic Plan document, a companion to this Business Plan.

### Planning Impetus:

- February 2009: Federal Geographic Data Committee (FGDC) National Spatial Data Infrastructure (NSDI) Cooperative Agreement Partnership (CAP) Grant Award for Arizona to support GIS Strategic & Business Planning
- July 2009: Governor Jan Brewer signed Senate Bill 1318 into law on July 10, 2009, effective Sept. 30, which includes:
  - Establishing AGIC in legislation
  - The requirement to establish a clearinghouse of information and a central repository for Geospatial Data and Statewide GIS Services
  - Focus on developing Enterprise GIS (shift away from project focus)
  - Facilitating data sharing

## Acknowledgments

The Strategic and Business Planning Process was coordinated by the Arizona Geographic Information Council (AGIC), with administrative and leadership support from the State Cartographer's Office, and funding assistance from the Federal Geographic Data Committee's (FGDC) Cooperative Agreements Program (CAP), Category 3: Fifty States Initiative. The planning process was greatly facilitated by the following individuals:

- Steering Committee:

- Gene Trobia, Arizona State Land Department
- Nicole Brown, Arizona Game & Fish Department
- Jana Hutchins, Arizona State University
- Tim Smothers, City of Peoria
- Kevin Blake, Yavapai County
- Tom Sturm, USGS Geospatial Liaison
- AGIC Workshop Coordinators:
  - Workshop 1 (Flagstaff): Kevin Blake
  - Workshop 2 (Kingman): Bruce Schneider
  - Workshop 3 (Phoenix/Peoria): Tim Smothers
  - Workshop 4 (Tucson): Manny Rosas, Steve Whitney

The Business Plan is a *living document*, meaning that AGIC should periodically update it to incorporate discovery during the process of implementation. The intention is for the overall strategic goals to last for the duration of the planning horizon (i.e., the next 2-3 years), but the implementation details may change due to shifting priorities and operating realities. Version changes should be tracked in the Document History at the end of the plan.

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## 1 EXECUTIVE SUMMARY

This Business Plan for the Statewide Geospatial Clearinghouse is focused on Strategic Goal #1 of the state’s recent GIS Strategic Plan, to “*Facilitate the productive application and sharing of geospatial data and GIS and location-based services to address the needs of Arizonans by establishing a Clearinghouse with statewide accessibility.*” This is directly consistent with Senate Bill 1318 (SB1318). The near term focus is on establishing a state-managed infrastructure, with a central repository and links to the best available data from data originators and stewards where possible.

The success of the Clearinghouse will be determined by its contribution to statewide initiatives and business drivers that require reliable geospatial base map data against which program-specific data can be displayed and analyzed. Noteworthy in this context is the **common need for base map data across several key statewide initiatives**, including the Arizona Renewable Energy Project, AZ3D (for emergency response and planning), and the Arizona Broadband Mapping Project.

Sharing geospatial data, services, and know-how via the Clearinghouse will cut down on costly duplication of effort associated with collecting the same data many times by different people and agencies. It will also result in productivity improvements through quicker search results and easier access to data and information. Together, **less duplication of effort and more productivity** will have a positive impact on the statewide economy and the successful performance of statewide initiatives, and will contribute to efficiency and fiscal responsibility.

A practical organizational approach is necessary to establish the Clearinghouse. The recommended approach is to leverage the Arizona Geographic Information Council (AGIC) organization and its committee structure. In addition, **a sponsoring agency needs to be officially designated** with the responsibility for implementing the Clearinghouse.

There are existing examples of websites in Arizona that contain useful collections of geospatial data, including metadata, which could be immediately useful ingredients for the new Clearinghouse. The actual review of existing infrastructure as part of this planning discovery process, including examples described in the body of this document, reinforced the need for a Clearinghouse. The **existing websites are not readily discoverable by a broader community** of users who want to find data, perform analysis, and create maps. The sites are aimed at GIS professionals, not general users, thereby diminishing their availability to support all of the strategic initiatives underway in the state.

The **investment to build the Clearinghouse** and its baseline functionality, database structure, and data management workflows **can be planned in phases**. Key cost line items are also covered in the body of this Business Plan, but the rough order of magnitude (ROM) costs for three years are estimated to be as follows:

Year	ROM Estimate (*)
1	\$211,000
2	\$181,000
3	\$125,000
<b>Total</b>	<b>\$517,000</b>

## 2 PROGRAM GOALS & CONTEXT

This Business Plan provides details to support the implementation of “Strategic Goal #1” from the Arizona GIS Strategic Plan, which is based on a specific requirement of Senate Bill 1318 (SB1318) to establish a Geospatial Clearinghouse (Clearinghouse). The Clearinghouse is also required by the Arizona Renewable Energy Project for all state agencies to share consistent framework and renewable energy data, and to support the state’s Broadband Infrastructure initiative. The Arizona Renewable Energy Project, as well as AZ3D and the Arizona Broadband Project may assist in the development of the Geospatial Clearinghouse.

### a. Establish a Geospatial Clearinghouse

The strategic goal that is addressed by this plan, and its related success factors, are stated in the table, below:

<b><i>Strategic Goal #1:</i></b>
<i>Facilitate the productive application and sharing of geospatial data and GIS and location-based services to address the needs of Arizonans by establishing a Clearinghouse with statewide accessibility.</i>
<b><i>Programmatic Goals</i></b>
a. Develop a Business Plan for implementing a Clearinghouse.
b. Collect information on user requirements on matters related to geographic information systems, geospatial data, technologies, products, services, standards, programs and activities and prioritize those requirements to inform decision-making for the implementation of the Clearinghouse.
c. Get necessary support from stakeholder, decision-makers, and funding agents for GIS and geospatial data.
d. Tie into GITA State IT Plan which mentions GIS as a priority for shared use (i.e. IT Goal #3: Standardization and Reuse – 3.2 Geographic Information Systems).
e. Assess where geospatial data spending is redundant, where a Clearinghouse could satisfy the needs for access to data without duplicate spending.
f. Design and build a Clearinghouse with statewide accessibility and use data from the original source where possible.

(\*) SOURCE: *Arizona GIS Strategic Plan, February 2010*

### b. Clearinghouse Defined

The term “clearinghouse” is widely used in the GIS community. Approximately 48 of the 50 states have a geospatial clearinghouse for disseminating data and services. For many of the states, their clearinghouse is registered as a node in the National Spatial Data Infrastructure (NSDI), to support the discovery of geospatial resources through the geodata.gov portal, which is part of the “Geospatial One-Stop” initiative at the national level (<http://gos2.geodata.gov/wps/portal/gos>). The Federal Geographic Data Committee, in this national context, defines clearinghouse as:



*A distributed system of servers located on the Internet which contain field-level descriptions of available digital spatial data and services. The descriptive information, known as metadata, is collected in a standard format to facilitate query and consistent presentation across multiple participating sites. Clearinghouse uses readily available Web technology for the publication and discovery of available geospatial resources. (Source: [http://www.fgdc.gov/dataandservices/clearinghouse\\_qanda](http://www.fgdc.gov/dataandservices/clearinghouse_qanda) )*

A more state-centric definition is provided by ESRI, the leading manufacturer for GIS software, as follows:

*A clearinghouse in GIS is a repository structure, physical or virtual, that collects, stores, and disseminates information, metadata, and data. A clearinghouse provides widespread access to information and is generally thought of as reaching or existing outside organizational boundaries. (Source: Wade, T. and Sommer, S. eds. A to Z GIS, ESRI Press)*

In the case of Arizona, while the first definition of a federated approach might eventually fit the long-term architecture of the state’s Clearinghouse, the near-term focus will be on establishing a state-managed infrastructure, with a central repository and links to the best available data from data originators and stewards where possible. Otherwise, there is a risk that data synchronization to keep content current will not be timely and repeatable. Over time, the Clearinghouse is envisioned to embrace greater local government participation and utilization.

### **c. Clearinghouse Context**

This plan provides a context for why the goal of establishing a Clearinghouse is important, i.e., to support the set strategic issues and business drivers that benefit from GIS. To define and prioritize this set, input was solicited from the Arizona GIS stakeholder community on commonly recognized issues and drivers across the state. More specifically, stakeholders were asked to identify the statewide issues for which GIS can or is adding value, and contributing to fiscal responsibility and efficiency.

As a result of the outreach to stakeholders, the following “Top Ten” strategic issues and business drivers were identified:

#### **Top Ten Strategic Issues and Business Drivers for GIS in Arizona**

<b>Rank</b>	<b>Strategic Issue and Business Driver for GIS</b>	<b>Score (*)</b>
1	Emergency Response & Planning; Public Safety & Disaster Planning	28
2	Environmental Management	26
3	Renewable Energy Development/Smart Grid	25
4	Services for “Prosumers” (i.e. professional consumers/citizens)	23
5	Health Care	22
6	Visualizing Information (i.e. Health Stats); Public Communications & Social Awareness of Issues	22
7	Smart Growth; Proactive/ Reactive Response to Change	21

Rank	Strategic Issue and Business Driver for GIS	Score (*)
8	Water Management	21
9	Broadband	20
10	Special Districts / Tax Districts for Utility Allocation (Property & Sales)	20

(\*) NOTE: *The consolidated list of issues and drivers was ranked during a facilitated consensus ranking exercise at the AGIC Annual Conference in Tucson in early November 2009. The Arizona GIS Strategic Plan included the full list of 18 ranked items.*

This aforementioned “Top Ten” list will be the lens through which all aspects of establishing the Clearinghouse should initially be viewed. The Clearinghouse should bring value to professionals who are working in support of these strategic issues and business drivers, for the benefit of Arizona and its citizens. Along these lines, and important to the Clearinghouse context, is the requirement to support current statewide initiatives, including the ones listed in the section below.

### 3 BENEFITS AND JUSTIFICATION

The Clearinghouse is a legislatively mandated requirement of SB1318, and will help to share geospatial data, services, and know-how. In general, it will benefit all of the strategic issues and business drivers previously identified, as well as provide essential support to major statewide initiatives, including:

- **Arizona Renewable Energy Project:** To support coordinated approaches and analysis for potential energy sites (e.g. wind and solar farms) and transmission corridor selection to increase clean, renewable energy sources and decrease dependence on foreign oil.
- **AZ3D:** To support law enforcement and emergency first responders in situation awareness and a common operating picture for emergency response planning and homeland security applications.
- **Arizona Broadband Mapping Project:** To support the assessment of broadband infrastructure and services throughout the state, to help increase and improve high-speed Internet connectivity for all citizens, including those living in rural areas.

#### a. Description of General Benefits

Sharing geospatial data, services, and know-how will cut down on costly duplication of effort associated with collecting the same data many times by different people and agencies. It will also result in productivity improvements through quicker search results and easier access to data and information. Together, less duplication of effort and more productivity will have a positive impact on the statewide economy and the successful performance of statewide initiatives.

The notion of “*collect once, use many times*” is a fundamental part of the Clearinghouse philosophy, with associated economic benefits from leveraging and reusing existing geospatial data and resources. A list of benefits, including the ones already mentioned, follows:

- Minimize duplication of effort
- Collect data once, and use it many times
- Improve productivity through quicker and easier access to official, documented data
- Reduce risk of using unofficial data of uncertain origin and vintage
- Facilitate self-service and free-up staff time now devoted to filling data orders
- Eliminate bottlenecks and wait times associated with order fulfillment
- Facilitate geospatial data integration (horizontal & vertical) and other standardization

**b. Benefits for Addressing Strategic Issues and Business Drivers**

Establishing a Clearinghouse without a clear context and sense of purpose is not the goal of this program. Importantly, both direct and indirect benefits to the performance of work that addresses the “Top Ten” strategic issues and business drivers will be the outcome of a successfully established Clearinghouse. Some benefits may not accrue immediately for all potential user groups, depending on access constraints during implementation phases.

In general, a consistent framework of official geospatial data will be beneficial to the support of the strategic issues and business drivers, along with selected other benefits as listed, below:

<b>Rank</b>	<b>Strategic Issue and Business Drivers</b>	<b><i>Selected Benefits</i></b>
1	Emergency Response & Planning; Public Safety & Disaster Planning	Official data for input to situation awareness, readiness, and a common operating picture; evacuation routing
2	Environmental Management	Official data for input to spatial analyses and scientific studies on natural resources; data to support site characterization and remediation
3	Renewable Energy Development/Smart Grid	Official basemap for locating energy resources and distribution systems; suitability analyses
4	Services for “Prosumers” (i.e. professional consumers/citizens)	Official backdrop for creative mash-ups and innovative crowd-sourcing applications; location-based services
5	Health Care	Official data for input to proximity analyses of patient populations to care facilities; backdrop for disease surveillance
6	Visualizing Information (i.e. Health Stats); Public Communications & Social Awareness of Issues	Official backdrop for presenting data on many subjects, to better inform citizens

Rank	Strategic Issue and Business Drivers	Selected Benefits
7	Smart Growth; Proactive/ Reactive Response to Change	Official basemap for locating people populations, supporting infrastructure, and constraints
8	Water Management	Official basemap for locating water resources and infrastructure, including collection and distribution systems
9	Broadband	Official basemap for locating broadband infrastructure, customers, service areas, and type of service; market analysis
10	Special Districts / Tax Districts for Utility Allocation (Property & Sales)	Official data for input to policy decisions, fiscal management, and equitable taxation

### c. Economics of Data Distribution

The general belief is that the willingness to pay for geospatial data is low, even though the value is high. As the price goes up, demand goes down. When the utilization of geospatial data is less than optimal, productivity and innovation are reduced, and overall economic welfare is lower for society at-large. Studies in the US (*i.e.*, *National Research Council, Licensing Geographic Data and Services, 2004*) and elsewhere have supported this economic viewpoint, including a recent study in New Zealand (*i.e.*, *Ministry of Economic Development, Spatial Information in the New Zealand Economy, 2009*).

## 4 REQUIREMENTS AND COSTS

This part of the Business Plan assesses the suitability of the existing infrastructure for meeting the program goals, as well as the requirements for establishing the Clearinghouse. There is a causal relationship between the requirements and costs, which are also discussed. And, as mentioned in previous sections, there is a very important requirement to support currently funded statewide initiatives, including: the Arizona Renewable Energy Project; AZ3D; and, the Arizona Broadband Mapping Project.

To illustrate this point, the Arizona Renewable Energy Project specifically requires a repository of geospatial framework data to help coordinate approaches and analyses for energy site and transmission corridor selection. Project specific data will be displayed and processed against this geospatial framework, or basemap data. The essence of the Clearinghouse is to supply this data in a reliable and efficient manner.

### 4.1 Organizational Approach

A practical organizational approach is necessary to establish the Clearinghouse. In Arizona, the recommended approach is to leverage the AGIC organization and its committee structure. This was also discussed in the context of the overall Strategic Plan, and is reinforced within this section of the Business Plan.

**a. Leverage AGIC Committees for Establishing a Clearinghouse**

An important requirement to support program implementation is to ensure alignment between the activities of the current AGIC committees and the goal of establishing a Clearinghouse. The leadership and membership of the current committees are key resources for enabling concerted action. All committees should be aligned with the overarching strategic goals, but the focus on implementing the more granular programmatic goals will vary by committee. Ultimately, it is up to AGIC to determine how this alignment should be best achieved, and whether or not committee charters need to be revisited in this context.

The current committees are relisted, below, followed by a table that shows one view of how they might align with the goals of this Business Plan, which is focused on “Strategic Goal #1” wherein the key program requirement for establishing a Clearinghouse is stated.

Current AGIC Committees:

- **Administrative and Legal Committee:** Chair, Tim Smothers (City of Peoria, and the League of Arizona Cities and Towns)
- **Data Committee:** Co-Chairs, Gene Trobia (Arizona State Land Department, State Cartographer), Tom Sturm (USGS Geospatial Liaison)
- **Conference Committee:** Co-Chairs: Jami Garrison (Maricopa Association of Governments), Steve Whitney (Pima County, and the Tucson Area GIS Cooperative)
- **Outreach Committee:** Chair, Adam Iten (Arizona Department of Administration, State 9-1-1 Coordinator)

**b. Alignment of AGIC Committees with Program Goals**

<b>GOALS</b>	<b>Admin.</b>	<b>Data</b>	<b>Conf.</b>	<b>Outreach</b>
<b>Strategic Goal #1:</b>				
<i>Facilitate the productive application and sharing of geospatial data and GIS and location-based services to address the needs of Arizonans by <b>establishing a Clearinghouse with statewide accessibility.</b></i>	X	X	X	X
<b>Programmatic Goals for Success</b>				
a. Develop a Business Plan for implementing a Clearinghouse. (*)	X	X	X	X
b. Collect information on user requirements on matters related to geographic information systems, geospatial data, technologies, products, services, standards, programs and activities and prioritize those requirements to inform decision-making for the implementation of the Clearinghouse.		X	X	X

<b>GOALS</b>	<b>Admin.</b>	<b>Data</b>	<b>Conf.</b>	<b>Outreach</b>
c. Get necessary support from stakeholder, decision-makers, and funding agents for GIS and geospatial data.	X	X	X	X
d. Tie into other statewide IT infrastructure initiatives.	X	X		X
e. Assess where geospatial data spending is redundant, where a Clearinghouse could satisfy the needs for access to data without duplicate spending.		X		X
f. Design and build a Clearinghouse with statewide accessibility and use data from the original source where possible.	X	X		X

(\* NOTE: *This Business Plan is to meet this success factor.*

Ultimately, it is up to AGIC to decide the best organizational approach, after review of the Business Plan and establishing an understanding of what needs to be done. For example, two important considerations require the Data Committee to focus on the technology aspect of its role:

- User interface (functionality and look-and-feel)
- Infrastructure specifications (hardware and software)

**c. The Clearinghouse needs an “owner” (sponsoring agency)**

The Clearinghouse requires an owner, to ensure sponsorship, sustainment, and accountability. One model used by some states is for an organizational unit under a Geospatial Information Officer (GIO) or his/her equivalent to be responsible. This usually puts the Clearinghouse within the department responsible for Information Technology (IT). Another model used by some states is to have the Clearinghouse owned and operated by an academic institution, supported and directed by a state authority. Across the states, there are many variations on these models. The important thing is to find the right approach for Arizona.

**4.2 Suitability Assessment of Existing Infrastructure**

There are existing examples of websites in Arizona that can inform the thinking of ‘what-to-do’ or ‘not-to-do’ when establishing the statewide Clearinghouse that is the subject of this Business Plan. Some of these examples contain collections of geospatial data, including metadata, which would be immediately useful ingredients for the new Clearinghouse.

Also, initial startup costs required for building any web-based Clearinghouse, and ongoing financial requirements to keep the Clearinghouse current, and to add more data, could be potentially alleviated by leveraging existing infrastructure.

**a. General Observations**

Other factors to consider with regard to the existing infrastructure include the following:

- Currently, the State Land Department’s information technology (IT) standard for servers is Unix-based; other departments have migrated to Windows
- The state’s Chief Information Officer (CIO) is located in the Government Information Technology Agency (GITA), same as AZ3D
- Many respondents to the online survey have used all of the Arizona’s existing data and web portal resources, with ALRIS being the most used (80.8%)
- In the online survey, the Arizona GeoData Portal was considered the “best model for a statewide Clearinghouse” by more respondents (25) than any other examples

#### **b. Existing Data and Web Portals**

The following web-based sites have content that would be appropriate to consolidate into a new Clearinghouse. The actual review of existing infrastructure as part of this planning discovery process reinforced the need for a Clearinghouse. There are sites that are not readily discoverable by a broader community of users who want to find data, perform analysis, and create maps. The sites are that aimed at GIS professionals, not general users.

The following web-based sites content could be the basis for meeting the prioritized data requirements. While the data may not be the most current or comprehensive they would be good starting points, until more accurate or current dataset are assembled for future release.

The following websites are profiled in this section, due to their relevant content and trend-setting for the notion of a Clearinghouse:

- Arizona GeoDataPortal
- Arizona Geographic Information Council (AGIC)
- Arizona State Cartographer’s Office (SCO)
- Arizona Land Resource Information System (ALRIS)
- Arizona Imagery Server
- The Arizona Map
  - Internet Map Services
  - Map Viewer
- Arizona Geoserver
- AZ3D

#### **Arizona GeoData Portal**

<http://agic.az.gov/portal/main.do>

The Arizona Geodata Portal is an initiative of the Arizona Geographic Information Council (AGIC). The Portal is maintained and hosted by the Arizona State Cartographer’s Office. The Portal is designed to provide GIS users with links to Internet map services, FGDC compliant metadata, and geospatial data downloads.

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The AGIC Portal was created to provide access to geospatial data resources for State agencies. All users wishing to download data from the Portal must first request a username and password.



The site includes information about the following items, which are also considerations for the subject Clearinghouse:

- Standards
- Geospatial Data
- Other Data Providers
- Data Tools

## AGIC

<http://agic.az.gov/>

The Arizona Geographic Information Council (AGIC) was established by Executive Order 89-24 as Arizona's primary forum and oversight group for geographic information and geographic information technology issues and coordination efforts. AGIC identifies standards, development and implementation strategies to provide a framework in order to optimize the state's investment in geographic data and technology.

## Arizona State Cartographers Office

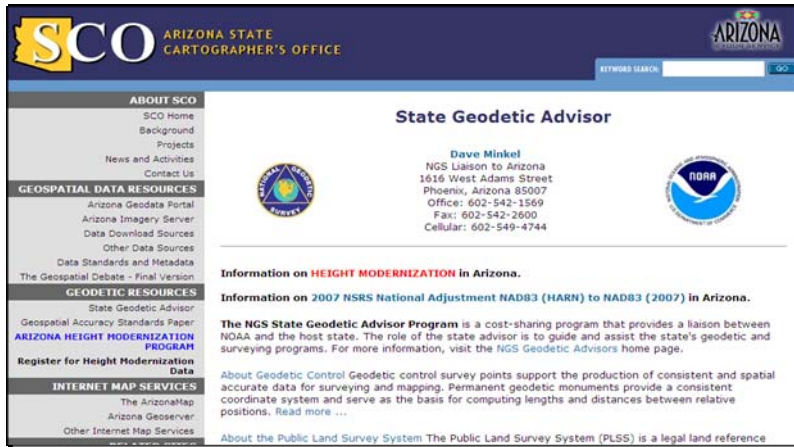
<http://sco.az.gov/ngs.htm>

The NGS State Geodetic Advisor Program is a cost-sharing program that provides a liaison between NOAA and the host state. The role of the state advisor is to guide and assist the state's geodetic and surveying programs.

Control Geodetic control survey points support the production of consistent and spatial accurate data for surveying and mapping. Permanent geodetic monuments provide a consistent coordinate system and serve as the basis for computing lengths and distances between relative positions.



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## Arizona Land Resources Information System (ALRIS)

<http://www.land.state.az.us/alris/>

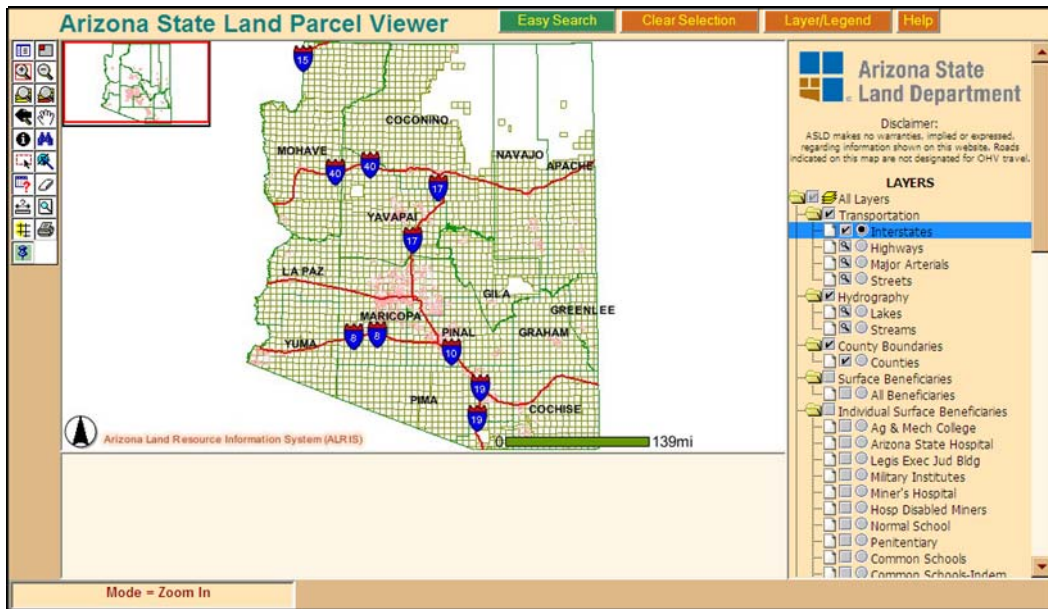
The Arizona Land Resource Information System (ALRIS) was established by the Arizona State Legislature in 1982. The goal of ALRIS is to "provide a geographic information system for...public agencies in the state...provide training and consultation in the use of the system, related technical services and limited production services to system users." Since its initiation, the ALRIS program has provided a wide variety of support services for Arizona's Geographic Information Systems (GIS) community.



ALRIS includes a link to a land parcel viewer:

<http://sco.az.gov/website/parcels/viewer.htm>

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## Arizona Imagery Server

<http://sco.az.gov/imagery.htm>

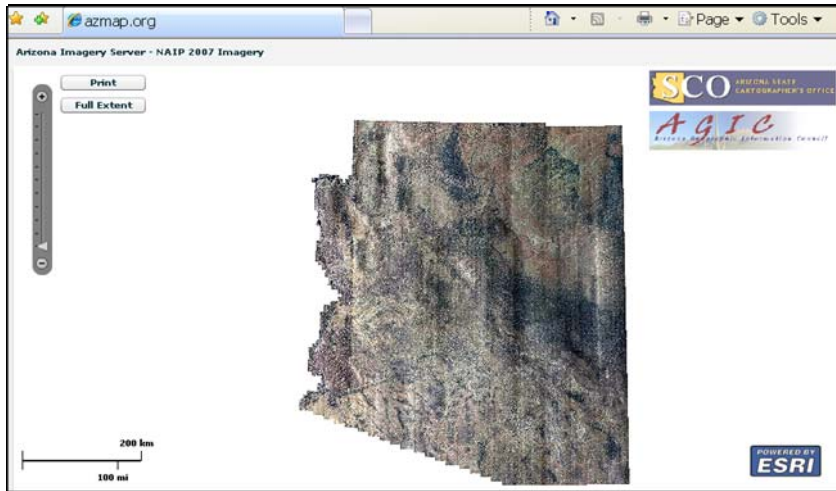
The Arizona Imagery Server project addresses the need for timely and accurate digital orthoimagery. Organizations employing GIS place a great deal of value on digital orthoimagery, as this source of imagery is useful for extracting new geospatial information from the imagery as well as providing context to existing geospatial data. Despite the utility of using digital orthoimagery in GIS, many organizations do not have the capacity to acquire and store the imagery. Imagery of this type tends to demand a substantial outlay of funding and requires a large amount of disk storage space.

Currently two imagery data sets are served:

- 2007 NAIP
- 2005 Census Imagery



Arizona Geographic Information Council (AGIC)  
Strategic and Business Planning Project



**The ArizonaMap (via AGIC website)**

***Internet Map Services***

The ArizonaMap Web Mapping Service (WMS) is an OGC-compliant web service that returns maps of geospatial data to a client application.

***Arizona Map Viewer***

The Arizona Map is an extension of the Arizona GeoData Portal for viewing base geospatial data layers for Arizona. The Arizona Map provides an Internet based interactive mapping service to allow users access to core Arizona geospatial data through a web browser or through desktop GIS software.



## Arizona GeoServer

<http://sco.az.gov/website/geoserver/>

The Arizona GeoServer provides access to coordinate control data developed by participating agencies. GeoServer functionality includes:

- View Control Points
- Identify or Select Control Points
- Search for NGS Control
- Download NGS Data
- Create Printable Maps

The GeoServer is maintained by the Arizona State Cartographer's Office.

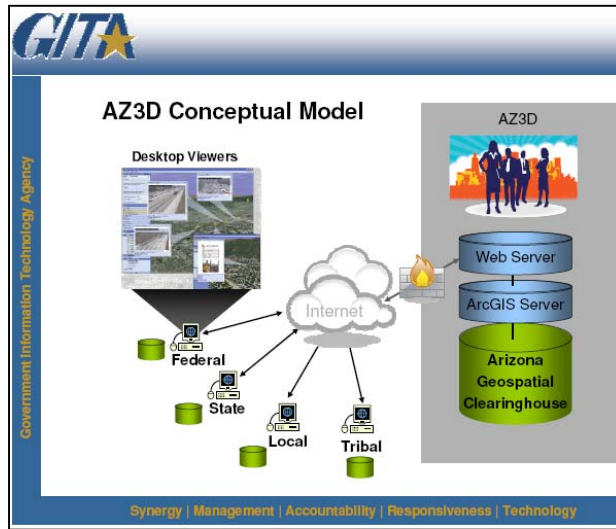
Control data consists of National Geodetic Survey (NGS) control, Maricopa County control, and City of Prescott control. Data from the Arizona Land Resource Information System (ALRIS) provide a mapping reference to the location of the control points. The data are displayed in Latitude/Longitude - Decimal Degrees.



The screenshot displays the Arizona GeoServer web interface. On the left, there is a 'Layers' panel with a list of data layers including NGS Stations, Township and Range, PLSS Sections, Interstates, Highways, Roads, Quadrangles, Cities, and Counties. The 'NGS Stations' layer is selected. The main map area shows a map of Arizona with county boundaries and names such as Mohave, Coconino, Navajo, Apache, Yavapai, Maricopa, Pinal, Graham, Greenlee, Yuma, Santa Cruz, and Cochise. A 'DOWNLOAD DATA' panel is open on the right, titled 'DOWNLOAD DATA' and containing a list of datasets for download, including 'Full Arizona set of NGS points (shapefile)' and 'NGS points by county' with links for each county (e.g., Apache, Cochise, Coconino, etc.).

## AZ3D

AZ3D is designed to support law enforcement and first responder user communities, with associated restrictions on access to some of the data and systems, due to critical infrastructure and sensitive homeland security considerations. The initial proof-of-concept work phase of AZ3D are completed and AZ3D is currently in Phase 1 of its implementation. The website requires on-going hardware and software technical development and support which is provided by the Arizona Government Information Technology Agency (GITA), ASU Institute for Social Science Research, the State Land Department and Maricopa County Emergency Operations Center. Services for networking, communications, storage, backup, retrieval, and disaster recovery are provided by the Department of Administration (DOA), which performs these services for a fee.



Potentially, the Clearinghouse can leverage investments already made (and/or planned) by GITA to support the AZ3D initiative. AZ3D is an enterprise system solution to integrate imagery and other geospatial data into government-use-only applications for emergency planners and First Responders. Funding has been provided to support the AZ3D initiative by the US Department of Homeland Security (DHS) through a grant from the Arizona Department of Homeland Security.

<u>AZ3D</u>	<u>Already Grant Funded (c/o DHS)</u>
Hardware Acquisition	Proof of Concept Hardware Purchased
Hardware Redundancy	Budgeted and anticipated to be available Q2 2010
Additional Server Capacity	Buy from State, ESRI, or Cloud
Web Hosting	Department of Administration grant funded
Software Acquisition	Software purchased from grant
Staff	One FTE grant funded and one in-kind

NOTE: *The Department of Administration (DOA) provides fee-based support for IT-related services.*

### **4.3 Data Requirements**

The geospatial content needed to fulfill the objectives of this program comes from multiple sources, database structures, geographic areas, and levels of government. Arizona is rich in data, but the wealth has not always been shared. Over the years, different approaches have been tried,

and the historic requirement for public agencies to charge commercial rates for their data has not been consistently practiced or effective. Recently, this requirement has been alleviated with respect to geospatial data by SB1318.

**a. Data Prioritization**

Arizona has been studying data issues for a long time. In the following table, the layers in **bold** are part of the “AGIC Core Geospatial Layers List” that was compiled by AGIC, independently from the current strategic and business planning process. During the current planning process, the list was expanded into 19 layers, and prioritized in anticipation of building the Clearinghouse pursuant to SB1318. While all 19 layers are listed in the Strategic Plan, only the “Top Ten” are listed as part of this Business Plan, to sharpen the focus of efforts to establish the Clearinghouse on the data considered most important during this planning process. However, there may be “low hanging fruit” in the second tier, which are easy to collect and include in the Clearinghouse; such data is not excluded from possible inclusion, but it should not de-focus efforts on the prioritized layers unless there is consensus within the AGIC committees.

The layers with three asterisks [\*\*\*] next to their names are the NSDI Framework Layers, identified as most important for The National Map (TNM) at the federal level. Not all of these layers are readily available as part of a conflated and managed data set. There are complications depending on the scale and amount of detail that is required. The Clearinghouse is aimed at starting a process whereby these known challenges are met over time, through proactive discourse and collaboration. The accrued benefits from successful efforts will enhance credibility and strengthen support as the Clearinghouse takes root.

**Top Ten Data Layers**

<b>Desired Data Layers in Arizona</b> *** = NSDI Framework Layer	<b>Rank in Arizona (*)</b>	<b>Source(s)</b>	<b>Steward (s)</b>	<b>Comments</b>
<b>Transportation***</b>	1	TIGER, ATIS, E911	US Census Bureau, ADOT, ADOA, Counties	Street centerlines and descriptive attributes
<b>Orthoimagery***</b>	2	NAIP, Local Gov't for High Resolution	USDA, USGS, Local Government	Corrected aerial photos suitable for basemap
Cadastral (Parcels)***	3	Counties	Counties	Property lot boundaries
<b>Land Ownership (Not Parcels)</b>	4	ALRIS, BLM, Counties	ALRIS, BLM, Counties	Database information about ownership
<b>Geodetic Control***</b>	5	NGS	NGS, SCO, APLS, Utilities	Accurate survey monument /station locations
<b>Land Use</b>	6	COGs	MAG, PAG,	Shows to what

<b>Desired Data Layers in Arizona</b> *** = NSDI Framework Layer	<b>Rank in Arizona (*)</b>	<b>Source(s)</b>	<b>Steward (s)</b>	<b>Comments</b>
			CAAG	purpose land is put (e.g. Agriculture, Residential, etc.)
<b>Elevation***</b>	7	USGS DEM, Local Gov't DTM	USGS, Local Government	Shows height and terrain contours and surfaces
<b>District Boundaries</b>	8	DOR, ALRIS, Counties	DOR, ALRIS, Counties	Tax-related boundaries
<b>Master Address</b>	9	E911	Counties, DOA	The location-based address for buildings and homes
<b>Administration Units ***</b>	10	US Census	Counties, Cities, Tribes	Non-tax-related jurisdictional boundaries

(\*) NOTE: The “Rank in Arizona” was determined by conducting a facilitated consensus ranking at each of the Regional Stakeholder Workshops, and then consolidating the results, and validating at the AGIC Annual Conference. The number 1 is the most important, descending from there. The complete and detailed rankings are included in the “Preliminary Findings Report” (submitted 10/19/09, revised 11/02/09).

### **b. Data Sharing**

The findings of the online survey that relate to data sharing are summarized, below. They provide a snapshot of what the GIS stakeholder community thinks about data sharing and paying (or charging) for data.

The survey was conducted as part of the planning process, and included input from 151 GIS users across the state, representing a broad diversity of disciplines, agencies, levels of government, and industry. The relevant results as follows:

- 86.7% of users (60) say they do not pay for the data they use
- 64.5% of producers (121) say they do not charge for the use for the data they produce and share
- Top barriers to data sharing:
  - Legal Constraints
  - Politics
- If there was a statewide GIS Clearinghouse most (59.7%) would contribute to it, but a significant number (36%) were undecided

- 43.7% of the respondents would rather use a statewide Clearinghouse than a regional one, but a significant number (33%) were undecided
- Almost all data was considered “Important” or “Very Important” except 3D Buildings

### **c. The Importance of Metadata**

Metadata is a common vocabulary for describing the actual contents of data. In this context, content refers to geospatial data, techniques, lessons-learned, and other usable information resources. Metadata is used to describe such resources, to make them discoverable and accessible to end-users. Support for discovery and access services for such resources is the essence of a Clearinghouse, and is sometimes referred to as a metadata catalog, or catalog service. This is the key to finding useful data that meets a user’s search criteria.

Thoroughly developed and widely distributed standards exist for metadata, including the FGDC Content Standards for Digital Geospatial Metadata (CSDGM) and the International Organization of Standards (ISO), international metadata standard, ISO 19115 (which the US will be transitioning toward). URLs for each are provided, below:

- <http://www.fgdc.gov/metadata/geospatial-metadata-standards>
- [http://www.iso.org/iso/catalogue\\_detail.htm?csnumber=26020](http://www.iso.org/iso/catalogue_detail.htm?csnumber=26020)

As Arizona undertakes the development of a geospatial data Clearinghouse, the absence or presence of metadata is an important consideration in determining the fitness of use of candidate data sets. Metadata is familiar to most state agencies engaged in geospatial data development, and the current ALRIS site has an extensive collection of data resources that are documented with metadata.

### **d. Data Stewardship**

This is an important aspect for AGIC to consider, especially the Data Committee. One of the programmatic goals for success for implementing the Clearinghouse is stated as follows:

*Collect information on user requirements on matters related to geographic information systems, geospatial data, technologies, products, services, standards, programs and activities and prioritize those requirements to inform decision-making for the implementation of the Clearinghouse.*

An essential matter in this regard is documenting the owner of the data of interest, as well as the source. In some cases, it is not the same agency, or person. Typically, the term “data steward” or “data custodian” is used to define the agency or person responsible for maintaining the data of interest. The responsibility for ongoing data stewardship is a key for both accountability and sustainability of a reliable Clearinghouse, and it should be defined for candidate data sets.

One of the challenges of a Clearinghouse is the need to provide a level of QA/QC and integration on the data, especially if it comes from multiple sources. This might involve data cleaning and conflation activities, for both geometry and attributes. Another activity that is likely is some amount of ETL (extraction, transformation, and loading) on disparate data sets. These aspects of data stewardship need to be anticipated and understood, and addressed with adequate staff



expertise and availability. Data stewards should strive towards greater data integration vertically, horizontally and standardize data content.

#### **e. Data Inventory**

The GIS Inventory (aka Ramona) coordinated by NSGIC, represents an inventory that could be a potentially useful resource for populating the Clearinghouse. The database indicates that 279 data sets have been inventoried related to the State of Arizona with 124 of these being “complete” county-level data sets. The interactive status map indicates that several of the top ten data sets (such as orthoimagery and street centerlines) are available at the county-level nearly statewide.

While there is no way to assess the completeness or accuracy of this inventory as compared to what is actually maintained at the local level, it does appear that there has been a high level of county participation in this GIS Inventory with 14 out of 15 counties reporting data holdings. It should be noted, however, that only 3 counties have input data sets with a 2009 or 2010 production date indicating that much of the metadata is most likely out of date. As described above, accurate and up-to-date metadata is essential in making the Clearinghouse discoverable and accessible and Arizona will need to assess this usefulness of this particular inventory as a resource in moving forward.

### **4.4 Functionality and Technology Requirements**

The Clearinghouse requires initial and on-going hardware and software technical support resources such as networking, communications, storage, backup, retrieval, and disaster recovery. To the extent feasible, building upon and extending existing infrastructure makes sense, but this depends on what agency provides sponsorship for the Clearinghouse. For the purposes of this Business Plan, the functional and technical requirements are described in this section, whereas how they are met is described in the section on the “Implementation Plan.”

#### **a. Functional Requirements**

The following functional requirements were described by the AGIC Steering Committee during the project initiation meeting in June 2009. In the opinion of the Steering Committee, *the Clearinghouse should:*

- Have a simple interface
- Be a “one-stop shopping” destination for discovering and sharing base map layers, to help eliminate wasteful duplication of effort to develop the same data
- Allow for discovery and viewing of data, and downloading
- Provide applications and services (internal and external), such as geocoding
- Include a wiki for knowledge sharing.
- Provide for restricted access when appropriate
- Focus initially on agency-to-agency data sharing, working towards more transparency
- Open to citizen access in the future
- Reflect an understanding of the both “GIS haves” and the “GIS have nots”

- Provide a data “store” for fee-based content

During the statewide workshops the geospatial community identified three techniques to use data from a Clearinghouse:

- *Visualize* – discover then view through the Clearinghouse
- *Serve* – discover then consume as Web Map or Web Feature services
- *Download* – discover then bulk download to the user desktop

In order to maximize the efficient access to geospatial data in the Clearinghouse, a standard set of data access services is needed. In addition to web services, secure file download capability, such as FTP, is needed. These services might initially be made available to only state agency consumers. As resources become available and the capacity increases, these can be more broadly accessed by state partners and the general public, depending on policy decisions and governance.

#### **b. Technology Requirements**

This Section addresses specific hardware, software, and performance considerations related to data access across networks and the Internet, beginning with server requirements.

#### **Servers**

The server capacity required for a statewide Clearinghouse should be spread across more than one machine. This is typical of hosting configurations, where it is not unusual to have a server dedicated to major functions, such as database management, web services, and applications. This allows for performance optimization, and facilitates system maintenance on discrete components, and also has bearing on software licensing.

In the case of Arizona, two servers are expected to suffice for the initial Clearinghouse configuration, one for the database management, and one for web services and applications. In addition, a file transfer appliance (FTA) is recommended for secure file transfer, for both uploading and downloading data.

The state should evaluate the possibility of Clearinghouse deployment in a virtualized server environment. Virtualized servers (and appliances) offer flexibility and scaling capability to meet increased demand. Even if the Clearinghouse is deployed initially on dedicated servers, migration to virtualized environment should be built into future planning.

In addition, it is typical for states that currently have Clearinghouse operations that they have a separate configuration for “staging” as compared to “production,” as well as a redundant configuration for continuity of operations in the event of an emergency, in a different physical location. At this time, the Business Plan includes only one redundant configuration, to serve as both a “staging” environment, and a back-up in the event something happens to the “production” environment. It is recommended that these two environments be located in two different buildings, as a modest accommodation to continuity of operations in the event of an emergency.

<b>Server Function</b>	<b>Staging</b>	<b>Production</b>
Database Management	1	1

Web Services and Applications	1	1
File Transfer Appliance	1	1
<b>Total Servers</b>	<b>3</b>	<b>3</b>

## Software

In addition to commercial-off-the-shelf (COTS) software, some custom application development, web design, and adaptation to Arizona workflows and user scenarios is anticipated. The assumption is that software licenses will be needed to support two configurations, one for “staging” and one for “production;” but not all software is needs to run on both environments.

### COTS Software

Software Function	Staging	Production
Database Management (RDMS)	1	1
Web Services and Applications (e.g. ArcGIS Server)	1	1
Metadata Management (e.g. AGS Geoportal Extension)	1	1
File Transfer (Included with Appliance)	1	1
ETL (e.g. Feature Manipulation Engine)	1	0
Web Statistics (e.g. Google Analytics)	0	1

### Custom Software

Software Function	Staging	Production
Data Profiling and Schema-Matching	1	0
Custom ArcObject Extensions for ArcGIS Server	1	0
Customization of AGS Geoportal Extension	1	0
Lightweight Data Querying and Visualization for Browser	1	0
ETL Custom Transformation Scripts	1	0

## Performance Considerations

There is no one set of rules that guide the deployment of a geospatial Clearinghouse in a network environment. However, there are three important considerations, including:

- The frequency of access
- The size of the data transferred
- The location of the originating request

These three attributes must be considered in light of performance expectations, storage network bandwidth, and network architecture. Network architecture can have different transmission characteristics, commonly referred to as network latency and jitter. These characteristics determine transmission delays and wait-time for a response. Often, geospatial Clearinghouse applications have high data access volumes, so network performance is important to customer satisfaction and the user’s experience.

There is also an important distinction to be made between data editing and data warehousing. Much GIS technology tends to be focused on data development and editing rather than warehousing and viewing, leading to performance issues when a system is not optimized for one or the other. In the case of the Clearinghouse, the focus should *not* be on data development and editing, but rather on data access, viewing, and downloading.

## **4.5 Resource Requirements**

### **From the Online Survey**

- A significant percent (58.5%) of the respondents said they have sufficient GIS support within their organization
- Lack of People Capacity (46.6%) and Funding (62.1%) ranked high for deficiencies in use of or access to GIS

### **From the Workshops**

There are ‘have’ and ‘have-not’ counties in Arizona. Each has its set of issues. How do and why should ‘have’ counties participate in a state clearinghouse? What data and services can a clearinghouse provide to ‘have not’ counties with little or no capacity to utilize GIS?

#### **a. System and Server Administration**

This resource requirement includes a number of specific functions that are necessary for a well run Clearinghouse. Resources are needed to perform the following tasks:

- Server operating system management for database, application, and web servers
- User management
- Disaster recovery and backup

#### **b. Database Administration**

In addition to data stewardship (which is covered in the section on “Data Requirements”), there is a need for database administration, to address the following Clearinghouse requirements:

- Spatial database management
- Relational database management
- Periodic data layer analysis for index optimization and performance tuning

It is conservatively estimated that one Full-Time Equivalent (FTE) is needed for system, server, and database administration associated with the Clearinghouse. The expertise for such a role may not be embodied in one individual, but in terms of cost, an FTE is recommended for budget planning.

## **4.6 Standards and Policies**

The Clearinghouse is much more than a data storage and access infrastructure. Effective organization and appropriate policy development are necessary to make the Clearinghouse the preferred “one-stop” place for geospatial data within the State of Arizona. Policy areas that need attention include the following:

### **a. Geospatial Data Acquisition and Coordination**

The processes for both establishing geospatial data requirements and for identifying the source of new data need to be determined. This includes responsibility and accountability for pre-acquisition review, acquisition and/or development of geospatial data.

### **b. Geospatial Data Management**

AGIC needs to describe the policies, standards, and best practices for geospatial data management in the context of the Clearinghouse, for example:

- Standards for geospatial data content and metadata (see below)
- Recommended best practices for data development, access, and use
- Geospatial data formats
- Restrictions on data distribution
- Quality control
- Clearinghouse import and download procedures

Relevant standards are available via the Arizona GeoData Portal, for example. Information on standards information is also available on the Federal Geographic Data Committee website (see: <http://www.fgdc.gov/standards>), including geospatial standards and specifications managed and published by:

- a. American National Standards Institute (ANSI)
- b. National Institute of Standards and Technology (NIST)
- c. International Organization for Standardization (ISO)
- d. Open Geospatial Consortium (OGC)

AGIC should address how standards are developed and implemented. Possible activities include development of a Standards Committee to address:

- Standardized Framework Datasets
- Metadata (mandatory subsets)
- Spatial Reference Systems (datum/projection)
- Maintenance (standards updates and data processing)

### **c. Geospatial Data Access and Control**

AGIC needs to define the level of access for each stakeholder group and outline the access constraints that must be considered when adding new data to the Clearinghouse. For example, specific considerations should be made for regulations and restrictions regarding the protection of privacy and critical infrastructure, such as:

- Health Insurance Portability and Accountability Act (HIPAA)
- Homeland Security and SB1318 critical infrastructure restrictions
- Broadband, renewable energy, and other utility proprietary information protection

## **4.7 Costs**

In this section, costs are presented in a coarse grain fashion, without regard to phasing or budgeting -- these timing aspects are addressed in the “Implementation Plan” section of this document. The cost estimates later in this section are rough order of magnitude (ROM), and not actual price quotes. As the process moves forward, actual price quotes can be obtained to refine estimates, either up or down. The following is a list of the primary cost drivers for the Clearinghouse:

### **a. Cost Drivers**

In some cases, the cost drivers below are actual cost line items for estimating purposes. In other cases, they have bearing on how time is spent, whether there is an associated cost line item or not.

- Software licensing and maintenance fees
- Hardware configuration / software deployment and the impact on licensing fees
- Server hardware
- Spatial data acquisition and development
- Storage and management of spatial data
- Server hosting, administration and communication fees
- System and database design, development, and administration
- Clearinghouse application development
- Fail-over and load balancing capabilities
- Service/data replication infrastructure and support costs

### **b. Cost Estimates**

The investment to build the Clearinghouse and its baseline functionality, database structure, and data management workflows can be planned in phases, as recommended in the section on implementation. The table below consolidates the key cost line items into one list, to be used to facilitate budgeting over a three year period. Amounts are ROM estimates, and not price quotes.

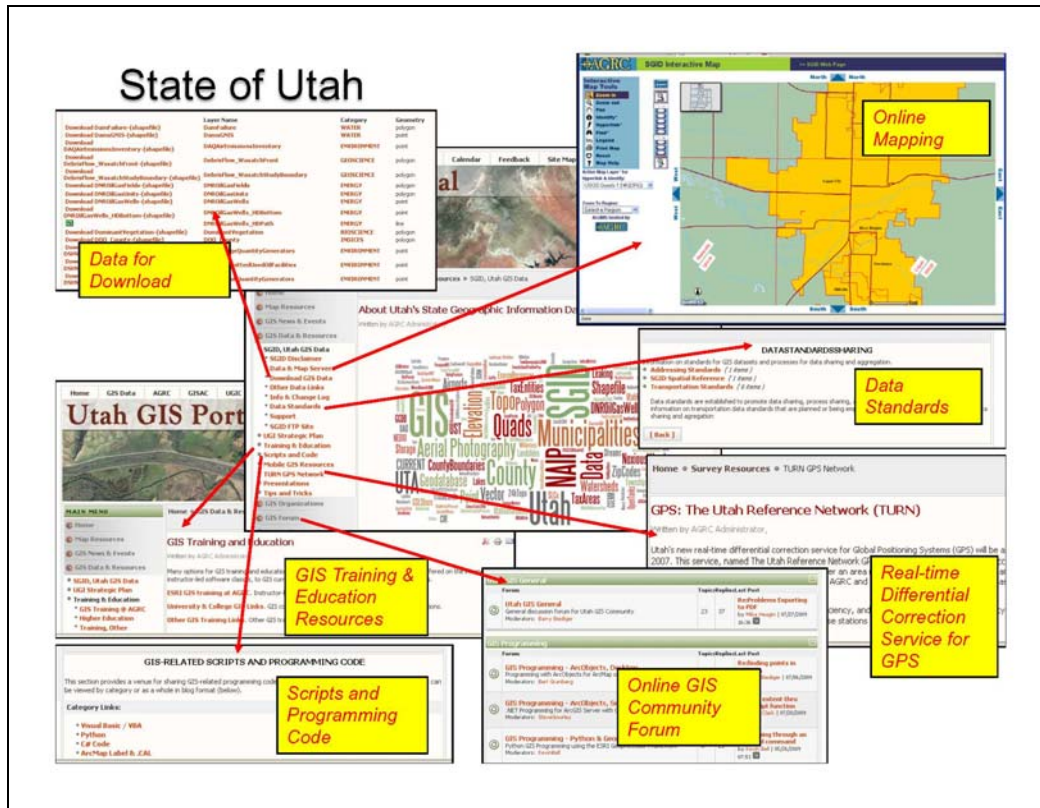
<b>Clearinghouse Requirement</b>	<b>Unit Cost</b>	<b>Quantity</b>	<b>Total</b>
System Planning & Design	\$15,000	1	\$15,000
Hardware Acquisition & Installation	\$6,500	6	39,000
Software Acquisition & Installation	\$45,000	2	90,000
Clearinghouse Web Application Design, Development, & Maintenance	\$30,000	1	30,000
Software Maintenance (covering two years)	\$18,500	2	37,000
Data Collection & Acquisition (Contrib. in kind)	C/k	1	C/k
Data Cleansing & Integration (Contrib. in kind)	C/k	1	C/k
System Support: Operations & Maintenance (two configurations, staging & production)	\$12,000	3	36,000
Office Space & Infrastructure Build-out for two locations (HVAC; Alarms; Other)	\$10,000	3	30,000
Staff (One FTE, ongoing recurring cost for 3 years)	\$80,000	3	240,000
<b>TOTAL ESTIMATE</b>	<b>\$217,000</b>		<b>\$517,000</b>

#### **4.8 Examples from Other States**

As mentioned previously, 48 of the 50 states have a geospatial clearinghouse. There are many different approaches and user experiences, but certain features tend to be present on most, in one way or another. By looking at a couple of good examples, and providing a brief characterization of each, the basic ideas and lessons-learned are of value as Arizona thinks through its own approach. The chosen examples are from Utah and Kansas.

##### **a. Utah GIS Portal**

<http://agrc.its.state.ut.us/>



In Utah, the Automated Geographic Resource Center (AGRC), which is located in the Department of Technology Services (DTS), manages the clearinghouse. AGRC is well staffed and has a close relationship with the state legislature and the Utah Geographic Information Council (UGIC).

Their clearinghouse, known as the Utah GIS Portal, has a very large catalog of publicly available geospatial data and consumable web services, as well as other informative content. In addition to general public access, they have a secure login for access to restricted data.

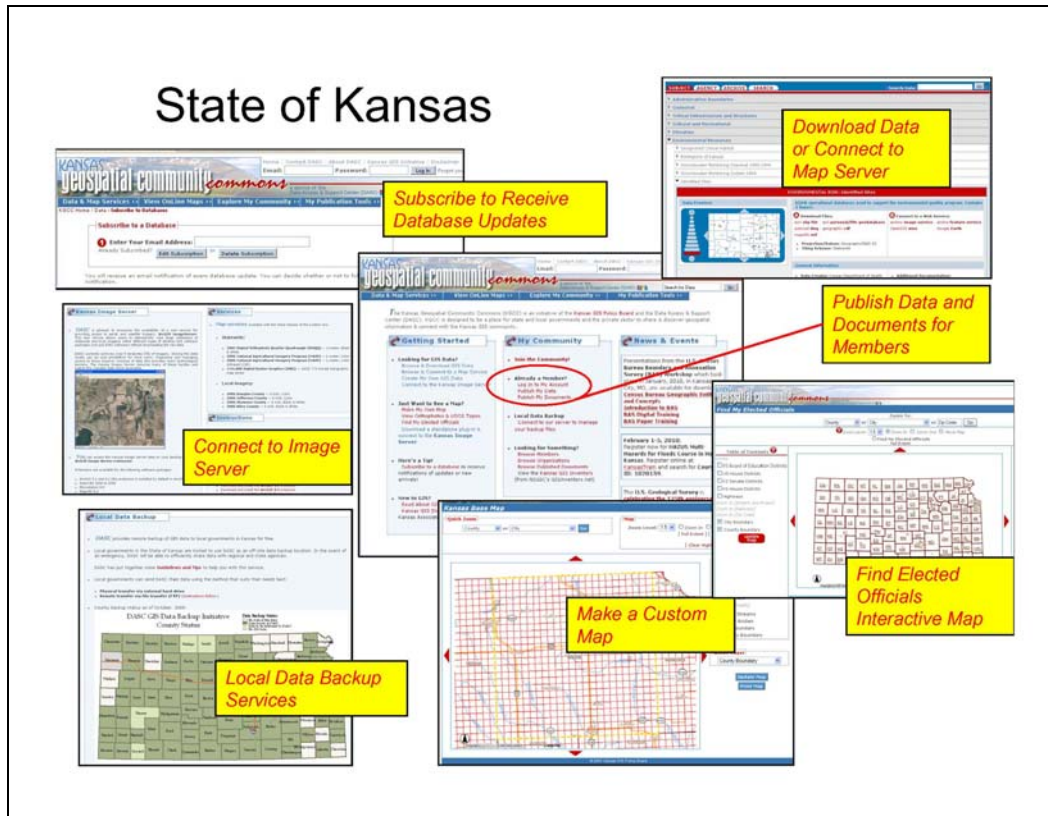
### Utah GIS Portal Features

- |                                |   |
|--------------------------------|---|
| Data for download              | Scripts and programming code              |
| Online mapping application     | Online GIS community forum                |
| Data standards                 | Real-time differential correction for GPS |
| GIS training & educ. resources | Upcoming UGIC activities & events         |

### b. Kansas Geospatial Community Commons

<http://www.kansasgis.org/>





In Kansas, their clearinghouse is known as the Kansas Geospatial Community Commons (KGCC). It is an initiative of the Kansas GIS Policy Board and the Data Access & Support Center (DASC), which is located at the University of Kansas. KGCC is designed to be a place for state and local governments and the private sector to share and discover geospatial information and connect with the Kansas GIS community.

The day-to-day management and staffing for the KGCC is provided by the University of Kansas and the Kansas Geological Survey. Funding and program priorities come from the state via the Kansas GIS Policy Board and its member agencies. The site provides the public with a large amount of GIS information and geospatial data for both download and web viewing. It also has content available to registered users via login.

### **Kansas Geospatial Community Commons Features**

- |                              |   |
|------------------------------|---|
| Connect to image server      | Download data or connect to map service         |
| Subscribe to receive updates | Publish data and documents for members          |
| Make a custom map            | Find elected officials with interactive map app |
| Locate data backup services  | Join Kansas GIS community                       |

## 5 IMPLEMENTATION PLAN

This section of the Business Plan will outline recommended steps, schedules, budgets, and activities required to accomplish the goals of the program.

A phased approach is recommended, aiming to show early success and incremental progress – a goal of the implementation plan will be to do useful things, quickly.

A frequent assessment of progress is helpful to ensure that plan objectives are achieved in a timely manner. Course corrections may be required as new information becomes available or new opportunities arise.

### 5.1 Implementation Details

To build the new Clearinghouse, a variety of activities must be addressed; the following subsections include details on both overall general considerations and guidance for implementation as well as more specific implementation activities.

#### a. Overall Guidance

- i. Strategic issues and business drivers that are more widely known as compared to GIS-specific topics (e.g., Renewable Energy, Broadband Infrastructure, Health Care, Homeland Security, etc.) will be used to support prioritization; for example, what data is most needed to support the strategic issues and business drivers identified in the plan?
- ii. Details related to the Clearinghouse shall become a priority for the various AGIC Committees, to help build momentum and to address known issues related to data sharing and implementation (Legal & Admin, Data, etc.)
- iii. While a federated approach might eventually fit the long-term architecture of the state's Clearinghouse, the near-term focus will be on establishing a state-managed infrastructure, with a central repository and links to the best available data from data originators and stewards where possible.
- iv. Consider a “phase-out” plan for the forerunners of the Clearinghouse, if appropriate
- v. Understand what has not worked vis-à-vis the Arizona GeoData Portal (see below), and address proactively with outreach and support
  - 1) Agencies have not been putting data in
  - 2) No incentive
  - 3) Lack of time
  - 4) Liability
  - 5) Portal has not kept up with technology (e.g. file-based v. web services)
- vi. A phased approach is recommended for the Clearinghouse implementation program. The initial implementation will focus on a core set of capabilities to create a

clearinghouse for prioritized data content. Over time, the content and user base will grow.

#### **b. Specific Implementation Activities**

- i. Research, analyze, design and implement a core infrastructure to house the prioritized geospatial data and related metadata as the foundation for the Clearinghouse. This baseline architecture should be implemented with the expectation of future extensions to include additional metadata attributes and expanded to include additional data.
- ii. Design and implement a core web-based application to facilitate the searching for and display of Clearinghouse data. This baseline application will facilitate the download and distribution of geospatial data.
- iii. Decide if the application will contain both a secure area (accessible only by state and local agency staff with appropriate credentials) and a publicly accessible area. Security decisions need to be made about access control (e.g. will it be at the departmental level or the individual user level; will it be controlled by the application and administered through a webpage within the website, or otherwise; will security be set at the data layer level, or the attribute level?)
- iv. Initially, data loading should be performed by an authorized data administrator. Details about a specific data layer may need to be modified by a departmental user once the data has been loaded, and if so, accommodations need to be made for this type of workflow. Eventually, departmental users may be authorized to load data, but this is a management decision, with technology and workflow implications.
- v. Prioritize and select the initial set of statewide geospatial data for loading into the new Clearinghouse. Decisions need to be made about how many versions of any data set may be allowed, and whether or not historical data will be archived within this system.
- vi. Web services should be part of the architectural approach, and for example, may be developed to allow data that has been loaded into the system to be consumed by a departmental user. Whether or not public users will have the ability to access such a Web service, or when, are decisions that need to be made.
- vii. Ideally, the site will provide an area with links to other data sources that would be useful to the AGIC community as well as non-GIS users.
- viii. Develop documentation that outlines a set of workflow steps that describe the basic lifecycle management procedures for Clearinghouse data. This documentation would be used to manage the data import and publishing process, and should be kept current and modified over time as the Clearinghouse data management workflows evolve and mature.
- ix. Infrastructure, both people and technology, will be needed to configure and launch the Clearinghouse, including the system design and development; the loading and maintenance of data; and, training and support.

- x. The Clearinghouse administrator should track of the volume of data that is viewed and downloaded from the site by users, to provide management with a sense of what is in demand; software that tracks such data and trends is readily available.
- xi. AGIC Admin & Legal Committee should research best practices on types of agreements
  - a. Data
  - b. Contributor
  - c. User
- xii. Assemble a Steering Committee to research best practices on Governance .
  - a. Discussions
  - b. Policies
  - c. Standards

## 5.2 Phasing and Milestones

GOALS	2010		2011		2012
	<i>1<sup>st</sup> Half</i>	<i>2<sup>nd</sup> Half</i>	<i>1<sup>st</sup> Half</i>	<i>2<sup>nd</sup> Half</i>	<i>1<sup>st</sup> Half</i>
<b><i>Strategic Goal #1:</i></b>					
Facilitate the productive application and sharing of geospatial data and GIS and location-based services to address the needs of Arizonans by establishing a Clearinghouse with statewide accessibility.	X	X	X	X	X
<b><i>Programmatic Goals</i></b>					
a. Develop a Business Plan for implementing a Clearinghouse.	X				
b. Collect information on user requirements on matters related to geographic information systems, geospatial data, technologies, products, services, standards, programs and activities and prioritize those requirements to inform decision-making for the implementation of the Clearinghouse.		X			
c. Get necessary support from stakeholder, decision-makers, and funding agents for GIS and geospatial data.	X	X	X	X	X

GOALS	2010		2011		2012
	<i>1<sup>st</sup> Half</i>	<i>2<sup>nd</sup> Half</i>	<i>1<sup>st</sup> Half</i>	<i>2<sup>nd</sup> Half</i>	<i>1<sup>st</sup> Half</i>
d. Tie into other statewide IT infrastructure initiatives.	X	X	X	X	X
e. Assess where geospatial data spending is redundant, where a Clearinghouse could satisfy the needs for access to data without duplicate spending.	X	X	X		
f. Design and build a Clearinghouse with statewide accessibility and use data from the original source where possible.		X	X	X	X

### 5.3 Budget Plan

The Arizona Renewable Energy Project requires creation of a Clearinghouse for all state agencies to share consistent framework and renewable energy data. AGIC should work with the Arizona Renewable Energy Project team to leverage investments and assist in setting-up a server that is similar to, or could become, the Clearinghouse. This may help fund the server. AZ3D and AZ Broadband Project will provide peripheral support and be clients (over time if not at first). It will be the beginning of a functional clearinghouse.

Clearinghouse Requirement	Year One	Year Two	Year Three	Line Item Subtotals
System Planning & Design	\$15,000	0	0	\$15,000
Hardware Acquisition & Installation	19,000	20,000	0	39,000
Software Acquisition & Installation	45,000	45,000	0	90,000
Clearinghouse Web Application Design, Development, & Maintenance	30,000	5,000	5,000	40,000
Software Maintenance (beginning in year two)	0	9,000	18,000	27,000
Data Collection & Acquisition (Contrib. in kind)	C/k	C/k	C/k	0
Data Cleansing & Integration (Contrib. in kind)	C/k	C/k	C/k	0
System Support: Operations & Maintenance (2 configurations, staging & production)	12,000	12,000	12,000	36,000
Office Space & Infrastructure Build-out for 2 locations (HVAC; Alarms; Other)	10,000	10,000	10,000	30,000

Clearinghouse Requirement	Year One	Year Two	Year Three	Line Item Subtotals
Staff	80,000	80,000	80,000	240,000
<b>TOTAL ESTIMATE</b>	<b>\$211,000</b>	<b>\$181,000</b>	<b>\$125,000</b>	<b>\$517,000</b>

**NOTE:** “C/k” in the table above means “Contribution-in-kind.”

## 5.4 Marketing Outreach

AGIC has proactively worked on outreach and professional development for the GIS stakeholder community over many years. The Annual Conference and other events and activities have contributed to building a GIS community across the state, including different levels of government and different professional disciplines. This might not have occurred under the banner of “marketing,” but it has achieved the type of results that are important for establishing a sense of identity and purpose, which are marketing objectives.

Even the current planning process is a form of marketing outreach. By gathering input directly from GIS stakeholders – i.e. consumers and suppliers of geospatial data – AGIC is building a better understanding of what is needed and what is feasible for a Clearinghouse to be successful, which is a type of marketing research. While outreach to the GIS community should be an ongoing activity, AGIC must also strive to reach out to the broader audience of non-GIS communities, who should be beneficiaries of the Clearinghouse.

In terms of this Business Plan, attention is needed on outreach to “market” the features and benefits of the Clearinghouse, to encourage support, and to promote its utilization. Effective marketing will help increase visibility for the Clearinghouse, and improve the awareness of the goals and objectives. A number of general tools and techniques for marketing GIS programs can be found on the NSGIC website (<http://www.nsgic.org/>). In addition, the following are specific objectives for marketing the Clearinghouse across Arizona.

- Leverage existing GIS communities (e.g., User Groups, Roundtables, List Server members)
- Identify and reach out to non-GIS communities who will benefit from the Clearinghouse, such as assessors, planners, engineers, surveyors, and other professional disciplines
- Develop a logo and slogan (e.g. “collect once, use many times”) for the Clearinghouse program
- Track and understand Clearinghouse utilization (i.e. Web statistics)
- Measure “customer” satisfaction on a regular basis via on-line survey methods

## 6 MEASURING PROGRESS AND SUCCESS

Regular progress reviews are an important aspect of monitoring a program. In busy, complex organizations, it is sometimes easy to lose sight of your broader goals. Revisiting goals on a periodic basis, and determining what level of progress has been achieved in meeting those goals, offers an opportunity to make appropriate adjustments in strategy or approach.

Success can be measured in many ways, including measurable cost savings, direct and positive feedback from the stakeholder community, additional funding or a growing level executive support. Developing a set of quantitative performance benchmarks for each goal or supporting objective provides a way of establishing a clearly understood scorecard. This will allow AGIC to look at progress over time.

Strategic Goal	Overall Goal Status (Green, Yellow, Red)*	Success Factors	Schedule	Comment and Color-Code (Green, Yellow, Red)*
Facilitate the productive application and sharing of geospatial data and GIS and location-based services to address the needs of Arizonans by establishing a Clearinghouse with statewide accessibility.		<ul style="list-style-type: none"> <li>□ Develop a Business Plan for implementing a Clearinghouse.</li> </ul>	2010	
		<ul style="list-style-type: none"> <li>□ Collect information on user requirements on matters related to geographic information systems, geospatial data, technologies, products, services, standards, programs and activities and prioritize those requirements to inform decision-making for the implementation of the Clearinghouse.</li> </ul>	2 <sup>nd</sup> half 2010	
		<ul style="list-style-type: none"> <li>□ Get necessary support from stakeholder, decision-makers, and funding agents for GIS and geospatial data.</li> </ul>	ongoing	
		<ul style="list-style-type: none"> <li>□ Tie into other statewide IT infrastructure initiatives.</li> </ul>	ongoing	
		<ul style="list-style-type: none"> <li>□ Assess where geospatial data spending is redundant, where a Clearinghouse could satisfy the needs for access to data without duplicate spending.</li> </ul>	2010	
		<ul style="list-style-type: none"> <li>□ Design and build a Clearinghouse with statewide accessibility and use data from the original source where possible.</li> </ul>	1 <sup>st</sup> half 2010 thru 1 <sup>st</sup> half 2011 and 2012	

\*Color Key (during operational use, cells in the preceding table will be color-coded and comments added as appropriate).

<b>Color: Rating</b>
<b>Green:</b> Fully meets expectations and requirements (e.g., on schedule and achieving desired outcome)
<b>Yellow:</b> Partially meets expectations and requirements (e.g., behind schedule, but making reasonable progress toward desired outcome)
<b>Red:</b> Not meeting expectations and requirements (e.g., behind schedule and very little or no progress toward desired outcome)

On a cumulative basis, overall status reported on the previous chart (i.e. Green, Yellow, and Red)\* will be “rolled-up” and tracked using the following chart:

Progress Matrix (*)	Year 1				Year 2				Year 3			
	Jan 2010	April 2010	July 2010	Oct 2010	Jan 2011	April 2011	July 2011	Oct 2011	Jan 2012	April 2012	July 2012	Oct 2012
<b>Strategic Goal Running Assessment</b>												

(\*) NOTE: Chart cells will be color-coded (i.e., Green, Yellow, Red) based on overall goal status as assessed by AGIC.



## APPENDIX A: INFORMATIONAL MATERIAL

For information on strategic and business planning in other states, and Clearinghouse information, see the NSGIC and FGDC websites:

- [www.nsgic.org](http://www.nsgic.org)
- [www.fgdc.gov](http://www.fgdc.gov)

## APPENDIX B: DOCUMENT HISTORY

Date	Description	Responsible Party
1/22/10	Preliminary Draft	AppGeo
1/25/10	Revised Draft	AppGeo
2/05/10	Revised Draft	AppGeo
2/10/10	Preliminary Final Draft	AppGeo
2/12/10	Final Contractor Version	AppGeo

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