



Testimony before the Subcommittee on Energy and Mineral Resources
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Geographic Information Systems (GIS) technologies are critical tools for improving the quality, accuracy, efficiency and responsiveness of government services. Using the concept of an “electronic” or digital map, GIS records, stores and analyzes multiple layers of spatial data and relates this data to locations of interest (e.g. communities, neighborhoods and people that live there). These layers can be viewed and analyzed in various combinations to identify underlying relationships not otherwise seen. Management of GIS data is critical to successfully using the technology. For the purposes of this paper, GIS data, digital maps, and geographic information are used interchangeably.

This written testimony discusses the 1) California perspective when it comes to geospatial data management and coordination; 2) what other states are doing; 3) what the framework of the National Spatial Data Infrastructure is and 4) how we know when we are successful with the NSDI.

California Perspective

This section presents the California perspective on the National Spatial Data Infrastructure, where California’s success and challenges are, its current condition, and finish by describing our future direction.

The California Perspective on NSDI

From California’s perspective, The National Spatial Data Infrastructure (NSDI) is the Data, People, Information Technology Infrastructure and Policies and Standards governing geospatial data in the nation. In order for it to be successful, it must meet local and state government needs; in essence a NATIONAL approach. By focusing on the needs of local government first, the NSDI will ensure that the taxpayer will only be required to pay for the production of geospatial data one time as opposed to duplication of data collection at every level. If properly instituted, the NSDI will also ensure that all levels of government will have the best possible data (highest resolution) to meet their business requirements. Finally, with this approach, the NSDI will result in data that has a far greater value to both the business of government and the private sector. High resolution data will enable literally thousands of commercial applications that will also provide benefit to the taxpayer and stimulate economic growth. For this



approach to be successful, significant local, state and Federal coordination are essential. This approach must be collaborative in nature.

California's Successes and Challenges

California's experience with the NSDI offers an excellent foundation in the following areas:

- Standards for describing information (e.g. metadata) and defining some data elements.
- Partnership grants for state participation (although this is underfunded, many success stories have come out of this effort and California has used them to our advantage).
- Direct liaisons and partnerships within California for leveraged local and regional data investments.

California has failed to meet NSDI goals in the following areas:

- An uncoordinated approach to imagery collection across all of the Federal government.
- The lack of government produced data in the public domain which meets state and local needs for several framework layers.
- An unclear central point for geospatial data assemblage at the Federal level. Is it the Geospatial One Stop the National Map or something else? Is our NSDI metadata node (CalAtlas - <http://www.atlas.ca.gov/>) being harvested by the right portal? Furthermore, we are unsure where the new data.gov fits into the Federal model.

California's Current Condition

California itself has experienced both success and failures when developing our own State Spatial Data infrastructure. Governor Arnold Schwarzenegger is a proponent and supporter of mapping technology. In 2008 he said this:

"During last year's firestorm [GIS] allowed firefighters to see through the smoke, giving them a more accurate real-time view of the conditions on the ground. And because of that, many of them told me that saved lives and it saved an endless amount of homes. And this is just the start." Gov. Arnold Schwarzenegger, May 2008.

His statement set a new tone for coordination of geographic information in California; it demonstrated that California had a leader at its highest level who recognized the value of mapped data. The State of California, its regional, local and education entities have long demonstrated mapping science innovation and capacity. California is a large state with a highly complex political, demographic and natural landscape. Mapping technology brings much of this complexity into view for our policy decision makers. Below is a brief assessment of GIS use and capacity in California.

- GIS technology and data is being employed in nearly 40 state departments and agencies.
- California has a central repository of GIS data and services called CalAtlas which enables the discovery of thousands of data layers resulting from thousands of government projects.
- There are more than 11,000 GIS databases or projects currently in state government.



- Our recently adopted California Information Technology Strategic Plan (See <http://www.itsp.ca.gov/>) identifies geospatial technologies as one of the six top technologies to further develop in the state.
- California has GIS Council (See <http://gis.ca.gov/council/>) with representation from state, Federal, and regional partners which advises GIS collaboration and coordination.
- The GIO is housed in the Office of the State Chief Information Officer, a Cabinet level agency in state government. The CIO directs information technology resources and has authority over IT policy. Importantly, the GIO is housed here rather than a specific business unit like Natural Resources, to ensure alignment of geospatial issues and program-neutral coordination amongst ALL government interests.
- California has successfully implemented seven of the nine National States Geographic Information Council (NSGIC) success factors (See http://www.nsgic.org/hottopics/fifty_states.cfm).
- Of the seven framework (See <http://www.fgdc.gov/framework>) data layers defined by the Federal Geographic Data Committee (FGDC), we have efforts towards statewide coordination for the following.
 - Geodetic Control
 - Elevation
 - Hydrography
 - Parcels (new)
- Many local and regional efforts within the state are further advanced than state government in terms of mapping technology development and use; most notably Los Angeles County and the San Diego region.

California now has a recognized central data store, called CalAtlas, which is free to all users. This GIS hub is a library of data that began to deliver substantial benefits when the old 'cost recovery' data model was removed and the data portal opened such that users could describe, publish and discover data for download at no cost. While the CalAtlas is not used by all state, regional and local entities, it provides a single location for the discovery of information. CalAtlas is a success because the state has a budget "line-item" dedicated for it. This budget status, while underfunded given the size of the state is working. Moreover, our approach is collaborative rather than a command and control approach. This collaborative approach has contributed to the advanced GIS use by many entities.

Most recently staff at the California Natural Resources Agency, which houses CalAtlas, has developed a common operating picture (COP) for the state. The COP was used by the California Department of Fire Protection, the California Emergency Management Agency and the Department of Public Health during statewide emergency exercise last fall and the fires that erupted shortly thereafter. Having a common picture allows all emergency operations centers across the state to view the same relevant local authoritative data during an emergency. We



have also used the COP during the recent H1N1 flu outbreak and expect to use it again as related pandemic flu activities ramp up in the fall.

Our collaborative approach to GIS has been very successful. California has developed as many as 16 regional GIS collaboratives that are self forming and self chartering. Some have become full-fledged non-profit organizations (501(c)3) while others are more loosely organized. In addition we have a non-profit professional association, the California Geographic Information Association (CGIA), which has provided a means to apply for grants, receive and spend money on behalf of state GIS initiatives before the GIO position was formally established. Finally, our California GIS Council has been in place for nearly 10 years, now on its second charter. The Council has provided a forum for Federal, state and regional goals to be developed and implemented. The Council, with support from the CGIA and state and Federal funding has published the following documents (1) the California Framework Data Plan, (2) the California GIS Strategic Plan and (3) an Imagery Business Plan (See <http://www.cgia.org> for all three papers).

California's Future Direction

California now has a formally recognized GIO and leadership support from the CIO, but there remains much more work to do. The following represents a minimum set of goals:

- Direct Agencies to establish GIS leads (e.g. Agency GIOs) responsible for data coordination and collaborate with the state GIO to align GIS investments with local and regional government.
- Establish appropriate state agency leads to collect and steward data layers for which they have logical responsibility and business interests; and coordinate the flow of appropriate related data to and from local and Federal levels.
- Establish a competitive GIS matching grant program to support the broader and collaborative use of GIS to solve significant public policy issues in communities and regions throughout California.

We are moving forward. The state CIO has identified an objective in the state IT Strategic Plan to manage statewide data as an asset, much like we manage buildings, roads and common infrastructure as an asset. As such, California is in the process of releasing a new strategy to assemble and manage these data. Central to the data strategy is managing geospatial data, in particular address data, at a central place with state government access. This approach, based on the concept of data as a service, will allow California to manage data more efficiently and reduce costs. The plan recognizes that the foundation of nearly ALL data has a geographic component. We need to collect and manage data such that we can apply the power of GIS to analyze these data assets geographically. Management of this common store will be driven by state government business needs rather than some technology specific drivers.



To sum up, California strongly endorses the concept of the NSDI (one that meets local and states needs in a coordinated way), and is on its way to ensuring a robust State Spatial Data Infrastructure, but still has more work to do with respect to coordination and funding.

States Perspective

This section presents the collective states perspective on the National Spatial Data Infrastructure, in particular some direction from the National States Geographic Information Council and the Western Governor's Association regarding the requirements for a robust NSDI.

States Perspective on NSDI

There is a high degree of variability from state to state. As an example, compare California to the District of Columbia. California is the third largest state (164,000 square miles) and D.C. is a major metropolitan municipality (61 square miles). California has approximately 37 million people and D.C. roughly 600,000. One thing that these two places share is a common vision for the NSDI. Both California and D.C. recognize that business needs drive the need for efficient mapping technologies and, in particular that, a national approach to data collection should be driven by local and state business needs. One thing that makes this complicated, is that the states and local government are all in varying stages of development and have adopted different approaches. This makes the job of coordinating the NSDI incredibly complex and its gets more complex each year that passes without effective Federal leadership. There are few incentives for local and state agencies to "retool" their efforts when they are heavily invested in their current operations.

In order to further develop a common goal, the states formed the National States Geographic Information Council (NSGIC) in 1991. NSGIC is an organization committed to efficient and effective government through the prudent adoption of geospatial information technologies. As such, NSGIC gathers state GIS coordinators to provide a common voice for GIS infrastructure and future recommendations. NSGIC has developed criteria for successful GIS coordination within states (called the Fifty States Initiative) and keeps a survey of GIS activities for states in order to measure progress. Finally NSGIC develops an advocacy agenda each year to focus the community on the most important GIS activities. Currently the NSGIC advocacy agenda, which is adopted by a vote from each state, lists the following as core issues for 2008:

- Imagery for the Nation (IFTN) – IFTN (See <http://www.fgdc.gov/iftn>) would create two effectively coordinated imagery collection programs for the nation and would establish basic standards for imagery collection and distribution. These programs will, annually capture 1 meter data leaf-on, and less frequent hi-resolution leaf-off data with buy-up options for states and locals who need additional features. This program would eliminate duplication of effort and reduce national costs. The National Geospatial Advisory Committee has endorsed ITFN. Imagery provides the



picture from which most other data are derived, making it the single most critical data layer.

- Nationwide Parcel Mapping – This initiative would create a seamless parcel dataset for the nation. Parcels are a framework data theme under the FGDC yet there is no national data layer available for government use. The National Research Council recently published a paper outlining what should be done, and those recommendations have been endorsed by the National Geospatial Advisory Committee. If created a national parcel database could be effectively used to monitor the health of the mortgage industry in the future, among other uses.
- Transportation for the Nation – This initiative calls for the Federal government creating a seamless nationwide addressable roads dataset that is built in a collaborative and shared environment. While the US Department of Transportation has authority to do this under OMB Circular A-16, a regular annual program does not exist.
- NSDI Cooperative Agreement Grants – The FGDC manages this competitive grant program in order to increase capacity for geospatial management in each state. The program budget for FY 2009 was \$1.3 million with individual grants at about \$50,000. The budget for this program, in order to be successful, needs to be significantly increased.
- Technology for the 21st Century – GIS is an advanced technology and as such needs to have ancillary technologies in place in order to be successful. NSGIC has identified increases in broadband availability and the reauthorization of the E-Gov act as critical to the success of the NSDI.

NSGIC's Recommendations

Since the adoption of this advocacy agenda in September 2008, NSGIC has developed specific recommendations along two lines. First, it is clear that the lack of a comprehensive imagery program inhibits further geospatial development. Second, with the release of the American Reinvestment and Recovery Act (ARRA) and in particular the National Telecommunications Information Administration (NTIA) notice of fund availability for broadband mapping releasing the highly accurate address point database from the US Census Bureau is critical. Below are suggested actions for each of these issues.

Imagery for the Nation

- Congress should fund Imagery for the Nation through the President's Budget at the full amount needed for national coverage. "Line items" are required in the USDA/FSA and DIO/USGS budges, and statutory language is required to protect funds from being diverted to short-term agency needs, unwarranted management fees or new priorities. An annual appropriation of \$95.6 million is required; current expenditures likely exceed \$30 million, but increased funding on an annual basis is critical.



- Ensure the business requirements of all levels of government can be met through buy-up options that allow government agencies to procure what THEY need (e.g. high resolutions, increased accuracies).
- Provide active leadership for the FGDC to implement IFTN and use it as a model to build the NSDI in concert with state and local governments.

Address Points from the Census Bureau

- Congress should remove addresses and address point locations from the Title 13 restrictions and instruct the US Census Bureau and other Federal agencies (e.g. the US Postal Service and the Department of Health and Human Services) to work together to develop a common file and make the data available throughout government levels.
- Give the US Census Bureau funds and granting authority to work with state and local governments to create and maintain a national address file.
- Address and coordinate data should be updated by local address authorities as building permits are issued, thereby capturing new construction developments. Data should be developed locally, with local and state custodians acting as regional integrators that merge local data into region-wide databases.

Western Governors Association Recommendations

Finally, the Western Governors Association (WGA) recently released a Geospatial Policy Statement (See <http://www.westgov.org/wga/policy/09/GIS.pdf>). The WGA first identified the key business issues facing the western states: economic downturn, renewable energy zones/energy reform, wildland fire protection, and water delivery. The WGA statement goes on to say that in order to affect these issues from a public policy perspective, the western governor's require "timely, accurate and multilayerd geographic data." The WGA statement calls for the following to occur:

- Implement effective policies in geographic technology that will help inform effective policies in economic, energy, fire and water agendas.
- Encourage regional, state and interstate data sharing, in particular for the Bureau of Land Management to lead and complete the national parcel dataset.
- Support IFTN and urge Congress to fully fund it.
- Support Federal, state, tribal and local coordination through Coordinating Councils.
- Support the National Geospatial Advisory Committee and the Geospatial Line of Business which is analyzing geospatial investment across the Department of Interior.
- Western Governor's believe in an intergovernmental approach to the development and governance of geospatial activities is necessary to a successful NSDI.

State and local government inclusion in managing the NSDI is imperative. A working solution must include the lowest common denominator of data collection (e.g. city/local) and, at a minimum, must include regular collection and maintenance of imagery, parcels, elevation, hydrography, transportation, geodetic control, political boundaries and address point data. At



a maximum, the data must be developed, coordinated and published such that interstate collaboration exists to evaluate and analyze landscape public policy issues.

National Spatial Data Infrastructure Framework

This section describes the promise of a robust NSDI and provides specific steps Congress can take to make the NSDI real.

Production of geospatial data and technologies has shifted from the Federal government to state and local government and the private sector. However, the United States is still using a Federal-centric governance model for the National Spatial Data Infrastructure (NSDI). We cannot build the NSDI without eliminating the “silos” and duplication of effort in Federal government, and implementing an inclusive governance model. This requires strong leadership that is independent of the specific agencies and has the authority to regulate geospatial budgets.

The FGDC and its participating agencies understand the role of state and local governments and the private sector in building the NSDI, but since there is no clear definition of the NSDI or effective business plans to build it, focus has remained solely on Federal business needs instead of national objectives that include local and state government benefits. In large part, this has been driven by the lack of a national policy, effective strategic and business plans, and the unwillingness to approach Congress for adequate appropriations to do the job.

Only those agencies with missions clearly tied to geospatial data are successful in securing budget appropriations are subsequently protective of their own targeted efforts. The FGDC has no authority or power to interfere with the budget processes in these agencies. For example, perhaps the largest public policy debate facing the 111rd congress will be healthcare reform. Healthcare represents the largest growth sector in the US economy currently representing about 15.2 percent of the Gross Domestic Product (GDP) projected to reach 19.5 percent of GDP by 2017, making it the single largest industry in the nation. Geospatial technology advancements can substantially improve the policy debate around health care by; 1) better understanding fraud and waste, 2) identifying high risk areas and providing focused outreach and prevention in those areas, 3) more accurately mapping quality and cost to provide better health outcomes and accessibility and 4) providing transparent information in a global pandemic (like H1N1) for better response and control of disease.

The NSDI is very complex and efforts to effectively describe it or its significance to decision makers often fail. It must also be understood by policy makers that the vision of the NSDI can't be achieved until local government data (i.e. parcel maps at local scales) are fully integrated to meet Federal business needs.

The FGDC does not currently allow state and local governments or the private sector a significant voice. This lack of input is contrary to the new vision of a more open and transparent government.



No one is willing to acknowledge the true cost of building an effective NSDI and its ultimate cost and value are difficult to quantify. NSGIC believes that the price tag is over \$8 billion with an annualized maintenance cost of approximately \$2.5 billion. For context, the global geospatial market is estimated at \$30 billion dollar a year and growing. The largest part of this expenditure is born by state and local governments, largely because no effective incentives from the Federal government cause them to conform to national standards or spend additional money to share data. A large portion of the initial \$8 billion has already been expended.

No Congressional committee has oversight for national geospatial activities or the NSDI. You can make significant improvements through the following actions:

1. Immediately create a Federal Geographic Information Officer (GIO) position in OMB with funding and the staff required to investigate and understand Federal agency expenditures. Give this individual the authority to require that agencies work together to define, develop and manage an effective NSDI.
2. Fund and task the GIO to develop a credible research report within 18 months that details the value of geospatial technologies and a shared NSDI to the nation, including all levels of government, the private sector, and the public.
3. Establish an oversight committee that deals with geospatial activities to ensure a point of contact in Congress with a clear understanding of the issues that can take appropriate action. Focusing on the needed improvements to E.O. 12906 and OMB Circular A-16 would be a positive start.
4. Build a governance structure for the NSDI that includes equal representation by the private sector (service providers and consumers); Federal, state, regional, tribal and local government; academia; utilities; and the general public. The FGDC should focus on Federal agency coordination working with the GIO.

What does success look like?

A successful NSDI is reached when decision makers are regularly using digital mapped data in policy discussions every day. This section will outline what a successful NSDI implementation would look like. In particular it addresses two main ideas; 1) the leadership required given the drastic advances in technology and 2) the vision described by the NGAC.

Leadership

Recently the NGAC published "*The Changing Geospatial Landscape*" (See <http://www.fgdc.gov/ngac>). This paper outlines specifically the changes and advancements the GIS community has witnessed over the past thirty plus years. The paper captures the major milestones and identifies several of the major issues that lie ahead. These milestones were reached in large part due to innovation in the Federal government (e.g. the US Census Bureau, the Global Positional System and the advancement of the World Wide Web). However, in conclusion the paper says:

"If we as a country are sincere about resolving universal concerns such as global warming, sea level rise, and affordable health care, the Federal government needs to



adopt innovative policies supporting a dynamic and robust spatial data infrastructure, an initiative that was promised more than 15 years ago."

Since President Clinton signed Executive Order 12906 in 1994 and OMB Circular A-16 was reauthorized much of the technology that GIS and geospatial activities is built on has changed dramatically. The "*Changing Geospatial Landscape*" paper identifies how a new collaborative approach to leadership is required to fully develop the NSDI. Further, it articulates how government data is being used for commercial applications particularly in social media and web 2.0 tools. One does not have to look far to see how the Obama Administration has opened to Web 2.0 tools for a more efficient and effective government. The NGAC have illustrated how GIS tools are fundamentally collaborative tools for advanced policy decisions.

To illustrate just how much has changed, nearly every Department, Division, and line unit in Federal, state and local government employ a Web master or an individual whose job duties include Web publication. Indeed this hearing is now being webcast. These advances are intended to make government more transparent to the public. Yet, the World Wide Web was not even an implemented technology 20 years ago. At the same time, in today's government, we do not have GIO's in each line unit similar to Web masters. GIOs would make significant advances in decision making through coordinating mapped data.

Vision

The NGAC's "*Strategic Vision*" document clearly outlines what success looks like for the full implementation of the NSDI. The desired outcome is "The Nation and its citizens value and are empowered by geospatial resources." A lengthy list of vivid descriptions for this future state is listed in this document. To get there, the Federal government needs to 1) lead with the collaboration of state and local partners, 2) publish ALL government owned data (that is publishable) as geographic data, 3) train the next generation workforce, and 4) set a clearly defined plan for the data and computing infrastructure required to manage this data.

When the NGAC vision is reached, all citizens will be relying on spatial data. Indeed all decision makers will be consulting map based data for decisions. In short, we know there is a successful NSDI when executive, commission and legislative bodies are using geospatial data in real time for collaborative decision making and policy recommendations.