WGA - Cadastral Data and Policy Forum
Final Report
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WGA - Cadastral Data and Policy Forum - Final Report

1. Executive Summary

All western states are dealing with serious decisions on challenges related to resource management, cultural equality, environmental balance, and development activities that require accurate and credible information. To address multiple land related issues, the Western Governors recognize the importance of the collection, integration, maintenance and distribution of digital geographic data representing the legal land subdivision from the Public Land Survey System (PLSS), land ownership and other related information. To this end, the Western Governors' Association (WGA) encourages member states, local governments and tribal entities and the private sector to engage in a coordinated effort that will lead to standardized best practices and land record modernization as well as a solid digital cadastral infrastructure.

The Western Governors' Association (WGA) Cadastral Forum was convened in March 2000 to investigate the status of the development of data sets for land ownership, and administrative boundaries. The Forum was coordinated by:

Western Governors' Association (WGA)
Intertribal GIS Consortium
National Association of Counties (NaCO)
National States Geographic Information Council (NSGIC)
The Bureau of Land Management (BLM), and
The US Forest Service (USFS)

The target group of approximately 250 participants were representative of those involved in cadastral information from county, tribal, state, and federal agencies from the eighteen (18) WGA affiliated states.

There are twelve (12) recommendations that came out of the Forum and activities are moving forward on these recommendations. The recommendations are summarized as follows.

Partnerships

Develop partnerships that maximize state, tribal, federal and local participation and collaboration in important programs for cadastral data collection and maintenance. These partnerships will work toward coordinating the efforts of all agencies working on cadastral information in the west and identifying a steering committee that can continue to push forward with the recommendations and activities from the forum. There are three specific recommendations related to partnerships.

- Coordinate the development of the PLSS/National Spatial Reference System (NSRS)
- Complete an inventory of successes and benefits of automated cadastral information
- Identify a steering committee to coordinate continued efforts coming form the forum.

Access

Promote sharing of cadastral information among jurisdictions to support critical functions and activities. The critical nature of cadastral information requires that it be shared and integrated with other information.

- Identify the members and participants in the cadastral community and work with the community to increase access to cadastral information

Funding
Support increased funding and resources for the collection and maintenance of cadastral data through federal, state and local collaborative efforts. These recommendations resulted Western Governors' Association resolution supporting the continued funding for the development and maintenance of the geographic coordinate database efforts in the BLM. There are two specific recommendations related to funding.

- Identify continued funding sources for the geographic coordinate database.
- Develop mechanisms to support the educational and technical needs of the cadastral community

Standards
Support the development and implementation of consistent cadastral procedures and data standards across jurisdictions. Collecting cadastral information in standardized ways and providing the cadastral information in standardized formats is essential for access and data sharing. There are two specific recommendations related to standards.

- Support national standards efforts including the identification of core cadastral information
- Develop standardized methods for automation and maintenance

Education
Inform and educate policy makers about the benefits and use of cadastral information. These educational materials will support local, regional, tribal, state and federal agencies. There are four specific education recommendations.

- Develop educational materials for policy makers
- Reach out to an extended cadastral community and provide education on the use and availability of cadastral information
- Work to develop state commissions on cadastral information that provide coordination and support within states
- Identify changes and improvements in the way cadastral information is managed so that maintenance can become a continued part of the normal workflow for all agencies and participants.

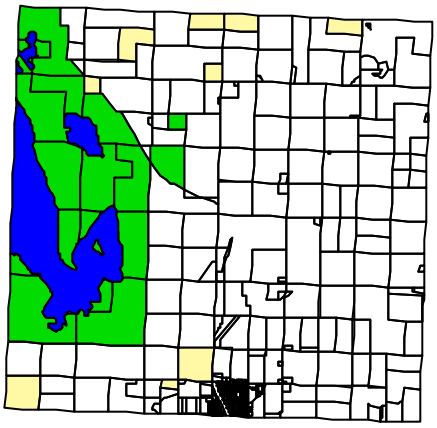
Since the Forum in March 2000 the Western Governors' Association has passed a policy resolution related to the Geographic Coordinate Data Base (GCDB) and digital land ownership in the West. The FGDC Subcommittee on Cadastral Data has convened and begun coordinating activities related to the recommendations. Some early attempts at web based communication and publication were done throughout the summer. These efforts continue to evolve.

The recommendations from the Forum will lead to a national cadastral infrastructure that can be used to coordinate activities among all data collectors, can be maintained locally, and can be applied at all levels of decision making.

2. Results and Recommendations

One of the United States Constitutional cornerstones includes the individual's right to ownership of land. Land ownership coupled with extensive lands in the public domain required a system for surveying and marking boundaries that led to the Public Land Survey System (PLSS). This survey system was first employed by the General Land Office (GLO) and is the basis for land ownership boundaries and title records for much of the United States. This cadastral information is fundamental to effective land management actions on both public and private lands. To make the nation's 200 years of historical survey data usable in a computerized world, the Bureau of Land Management (BLM), in cooperation with states, counties, tribal organizations and other federal agencies, is developing a digital representation of the PLSS called the Geographic Coordinate Database (GCDB).

The Western Governors' Association (WGA) has recognized that "cadastral data are critical for maintaining livable communities, encouraging economic development, and developing the tools that give community leaders the ability to manage both." They also recognize that "GCDB is the best hope of standardizing the PLSS in Western States and its use is strongly endorsed by WGA." (See WGA Resolution 00-005, Public Land Survey System and Ownership Database, Appendix B).



The combination of land ownership and its defining structure in the west, the Public Land Survey System (PLSS), is termed cadastral information. Many federal, state, local, and tribal agencies are developing digital PLSS information based on survey, global positioning systems (GPS), or record information. Most western states are involved, at some level, in integrating these data sources into geographic information systems (GIS).

There has never been a comprehensive analysis to determine the procedures, outcomes, or lessons learned in these activities. These recommendations are focused on solving that problem. The recommendations envision a continuous system where all participants would have a single maintained representation of cadastral information that could be used and relied upon for decision-making in the west.

Individual recommendations have been categorized into five groups, Partnership, Access, Funding, Standards, and Education and Outreach. The following is a general description of the five categories along with the recommendations related to them. There are twelve recommendations.

Partnerships

Develop partnerships that maximize state, tribal, federal and local participation and collaboration in important programs for cadastral data collection and maintenance.

1. Partnerships - PLSS/National Spatial Reference System (NSRS)
2. Partnerships - Inventory of Successes and Benefits
3. Partnerships - Steering Committee

Access

Promote sharing of cadastral information among jurisdictions to support critical state functions and regional activities.

4. Access - Cadastral Community

Funding

Support increased funding and resources for the collection and maintenance of cadastral data through federal, state and local collaborative efforts.

5. Funding - Sources
6. Funding - Support for Communities

Standards

Support the development and implementation of consistent cadastral procedures and data standards across jurisdictions.

7. Standards - National
8. Standards - Methods

Education

Inform and educate policy makers about the benefits and use of cadastral information.

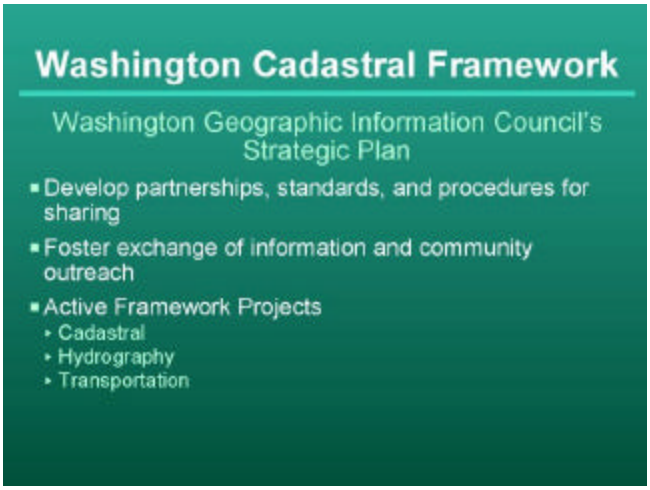
9. Education and Outreach - Policy Makers
10. Education and Outreach - Extended Community
11. Education and Outreach - State Commissions
12. Education and Outreach - Work Flow

The following describes the recommendations in more detail.

2.1 Partnerships - PLSS/NSRS

Work with all agencies to bring the Public Land Survey System (PLSS) and the National Spatial Reference System (NSRS) together.

This means that PLSS corners will have coordinate values and will either be coincident with or near geodetic control stations, as adjustment parameters allow. This action will result in the perpetuation of both corners and control monuments.



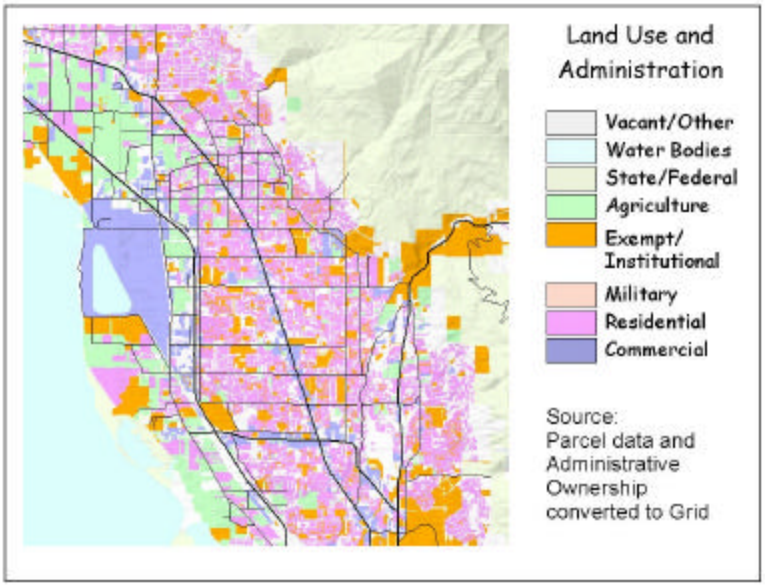
This recommendation requires coordination with the National Geodetic Survey (NGS) for survey control by cadastral agencies and coordinating PLSS corner monumentation among all agencies. Some of the issues that will need to be addressed are monumentation standards, access to monuments and monument information, and control adjustment specifications.

A national coordination task force should be identified to take this recommendation forward. The task force should consider horizontal and vertical control, PLSS corners and corners in non-PLSS areas of the United States. Issues to be addressed include monumentation specifications, control adjustment specifications, educational materials, and outreach programs to get educational materials into the hands of responsible agency officials

2.2 Partnerships - Inventory of Successes and Benefits

Develop examples of successful programs and benefits of cadastral systems.

This activity includes conducting an inventory or survey of geographic information system programs and other cadastral systems to identify success stories. From these success stories specific benefits and benefit stories can be summarized.



These successes can be technical or organizational accomplishments. The technical successes will focus on information that supports data collection, information distribution,

and maintenance of systems. The organizational successes will focus on partnerships, organizational structure, and cooperative decision-making. This task includes quantifying the accrued benefits of cadastral systems and collecting anecdotal information, benefits, and partnership role models.

The Federal Geographic Data Committee (FGDC) Subcommittee on Cadastral Data should act as the coordinators and custodians of the results of this activity. In this way the success stories and accrued benefits can be continued and expanded over time.

2.3 Partnerships - Steering Committee

> *Create a steering group, starting with FGDC Cadastral Subcommittee that will marshal the recommendations and support continued communication among participants.*

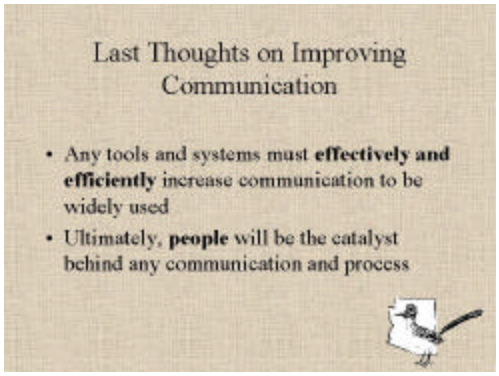
A steering group will coordinate the activities related to the recommendations and encourage national participation and coordination of efforts related to the recommendations. The coordination will include maintenance of web resources at an independent site, emphasis on quality, and coordination of reviews and comments

FGDC Subcommittee on Cadastral Data, which has met to discuss the recommendations and to identify lead coordinators for each recommendation, took a lead role in this recommendation.

2.4 Access - Cadastral Community

> *Formalize the communication and cooperation within the cadastral community using available technology and communication mechanisms.*

Communication and cooperation will utilize existing organizations as much as possible. Existing organizations have the infrastructure in place to deploy communication and cooperation. The cadastral community activities include communication, data sharing, and integration of activities and data among the organizations.



Incorporating communication, data sharing, and integration into organizations is an ongoing and long-term effort. It is necessary to developing shared and common standards to support this recommendation.

2.5 Funding - Sources

> *The Geographic Coordinate Data Base (GCDB) leads to robust and maintainable cadastral infrastructure through funding, partnerships and standards. The GCDB efforts need to be supported aggressively.*

A resolution supporting the GCDB was drafted and taken forward to the Western Governors' Association. This resolution (WGA Policy Resolution 00-005, Appendix B)

describes the intent of the Cadastral Forum in this recommendation. Excerpts from the resolution are as follows.

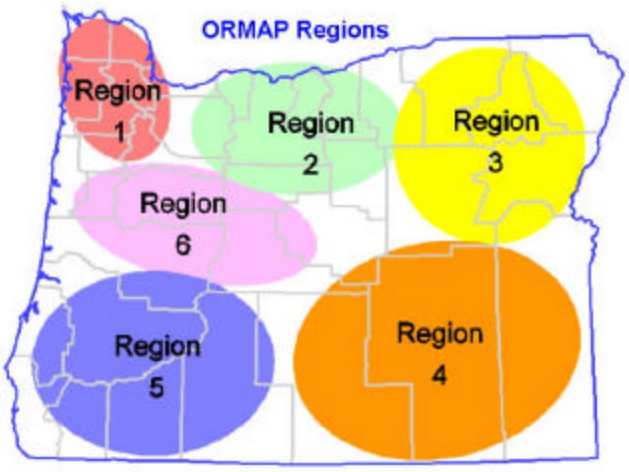
> To address multiple land related issues, Western Governors recognize the importance of the collection, integration, maintenance and distribution of digital geographic data representing the legal land subdivision from the PLSS, land ownership and other related information. To this end, WGA encourages member states, local governments and tribal entities and the private sector to engage in a coordinated effort that will lead to standardized best practices and land record modernization as well as a solid digital cadastral infrastructure.
>
> Western Governors recommend the BLM, in conjunction with the Western Governors Geographic Information Council, develop a comprehensive, unified plan for GCDB implementation across the West. This plan needs to address technical issues (e.g. data content), policy issues (e.g. data sources), and resource issues (e.g. funding).
>
> Western Governors urge BLM to complete, enhance, and maintain the GCDB in coordination and partnership with states. Western Governors call on Congress to provide the necessary funding for BLM to undertake this important effort.

The full text of the resolution is contained in Appendix B.

2.6 Funding - Support for Communities

> *Develop regional, state and tribal support systems for the undeveloped state agencies, counties and tribes so that a consortium of technical, data, and staff support can be built to serve these communities.*

Regional support systems are necessary to have a maintainable and complete cadastral infrastructure for the west. Because of the continuing need for technical expertise and the need to maximize organizational efforts, regional consortiums and other support systems can provide peer-to-peer support. Sustainable systems need to be developed so that all cadastral information can be maintained.



This activity includes developing agreements, defining necessary funding, and providing sample legislation and model structures, as needed.

2.7 Standards - National

Support or develop national standards for cadastral information.

National standards are important for effective communication and integration of cadastral information. These standards include consistent data transfer standards across the west, metadata for cadastral information, and the definition of core cadastral data. The standards should be open, extensible, and easy to use and apply. All standards need to have an implementation plan and a definition of compliance.

The development of core cadastral data national standards has begun. The BLM has applied for and received a small grant to facilitate the development of core cadastral data for public access and publication. Defining and adopting a core set of cadastral elements is critical to other recommendations and has a higher priority than the ongoing standards efforts.

This recommendation includes adopting national standards as a policy and developing mechanisms to follow through on the policy. Supporting and developing the standards will be an ongoing effort.

2.8 Standards - Methods

Establish a common set of methods for automating cadastral data and maintenance of that data.

This recommendation is related to the development of core cadastral data and the identification of cadastral success stories. That is the standard methods will support core data and will be developed from successful implementations. The common set of methods includes vertical integration processes and adjustment routines. The methods must support the collection, distribution and maintenance of core cadastral data.

Once these methods are defined, the processes for collecting and maintaining data will follow.

2.9 Education and Outreach - Policy Makers

Develop educational and support materials related to results of the Forum and the development of a cadastral data infrastructure.

The visions and goals for cadastral information need to be clearly described in a brochure or similar format. The success stories identified and documented in other recommendations will support developing these educational materials.

The documentation of the accrued benefits and information from the inventory need to be packaged into an easy to use presentation media, such as a compact disk (CD), with pictures and examples that can be distributed to policy makers. This information will support legislative and funding efforts.

2.10 Education and Outreach - Extended Community

Identify and involve related groups and interested parties to form an extended community that will help in defining priorities for collection, maintenance, and other activities.

Cadastral information affects a large number of citizens. There are many interest groups and decision makers that require landownership and other cadastral information. This activity will identify the extended community to support defining where data collection will occur, how the data will be distributed, and how maintenance will be conducted. It is important to involve the end user community in identifying priorities for data collection. The technical and data maintenance community can work from these priorities toward a common direction and priority for the nation.

2.11 Education and Outreach - State Commissions

Within each state establish a commission by statute that has multi agency and multi jurisdiction control and representation on matters related to the collection, maintenance and distribution of cadastral information.

This recommendation provides for defining and establishing state commissions. These commissions must be able to accept money and distribute funds, as well as establish policy, adopt standards, and set priorities. The concept of state commissions expands many of the existing multi agency and multi jurisdiction committees that already operational in many western states. By having identifiable state bodies that are representative of federal, state, local and tribal interests acting in a coordinated manner to establish policies and standards, many of the impediments to achieving a cadastral infrastructure can be overcome.

It will take time to work with each state to establish these commissions. Model structures and legislation should be identified as a part of the survey of cadastral systems. This recommendation will need to be supported by other educational materials.

2.12 Education and Outreach - Work Flow

Identify changes that can be made in the way cadastral information is managed in the business workflow that will assure that maintenance is a by-product of normal business.

This recommendation addresses the need to examine how cadastral data maintenance are incorporated into the workflow as a part of the automation process. As described in the pre-forum surveys one of the keys to realizing the benefits of cadastral data automation is to incorporate maintenance into the daily workflow and to stream line the processes and actions to experience the efficiencies from automation. This recommendation does not propose that there is one workflow that can be used in every local jurisdiction, but it does acknowledge that maintenance must be part of the workflow.

In the aftermath of the November 2000 elections one pundit stated that the two most decentralized activities in the United States are garbage collection and voting. Collecting and maintaining cadastral data could be included in mix of decentralized activities. This recommendation would promote technology and legislation that encourage institutionalization of maintenance.

Some of the information to accomplish this recommendation will be captured in the survey of the current status described in other recommendations. The goal of institutionalizing maintenance is also a part for the GCDB funding task and other legislative tasks.

3. Forum Organization

The goals for the Forum were to:

1) Determine implementation strategies to build a standard integrated representation of PLSS and other cadastral data.
2) Develop policy recommendations for WGA and others to assist in deploying these strategies.
3) Communicate the results of the Forum to others in their states and tribes.

The agenda included presentations to describe current activities in each state, expert presentations on applications, breakout and group discussion to develop

recommendations. Many discussions and presentations described complete cadastral information collection, use and distribution.

One of the key components of the Forum was the state and tribal delegations. The intent was to have state and tribal delegations convene prior to and following the Forum to review cadastral information collection, use and distribution in their jurisdiction and to learn about and to discuss how to make more effective use of the resources in their jurisdiction related to cadastral information. Delegations were a mix of interests and skill sets ranging from elected officials and other decision-makers to field collection and computer specialists.

A second key component was the post Forum information sharing. The delegations were intended to be representatives that could take what they learned and the recommendations back to the constituent groups. In this way the lessons learned and results could be disseminated to a broader base, building a cadastral information foundation for the western states. This report is also a part of the information-sharing component.

This section summarizes the pre-Forum activities the Forum agenda.

3.1 Pre-Forum Activities

The initial concept for the Forum was developed nearly eighteen months prior to the Forum. The Forum was sponsored by the WGA with initial support funding from the Bureau of Land Management (BLM). The detailed pre-Forum activities began about six months prior to the Forum.

Steering Committee

A steering committee was formed about six months prior to the Forum event. The steering committee secured funding for the Forum, coordinated the facilities, developed the agenda, and coordinated the development of delegations. The steering committee composition was:

- three State representatives
- one tribal representative
- four federal agency representatives
- one county representative and
- administrative support from contractors and WGA.

The steering committee met by conference call on a weekly basis for four months preceding the forum. In addition they held two onsite meetings to review logistics and to discuss agenda and content.

The three state representatives were each coordinating with six states and they also served as the state delegate leaders in their own states. This was a significant workload and in hindsight the division of labor for coordinating the state delegations should have been shifted to non-steering committee members.

The steering committee worked well. A twelve-person committee may appear to be unwieldy, but with weekly calls having twelve people meant that each call had a quorum. The larger steering committee helped distribute the pre-Forum workload more evenly. The calls were scheduled at a set time each week and those who were available participated. The Steering Committee did not experiment with web-based conferencing, and this is something to consider for other Forums. Limiting the calls to one hour also meant that letter writing, document reviews, and other details were done by email prior to each call.

Funding

The steering committee was tasked with identifying funding sources for the Forum. Because of the need to attract attendees from all segments of cadastral activities in the west, the steering committee felt it was important to have funding to support travel and accommodations for attendees that did not have base agency support. The funding needed to be enough to support ravel for a percentage of the attendees, produce Forum materials, support contract assistance, and pay for organizational activities such as conference calls and pre-Forum onsite meetings.

The Forum was discussed and refined at a meeting of the Federal Geographic Data Committee (FGDC) Subcommittee on Cadastral Data. The Subcommittee provided "buy in" and other support from federal cadastral agencies, associations and local constituencies. With the base of support from the Subcommittee and its representative voices, the Steering Committee mailed letters requesting support to identified states, federal agencies, associations, and other organizations represented on the Subcommittee as well as other GIS and data collection organizations. The following sponsors came forward:

Bureau of Land Management
Federal Emergency Management Agency
Federal geographic data Committee
Environmental Systems Research Institute (ESRI)
Compaq Computer Corporation
Trimble Navigation
Berntsen Monuments
EUCLID Software
Premier Data Services

A Forum of this magnitude requires significant funding support. The Steering Committee and the sponsors agreed to provide travel support to participants that could not get agency support for out of state travel. The Forum was hosted at the State of Utah Offices, which saved on facility rentals. Meals and breaks were kept to a minimum and sponsors paid for the Forum reception.

State Delegations

Each of the 18 Western States and the Tribes had a designated contact person to orchestrate the invitation, coordination and communication among their representative areas. It was recommended that each state delegation have representatives from local, private, state, federal, and tribal interests. The delegations discussed their cadastral issues and data collection status among themselves. The concept was to begin the

discussions in the states and tribes so that participants would be informed and engaged by the time they got to the Forum.

To facilitate this communication, each state and each tribe was provided with a pre-forum survey to get a snap shot of the state of cadastral data in each state and with each tribe. The results of the pre-forum surveys are discussed in Section 4. The survey forms are in Appendix B.

The leaders of the state delegations were given a lot of responsibility for pre-Forum information collection and identifying participants. Because people were uncertain about the content of this Forum as it was the first of its kind, the commitment to these pre-forum activities was uneven. This may in itself make a statement about the status of cadastral information across the west. The collection, maintenance, and distribution of cadastral information are also uneven.

The results of this Forum do not provide any insight on how to better engage participation, but it is hoped that the results and success of the first Forum will mean there will be more active participation in future efforts.

Pre-Forum Surveys

The pre-Forum surveys were designed by the steering committee. They were tested in two states, revised and then distributed to the state and tribal delegations about two months prior to the Forum. The sample survey forms are included in Appendix F.

There was not a separate form for federal agencies. The federal agencies participated with their respective state delegations. This was intentional. The concept was to engage the federal agencies with their state and local partners in each state.

The participant surveys were divided into sections. Each state and tribe returned the first section to get an overview of each state and tribe. The original intention was to be able to describe to the Forum participants what was going on each state and to summarize the condition of cadastral information in each state.

The survey participation varied widely among the states and Tribes. The results may have been more effective if telephone or onsite interviews had been done to extract specifics and conduct follow ups as needed to give a better picture. Given the success and content of this first forum, it is expected that it be easier to begin earlier with any future forums because the lead contacts in each state are better identified and participants will have a better idea of what to expect.

Another alternative would be to go web based survey forms. In this way the status and progress of could be updated continuously. Some of these ideas were provided to the BLM's GeoCommunicator Project. If the status of each state could be hosted continuously on a web site, the state of cadastral data nation-wide could be provided.

Forum Participants

The Forum participants came from the state and tribal delegations. The steering committee wanted a cross section of interests, skill sets, and level of involvement with cadastral information, just as the steering committee itself was a cross section. The demographics were fairly evenly divided. Figure 1 illustrates the participation based on the participant's organization type.

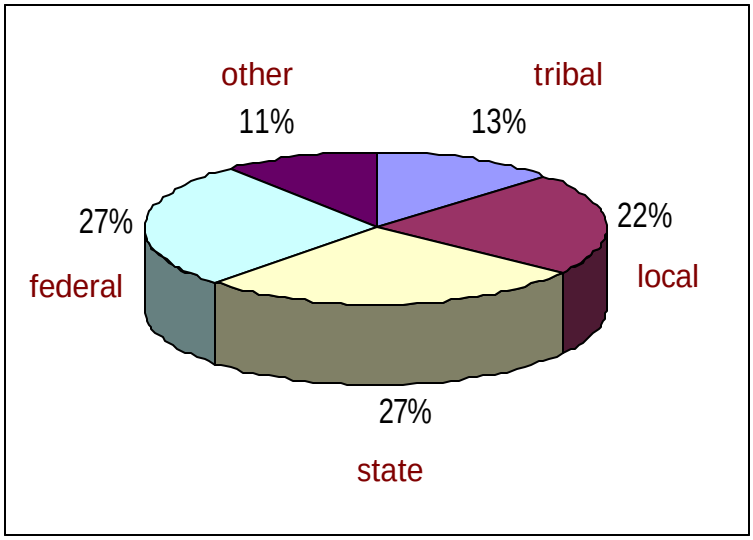


Figure 1 - Forum Participants

The Other Category includes private sector, associations, educational institutions and support staff.

In terms of total numbers, a snow storm the Sunday prior to and Monday of the Forum limited some attendance. The participants shown in Figure 1 and listed in Appendix D are the final registrants, recognizing that not all of the registrants were able to travel to the Forum.

The participant registration was coordinated through the states. Each state and the Tribes were given an established number of invitees and a database to enter the information for their state or tribe. There were some early technology issues with the database version and format and this process required a lot of follow up. This is another place where a web based registration form may have been helpful. The web-based tools would have reduced the technology compatibility issues, but, at the time, it may have excluded some of the participants.

3.2 Agenda

The agenda was designed to move the discussions from the vision of what is needed and understanding of the issues and concerns to specific recommendations. There

were four sections of the agenda, Visioning, Impedance to the Vision, Pathways to the Vision, and Recommendations. Each section had full group presentations followed by discussion groups with the results of the break out sessions presented to the group. Sharing a common interest in the collection, maintenance and use of cadastral information the participants came from a variety of disciplines including recorders, surveyors, assessors, GIS specialists, lands and reality specialists, resource managers, and legislators.

The forum began with a series of presentations that framed special issues facing the West in terms of land use, open space, and resource allocation. The importance of cadastral information supporting these quality of life issues was made clear with examples from tribal, federal, state, and local government participants. The forum participants broke into five discussion groups to describe and characterize an ideal cadastral system that would support all decision-making. Some of the topics considered were:

The results of these sessions described a target system that is vertically integrated, which meant that cadastral information, resource data and all information are related to one another so they can be used as together. The data would be seamless across the West, which meant that all parcel information would be collected and maintained and would be tied to a known mathematical reference. The technology would be available to support continued maintenance and use of the cadastral data. Continued maintenance meant that as land ownership changes through transactions, these changes are made to the system and the information it is kept current.

Forum participants agreed that identifying and developing the standards, technology, distribution, access, and funding mechanisms to make this target system a reality is a goal of the forum and ongoing activities.

A reception Monday night, sponsored by ESRI and FGDC, showcased the work that the western states and agencies are doing with cadastral information, GIS and the Internet.

The Tuesday morning presentations described the impediments agencies had experienced in developing cadastral systems. The forum broke into five discussion groups to continue to discuss the impediments to building the target system in the West. The impediments were grouped into topics, organizations, people, data, processes, technology, and funding. Although funding is always a topic, organizational cooperation, partnerships, finding staff with appropriate skill sets, and standards for data exchange were among the top impediments.

The Tuesday Luncheon speaker from Trimble explored some of the new technology that can be leveraged to overcome our technical issues. The speaker focused on positioning and accuracy issues and solutions.

The Tuesday afternoon presentations described how organizations had overcome impediments and what changes organizations made to be successful. The Tuesday afternoon discussion sessions focused on describing action items and recommendations that the forum could take to achieve the target system in the West. The final recommendations were further discussed on Wednesday morning. See Section 5 for a more complete discussion of the recommendations. Appendix C contains the breakout session result summaries.

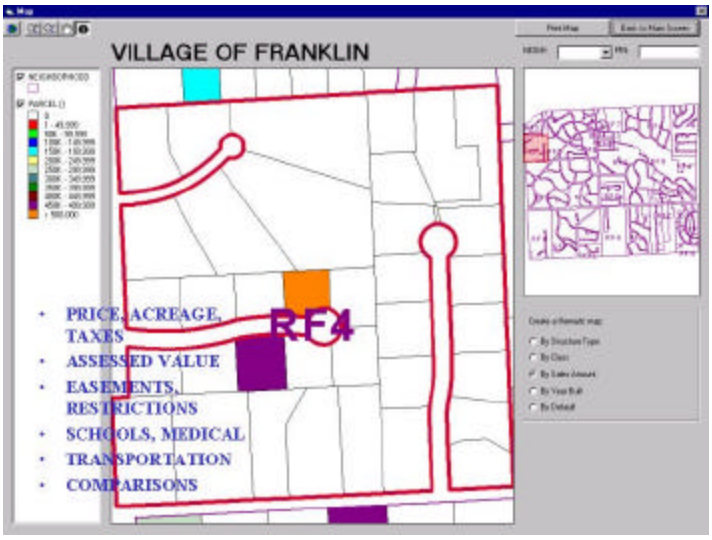
4. Pre-Forum Surveys

A survey instrument was designed to capture information about the current situation of cadastral information in the 18 states of the Western Governors' Association.[1] The survey attempted to gather information about the distribution of land ownership in the state, the nature of the parcel-level land records systems, levels of automation of this system, and information about policies for sharing data. Ten states responded to the survey, some more completely than others. This section of the report provides a summary of those responses. More detailed information about the survey and responses from individual states can be found in Appendix F.

The states that responded included Alaska, Arizona, Hawaii, Nebraska, New Mexico, Oregon, Texas, Utah, and Washington. They range in size from 6 to 570 thousand square miles (Hawaii to Alaska). Ownership ranges from under 1 percent private land (Alaska) to over 90 percent (Nebraska and Texas). Federal lands range from 1 percent in Texas to 2/3 or more in Alaska, New Mexico, and Utah. State ownership ranges from a few percent to 25 percent in Alaska and 29 percent in Hawaii. Tribal (Native) lands range from none to 27 percent in Arizona. In all, these states are fairly representative of all western states, except for some unique land record modernization efforts in Montana, New Mexico, and Oregon.

Some of the highlights of these findings are as follows.

- The dominant system in the west is for counties, or their equivalent to manage the entire property tax system with a minimum of control from the states.



- At the county level the norm is for the automation of text data related to taxes but not to have related digital parcel maps. The exception is found in larger counties.
- Three states have or soon will have complete parcel coverage.
- The information we have on other land management entities indicates a thorough mix of no automation, automation underway, and complete automation.

[1]Surveys were also sent to Tribal participants in the workshop. Because the situation of each tribal body is so unique that summarization would be difficult and because participants asked that this information be kept confidential, no results from those surveys is presented here.

- A number of states have created multi-agency and multi-jurisdiction committees to coordinate cadastral activities.

- In a few states, a central agency provides resources and guidelines. This is certainly true in the states with mandated geographic information system (GIS) programs.

- The Geographic Coordinates Data Base (GCDB) is a common resource used in many states. GCDB is a program of the Bureau of Land Management (BLM) to make available the most accurate known data regarding the exact location of Public Land Survey corners.

- The largest barrier to digital cadastral in the West is the large number of rural counties (and boroughs), which have large land area and few resources to do the work. The limiting factors are financial and finding and keeping skilled workers.

- Lack of standards and guidelines is a second major barrier.

- In some states early investments in technology had significant payoff, but those early systems are now obsolete and need to be upgraded.

- One significant reason for automating cadastral information is to share with other units or levels of government, thereby improving overall government performance.

- Policies on data sharing vary greatly across the west ranging from states that copyright their data or charge for it, to cost recovery, to freely available on the Internet. Approximately half withhold the owner's name from any shared data.

4.1 Appraisal-Assessment-Property Tax System

The dominant system in the west is for counties, or their equivalent, to manage the entire property tax system with a minimum of control from the states. In Alaska, New Mexico, and Oregon the state values certain properties; e.g. oil and gas, utilities, very large industries. In one state, Montana, the state values all property then passes this information to the counties for tax levy and billing. In Nebraska, with many small rural counties, the counties have the option of passing valuation work to the state and 9 counties have opted to do so.

4.2 Current Status of Cadastral Automation

At the county level, which tracks all private land, the norm is for automation of textual data related to taxes but not to have related digital parcel maps. The exception is found in larger counties, which often have digital maps; they have more resources and more need for this work. As a result several states have as much as half their parcels in

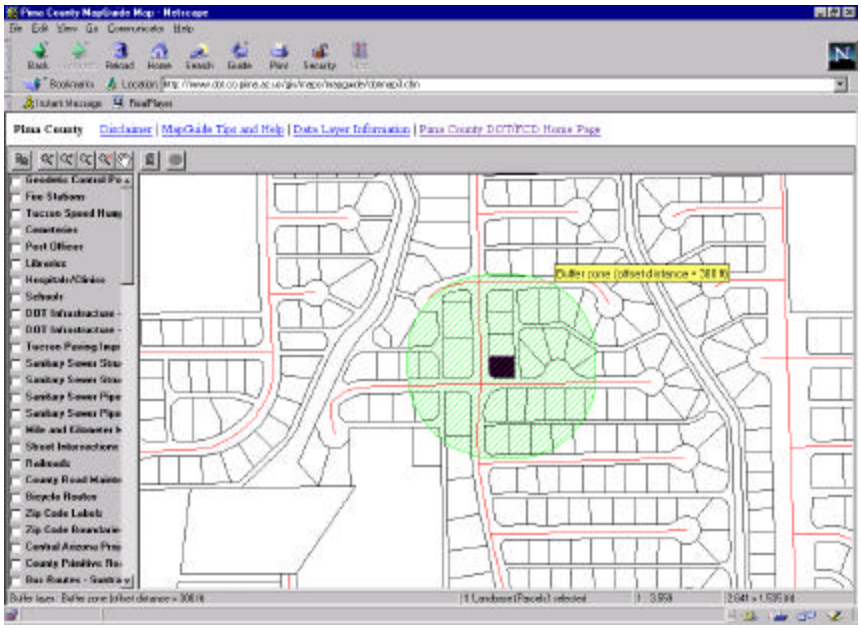
digital form, even though these urban counties represent a small percentage of the total land area in any state.

Three states have or soon will have complete parcel coverage. Montana and New Mexico are both operating under state mandates to have statewide, seamless parcel databases by 2002; both benefited from earlier efforts to develop paper mapping systems in all counties. Hawaii is another exception, with much of the digitized being completed by a private firm.

We do not have good data about the extent of digital mapping by other land management entities; e.g. state and federal agencies. What information we have indicates a thorough mix of no automation, automation underway, and complete automation. The US Forest Service in Alaska is about 20% complete in implementing its Automated Land Project while the Alaska Department of Natural Resources is 100% complete. In Nebraska, where we have the most complete survey responses from state agencies, two the four responding agencies have complete automated attribute data about their land, but only one has a digital map.

4.3 Cadastral Successes

Most states noted significant successes in a few isolated counties and agencies. The three states with complete parcel databases must be seen as a success, though the Hawaiian case is troubled by spatial inconsistencies.



A number of states have created multi-agency and multi-jurisdiction committees to coordinate cadastral data activities. New Mexico has revived its State GIS Advisory Committee to coordinate cadastral activities within state agencies. Alaska and Washington committees are working to promote a common cadastral level across political boundaries in the state. Arizona is working on a physical implementation of the cadastral content standard. Nebraska is developing standards and guidelines and a guidebook to assist local government with multipurpose land records systems.

In a few states, a central agency provides resources and guidelines. This is certainly true in the states with mandated GIS programs. Oregon's Department of Revenue provides a 50/50 cost-share program for converting paper maps to digital and provides mapping standards. Nebraska's State Surveyors Office provides assistance in local governments trying to automate mapping activities. Washington's Department of Natural

Resources obtains copies of all surveys from the counties, many in digital form, and makes these available for a fee. Most states provide guidelines and review of the assessment and property tax system.

The Geographic Coordinate Data Base (GCDB) is a common resource used in many western states. GCDB is a program of the Bureau of Land Management (BLM) to make available cadastral survey based data regarding the location of Public Land Survey corners. This information is critical to the accurate location of cadastral information, since nearly all land descriptions are tied to the PLSS directly or indirectly. BLM is actively developing this program in the West. Most western states are working with the BLM to develop and improve this data. The Montana system is linked to the GCDB. In Utah a partnership between BLM and the state is now providing GCDB data for over 90% of the state.

A number of places are working to make their data available over the Internet. This provides a good access to data in places otherwise remote. The Montana data, for example, is going on the Internet. Alaska has survey and land status data on the Internet. Several Arizona counties have their data on the Web. Clark County, Washington has its data on a website; the data is viewable, but not downloadable.

4.4 Barriers to Automation

In this section, we list the significant barriers mentioned by one or more of the responding states. As section 4.3 indicates, there are solutions to many of these barriers. This section focuses on the problems and omits references to the solutions found in other states or developed at the workshop.

The largest barrier to digital cadastral in the West is the large number of rural counties (and boroughs) which have large quantities of land and few resources to do the work. Funding is a major concern, but of equal concern is the lack of skilled workers to do the job. When such a worker is found and trained, they often leave for better paying jobs.

Lack of standards and guidelines is a second major barrier. To be sure, there is a federal Cadastral Standard, but this seems to be overwhelming to most and needs to be modified and translated to fit the local environment in each state.

In most states, no single agency has the responsibility to encourage use of standards or the development of a modern cadastral system. One consequence is lack of coordination across organizations. Another is lack of a unified voice with dealing with the federal government. Similarly, no agency is providing leadership or resources to local government. Finally, there is no central voice to focus the attention of state policy-makers, executive or legislative, on the need to invest in improved systems.

The GCDB appears to be a significant resource, yet it is not yet available in some of the western states. Even where it is available, local government needs the tools to link local parcels to the section corners, then adjust parcel coordinates as locational information on the section corners is improved and updated.

In some states early investments in technology had significant payoff, but those early systems are now obsolete and need to be upgraded. The Alaska Department of Natural Resources has an older system that cannot share data with newer systems across the

state. In Hawaii and Montana, early work in creating digital parcels seems to have created maps that are inconsistent in some way with current standards.

One significant reason for automating cadastral information is to share with other units or levels of government, thereby improving overall government performance. Working against this goal is a lack of standards that render shared data useless. Another barrier is government policy that charges other governmental units for data. Often the justification is cost recovery of the initial investment in the new technology.

4.5 Part 2 of the Survey, Data from State Agencies and Counties

A second part of the survey was to be distributed to various providers of land data in the state: state agencies that manage land, state agencies that collect data about land, and three types of counties (fully automated, partially automated, and without automation). This was a labor-intensive task and only three states were able to supply such information -- Nebraska, New Mexico, and Washington. As a result, discussion of the results will be limited.

State agencies that own or manage lands appear to vary a great deal in their use of technology. In total, eight agencies in the three states provided information on this question. Three had no automated system for handling attribute information on their lands, three had no automated mapping system, and three had no document imaging system. No agency had a fully complete mapping system, but two were making excellent progress, one was getting started, and two more spoke about plans to automate.

Only four state agencies that compile land data responded. The New Mexico State Engineer collects data on water rights. The Washington Office of Financial Management collects detailed housing data to help develop population estimates. The other two agencies (one in Nebraska and one in New Mexico) work with cadastral data collected from a subset of counties in the state.

Eight counties responded to the survey. In every case, whether the county had automated cadastral mapping or not, the county had automated parcel information to support their property tax efforts. The counties that had fully automated parcel mapping also had document imaging in the recorder's office, but not all were linked to the parcel map. Imaging existed or was planned in 6 of the 8 counties.

4.6 Part 3, Policy and Partnerships

A third part of the survey looked at various partnerships between governments and policies affecting the distribution of data. Only Nebraska and Washington responded to this part of the survey and only a few agencies are represented, so findings are quite limited.

Most of the partnerships identified dealt with sharing data and involved no exchange of funds. The Nebraska Survey Office has a formal agreement with a number of federal agencies on specific Public Land Survey related projects; this does involve limited funding.

Policies on data sharing vary greatly across the five responding organizations. In Nebraska, no county or state agency copyrights their data or charges for it except to recover the cost of copying. Clark County, Washington copyrights its data, licenses it, and sells it for a fee. About half the sample provide a disclaimer with their data. Half withhold the owner's name from any shared data. Only Clark County has their data on the Internet.

5. New Partnerships and Communications

As with any gathering of professionals with a common interest, the Forum initiated a lot of new communication and connections. The Forum participants were able to interact with their peers in other states and gain an understanding of what others were doing and to look at successes in other places that could be translated to their locations. A common theme throughout the Forum was the importance of a shared and integrated National Spatial Data Infrastructure (NSDI) for cadastral information. A shared NSDI can provide a continuous and maintained set of cadastral information that can be used by all agencies across the west. A coordinated cadastral effort means that collection and maintenance can be once in any geographical area, connected to surrounding areas, and integrated with other data. This will make more effective use of funding and improve communication across the west.

The structure of state and tribal delegations was intended to increase communication within states and tribes. Those who attended were encouraged to take what they learned home and to share it among their state peers. In some states this worked to promote new dialogues and discussions are continuing. In other states the participants found particular contacts to solve specific problems and have acted on resolving problems and establishing new communications.

The Forum organizers posted information to a web site. This information was accessed at the rate of about 100 unique accesses and downloads per week for the month following the Forum. Traffic decreased over the summer but remains steady in the range of five to ten new unique accesses each week. Traffic peaks when press releases and news articles are published. For example, Professional Surveyor carried an article on the GCDB that referenced the Forum and the site. This created a peak in the number of accesses to the web resources.

A web based discussion group was also started. This had limited success with some discussions related to Forum wrap up and surveyor registration issues. This site is no longer active.

In terms of action items on the recommendations the highest priority recommendations have had a significant amount of activity over the summer of 2000.

The WGA adopted a policy resolution related to the GCDB, PLSS and digital land ownership information. This is policy number 2000-005 and it is included in this report in Appendix B. This policy has been presented to legislators and other interested parties in Washington DC by representative Forum participants. The resolution has been favorably received.

There was an attempt to attach some funding to the 2001-2002 budget cycle, but these efforts were started after the Department budgets were drafted and were not included. However, legislators encouraged Forum representatives to return and present their requests in the winter of 2001 for the 2002-2003 budget cycle. Legislators from non-western states supported the budget resolutions.

On July 18, 2000, the Office of Management and Budget (OMB) held a public roundtable in cooperation with the Federal Geographic Data Committee (FGDC) and the National Partnership for Reinventing Government (NPR) to explore how to overcome the financial

and institutional barriers to the sharing of geospatial information horizontally and vertically among Federal, State, local and tribal government agencies, and the private sector. The roundtable built upon a dialogue begun on July 7 in a general session on Information Technology. Over 110 senior officials from Federal agencies, states, cities, technology vendors, OMB, Senate Appropriations staff, and public interest organizations attended the July 18 meeting.

One of the recommendations from this meeting was: In alliance with State, local, and tribal partners, encourage the development of a national cadastral (parcel mapping) layer providing parcel information, outlines and ownership. This should be a priority given the many uses for home and business location information, and of sufficiently high resolution so as to be useful to local and tribal governments (which usually require greater detail than their state or federal counterparts.)

This recommendation along with the WGA resolution and the coalitions built at the Forum provided momentum to advance the WGA recommendations.

The BLM submitted two grant applications to the FGDC, one for cadastral standards and metadata training and he other for developing core cadastral data definitions. A grant to cover travel expenses for developing core cadastral data definitions was approved and work has begun on that effort.

The FGDC Subcommittee on Cadastral Data convened in May 2000 to review the results of the Forum and identify leaders and coordinators for each recommendation. The recommendations were consolidated and timeframes and people were assigned to each recommendation. The BLM announced and has filled a new position to coordinate external input and requirements related to BLM cadastral information. The FGDC Subcommittee on Cadastral Data web site contains meeting notes and updates on activities.

The Cadastral Data and Policy Forum was successful in educating professionals interested in cadastral information and in establish a common overall direction to a cadastral data infrastructure. It was clear from presentations and discussions at the Forum and in continuing discussions that landownership is vital to public decision-making. It is also clear that land ownership records are collected and maintained in decentralized offices. Automating these records and making them available for decision making will be relatively expensive and needs standards to assure that information collected locally can be used regionally and nationally.

The recommendations from the Forum will lead to a national cadastral infrastructure that can coordinate activities among all data collectors, can be maintained locally, and can be applied at all levels of decision making.

Appendix A - Acronyms

Acronym	Text
ACSM	American Congress on Surveying and Mapping
AGRC	Automated Geographic Reference Center
ALTA	American Land Title Association
ASPRS	American Society of Photogrammetry and Remote Sensing
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CD	compact disk
DNR	Department of Natural Resources
DOA	Department of Administration
DOR	Department of Revenue
DOT	Department of Transportation
EPA	Environmental Protection Agency
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FGDC	Federal Geographic Data Committee
GCDB	Geographic Coordinate Data Base
GIS	geographic information systems
GPS	global positioning system
HARN	High Accuracy Reference Network
MDOR	Montana Department of Revenue
MDOT	Montana Department of Transportation
MOA	Memorandums of Agreement
MOU	Memorandums of Understanding
MPO	Metropolitan Planning Organizations
NaCO	National Association of Counties
NGS	National Geodetic Survey
NRCS	National Resource Conservation Service
NPR	National Performance Review
NSDI	National Spatial Data Infrastructure
NSGIC	National States Geographic Information Council
NSRS	National Spatial Reference System
OMB	Office of Management and Budget
PAT	Property Assessment and Taxation
PIN	Parcel Identification Numbers
PLSS	Public Land Survey System
RPO	Regional Planning Organizations
UCGIS	University Consortium of Geographical Information Systems.
USFS	US Forest Service
USGS	US Geological Survey

Appendix B - WGA GCDB Resolution

POLICY RESOLUTION 00 - 005

Public Lands Survey System and Ownership Database

SPONSORS: Governors Leavitt and Geringer

A. <u>BACKGROUND</u>

1. The Public Land Survey System (PLSS) defines land ownership and boundaries in the Western states and can be traced to the early development of the nation. Different representations of the PLSS on the ground, on maps, and now in computer databases have evolved. These representations significantly vary in content and accuracy. Digital data is being used increasingly in state, federal, tribal, and local Geographic Information Systems (GIS) and as such, it is imperative to reconcile these various representations.

2. The National Spatial Data Infrastructure (NSDI) is a broad-based effort to create a framework of data and communication links that will facilitate public and private participation in decision making processes. State, local, tribal, and federal entities are in the process of modernizing land record data used in the western states. The Cadastral (or land ownership layer) is one of the framework layers for the NSDI.

3. The Western Governors Geographic Information Council, the National States Geographic Information Council, the National Association of Counties, the Intertribal GIS Council, the Federal Geographic Data Committee (FGDC) Cadastral Subcommittee and many other organizations recognize that the NSDI, land record modernization, and cadastral data are critical for maintaining livable communities, encouraging economic development, and developing the tools that give community leaders the ability to manage both. The same organizations sponsored a Forum on Western Cadastral Data and Policy issues, which resulted in recommendations to the Western Governors' Association (WGA) and member states.

4. The Bureau of Land Management (BLM) is developing a digital representation of the PLSS in Western states called the Geographic Coordinate Database (GCDB). GCDB is the best hope of standardizing the PLSS in Western states and its use is strongly endorsed by the WGA-sponsored Western Cadastral Data and Policy Forum and the Western Governors Geographic Information Council.

5. As was discussed at the Western Cadastral Data and Policy Forum, GCDB implementation varies widely from state to state, depending upon the priorities and resources of each BLM state office. To best utilize GCDB, the WGA member states need

a consistent implementation of GCDB across the West, and state BLM offices need to develop and coordinate with state partners.

B. GOVERNORS' POLICY STATEMENT

1. To address multiple land related issues, Western Governors recognize the importance of the collection, integration, maintenance and distribution of digital geographic data representing the legal land subdivision from the PLSS, land ownership and other related information. To this end, WGA encourages member states, local governments and tribal entities and the private sector to engage in a coordinated effort that will lead to standardized best practices and land record modernization as well as a solid digital cadastral infrastructure.

2. Western Governors support the general recommendations of the Western Cadastral Data and Policy Forum including:

> Partnerships: Develop Partnerships that maximize state, tribal, federal and local participation and collaboration in important programs for cadastral data collection and maintenance.
>
> Access: Promote sharing of cadastral information among jurisdictions to support critical state functions and regional activities.
>
> Funding: Support increased funding and resources for the collection and maintenance of cadastral data through federal, state and local collaborative efforts.
>
> Standards: Support the development and implementation of consistent cadastral procedures and data standards across jurisdictions.
>
> Education: Inform and educate policy makers about the benefits and use of cadastral information.

3. Western Governors recommend the BLM, in conjunction with the Western Governors Geographic Information Council, develop a comprehensive, unified plan for GCDB implementation across the West. This plan needs to address technical issues (e.g. data content), policy issues (e.g. data sources), and resource issues (e.g. funding).

4. Western Governors urge BLM to complete, enhance, and maintain the GCDB in coordination and partnership with states. Western Governors call on Congress to provide the necessary funding for BLM to undertake this important effort.

C. GOVERNOR'S MANAGEMENT DIRECTIVE

1. To support the development and integration of Public Land Survey System data, land ownership, and related boundaries, Western Governors direct the Western Governors' Geographic Information Council to make available to WGA member states the published report from the Western Cadastral Data and Policy Forum to be used in developing and supporting state-based PLSS activities.

2. The Western Governors also direct the Western Governors Geographic Information Council to work with other interested parties to implement the recommendations of the Western Cadastral Data and Policy Forum.

3. This resolution shall be transmitted to the Western congressional delegation, the Secretary of the Department of the Interior, the Director of the Bureau of Land Management, the Office of Management and Budget, the Federal Emergency Management Agency, the Federal Geographic Data Committee, the National States Geographic Information Council, the Intertribal GIS Council, the National Association of Counties, the U.S. Geological Survey, the U.S. Census Bureau, and the U.S. Forest Service.

Approval of a WGA resolution requires an affirmative vote of two-thirds of the Board of the Directors present at the meeting. Dissenting votes, if any, are indicated in the resolution. The Board of Directors is comprised of the governors of Alaska, American Samoa, Arizona, California, Colorado, Guam, Hawaii, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Northern Mariana Islands, Oregon, South Dakota, Texas, Utah, Washington and Wyoming.

All policy resolutions are posted on the WGA Web site www.westgov.org or you may request a copy by writing or calling:

Western Governors' Association
600 17th St. Suite 1705 South
Denver, CO 80202-5452
Ph: (303) 623-9378
Fax: (303) 534-7309

Appendix C - Break Out Session Results

This section contains the listings of the breakout sessions. These results are not less important than the final results, but they are included in the Appendix because the final recommendations of the Forum sprung from these intermediate results.

Establishing the Vision

The purpose of this discussion will be to characterize the elements of an ideal or target Western Cadastral Infrastructure. These will be bullet points that will characterize the system in a variety of ways. Some things to consider are:

Accuracy - is there a defining accuracy that a system should have? Is there some limiting accuracy?

Completeness and level of detail - What should it contain? All parcels? Public parcels? Is there a core set of attributes that should be known about each parcel? Should it include sub parcels - such as tax assessment classification areas?

Maintenance - Who should maintain it? How frequently should it be maintained?

Custodianship - who should have custodial care of this system? Is it a shared custodianship? Is there an overriding state level coordinator? Is there a regional coordinator?

Partnerships and agreements - which ones are needed? Are they handled in a standard way? Who needs to participate?

Access and Distribution - how should the system provide information? Free? Subscription? Pay as you go? Up front partnerships? Should there be limits on distribution?

Technology - is there a clear technical approach? What data standards? What process standards? What metadata standards?

Guiding Principles - are there any overarching principles that direct the over all direction and operation of a system?

Not every group needs to be the same and not all groups need to look for the same sets of elements or characterizations. Try to get at 10 elements that describe an ideal Western Cadastral Infrastructure.

The following summarizes the bullet points from all groups. These have been synthesized into one list and are in no particular order.

- Cadastral Information is vertically integrated spatially
- Technology that supports vertical integration is available and readily used
- There is seamless data with one representation for a given geographic extent
- Cadastral Information is transaction based and is updated daily

- Cadastral information is very accurate and complete with attribute information
- There are a set of core attributes with well defined standards - including Parcel Identification Numbers (PINS)
- Standards are transparent to users with an intuitive interface
- Document imaging systems are included with cadastral information
- Metadata standards are used and incorporated into the system and are easy to use
- Legal descriptions are well written and approved before recording
- Public access to cadastral information is timely and freely available
- Individual rights and intellectual property are protected appropriately
- There is protection from misuse
- There is a communication tool with real time data and notification of cadastral activities.
- Internet portals exist for data sharing and access to information
- Funding strategies include federal assistance, user fees, recording fees, and partnerships
- There is self funding through fees, licensing, or other mechanisms
- Regional - State GIS/Mapping/Data Centers exist to coordinate integration and provide regional technical support, especially for rural counties and tribes.
- There are multi-agency teams for county and regional coverage like the current Canyon County partnerships
- There is distributed geographic information systems (GIS) with maintenance based on jurisdictional authority
- There is local control and local stewardship
- There is invisible data transfer among all systems
- There is invisible and continuous migration to new systems and capability to respond to new technology
- The Public Land Survey System (PLSS) is control based
- Monuments are in the correct location
- There is accurate geodetic control available with complete High Accuracy Reference Network (HARN) densification

Impedance to Vision

Organizations

- Partnership, need more of them
- Lack of access, need jurisdiction coordination
- Turf between jurisdictions and professions
- Competing interests
- Lack of communication
- Partnerships need to involve all stakeholders

People

- Staff - education, training, learning curve, and ease of use
- Leaders - education, convincing, selling, turn over
- Consuming public - support, education market plan
- Lack of clear direction regarding personal privacy
- Lack of trust

Technology

- Lack of ease to use interface for casual users and typical staff
- The technology has been oversold as a solution to problems
- Lack of easy to use interface for cadastral editors

Data

- Standard are complex or do not exist
- Lack of implementation plans for standards
- Source data for cadastral are of uncertain quality; metadata is needed
- Proprietary data excludes access
- Abundance of low quality info; lack of known accuracy
- Lack of monumentation because of fraudulence or neglect
- Uneven data coverage
- Lack of a common base
- Data Access and Distribution
- Competing standards
- Lack of description of what compliance is with standards

Method/Process

- Update procedures are not consistent
- Systems are built without a maintenance plan
- Need to understand customer needs and business processes

Policy

- Needs to be program not just a project
- Legislation has been out paced by technology
- Lack of clear common unified vision
- Lack of a policy for establishing priorities

Funding

- High start-up cost
- No funding
- No benefit cost studies

Pathways to the Vision

These are the notes from the flip charts in the discussion rooms. They are not in any particular order.

1. The Cadastral Forum should be an annual or bi-annual event. The event should include more counties. The financial support for travel helps with broadening the participation. We need to think about what the agenda would be.

2. Follow up activities should include:
   - Monitoring the reaction of the Western Governors
   - Set up a website and listserv

- Identify shepherds to keep the activities moving.

3. We should use lay terms and clear language when developing information ofr non-technical audiences.

4. We need to sustain the Governors support
    - Within states to sustain partnerships
    - Finesse within Governor's Offices and legislators
    - Get WGA buy in to the programs and ideas
    - Include NaCO in the support
    - Regional office buy in from BLM, USFS, USGS, BIA, Corps of Engineers, EPA,

- Cadastral Focus Groups

12. Need to overcome the problems with difficult interfaces and the challenge of using complex software. We need to work with the vendors to develop a better parcel management toolkit, easier coordinate geometry functions, standards for digital data submission that is compliant with the American Land Title Association (ALTA) standards, and easy customization of parcel creation tools.

13. We need to articulate the need for accuracy, metadata, and standards so that we can take full advantage of the technology.

14. Build a solid base of support

15. State and counties need to help set priorities

16. Coordinate before we collect data

17. Define the forum for establishing priorities

18. Define the funding into appropriate regional and multiple counties funding

19. Establish a simple vision that has a central focus. The vision needs to include the new economy.

20. Coordinate the cadastral activities for smart growth

21. Get WGA to promote partnerships as a part of their activities.

22. The cadastral program has to compete with other programs. It will have supporters and detractors.

23. Coordinate what we are doing with the National Conference of State Legislators

24. We need to education the legislators and other interested parties. The educational materials should include the following information:

- Why do we need cadastral information?
- How does it support the legislator's goals?
- How does it relate to current litigation or reduce or prevent litigation?
- How does it relate to the historical and statutory responsibility of legislators?
- What will it take to make this happen, timeline and budget?
- How does it support decision making in a legislators jurisdiction?

25. We need a program, not a project. A project has a narrow focus and is ad hoc. A program is multi-level and doesn't have a defined end point. A program has continued funding instead of year-to-year funding. A program is:

- A part of the infrastructure
- Ongoing and part of the workflow
- Includes a clear vision
- Is customer based
- Is the outcome of a project

- Is sustainable over time
- Has a sound funding base

There is State and local demand and need for the GCDB to be a program

26. We need to quantify the benefits of cadastral systems and have them verified through an independent organization such as the University Consortium of Geographical Information Systems.

27. We need common policy for the WGA and level playing field on

- Privacy issues
- Fee structures
- Data media
- Public disclosure

28. Identify good leadership and leaders for recommendations

29. Need regional technical support centers. The regional centers would have financial support as well. One model to follow is the rural electric cooperatives. These could be like a local council of governments that assist at the technical level and are a policy support for the members. This will need local government buy in and they will have to be full participants. That is this can not be forced on the participants. The Oregon model is another example of a system that encourages the local governments and tribes to work together.

30. We need to coordinate the establishment of High Accuracy Reference Network (HARN) points and PLSS monument. That is, if it is possible we should densify geodetic control on or near the remonumented corners.

31. We need to support developing resources to enhance the metadata standards and collecting metadata for cadastral information.

32. We need to discourage funding the collection of proprietary data

33. Encourage the WGA to endorse and support funding for free access to and distribution of cadastral information.

34. We need to define what a cadastral infrastructure in and how having cadastral information described as a part of the infrastructure it will improve decision making and enhance the implementation of all land policies.

35. Create a task force to inventory standards and recommend consistency of standards across the west. We should also develop a consistent transfer standard for cadastral data in the west.

36. The WGA should endorse expanded funding for the GCDB and encourage developing the GCDB to be more than it is right now. IT should include all the west, not just federal lands, it should include as much information as possible so it can be used by local and tribal governments.

37. Developing a funding support plan that starts small and then publish the success. Describe that the value of data is what you can do with it not the amount that it costs to collect. Establish organizations that have spending authority.

38. We need to continuously describe who "we" includes.

39. Establish priorities for cadastral data. Include multiple groups and carry the message to the legislature. Start with the BLM and then get other agencies involved.

40. Establish commissions by statute by state that are multi agency. The commission needs to have spending authority and include many participants

41. Establish a WGA sponsored 18 state commissions to address cadastral information. This may be the WGA GIS council.

42. Get on an equal footing with other components of the infrastructure.

43. Get the policy makers to the table as we discuss the courses of action. This needs to happen after we have a clear and concise vision.

44. There are a lot of funding alternatives that need to be considered. These include:

- Transaction fees collected on a state-wide level with a redistribution option to the locals and tribes, look at Oregon and Wisconsin examples.
- Incentives for bonding which is funding like other parts of the infrastructure
- Identify capital investments opportunities.
- Look at fees, bonds, and other mechanisms to start a program

45. Work with the federal agencies to encourage them to include the states and locals in funding discussions and support.

46. Get agreement at the county. City, state, tribal, and federal level on common processes and core data requirements. Provide the vendor community with these common processes to support the development of software tools. This should be done by working with the FGDC Cadastral Subcommittee. NaCO, WGA, surveyors and others. This will need cross pollination within the states at all levels in addition to regional and national levels.

47. Improve the description of the Public Land Surveying System (PLSS) by defining the core data and the update procedures that should be followed so that any one who has better information can add it to the PLSS and GCDB. We need to include funding for maintenance in these discussions. Need cross cutting representation to develop good maintenance recommendations.

48. Create new processes that maintain data as a part of the daily workflow. Integrate processing and maintenance so we improve the way we do work. What processes are done to provide customer support? What skill level is needed to implement these processes?

49. Institutionalize the network of interested people and technical resources for cadastral information using lots of things like push-pull technology, GeoCommunicator, posted work schedules, and best available technology.

Appendix D - Attendees

Last Name	*First Name*	*Title*	*Organization Name*
Aanstoos	Rob	GIS Coordinator	
Ader	Bob	Cadastral Survey	Bureau of Land Management
Ames	Debra	Recorder	Rich County
Anable	Mike	Arizona State Land Commissioner	Arizona State Land Department
Anderson	Bruce	County Surveyor	Kootenai County
Angelides	Dean P.	Vice President	VESTRA Resources, Inc
Archambault	Dwight	Realty Specialist	Standing Rock Sioux Agency
Aston	LaNell	Executive Assistant	Texas General Land Office
Ault	Marcus	Assistant Manager of Assessment Map	Clark County Assessor's Office
Ayarbe	Liz	Tax Mapping Specialist	Taxation and Revenue Department
Bacino	Craig	Digital Cartographer	DOA/ISD
Bader	Cris		State Water Commission
Barber	Brad	State Planning Director	Governor's Office of Planning and Budget
Barker	Les	Recorder / Surveyor	Garfield County
Bautista	Melvin	Registered Land Surveyor	Gila River Indian Community
Beaty	Mike	Senior GIS Analyst	U.S. Bureau of Reclamation
Begay	Jonah	Computer Programming	Navajo Land Department
Bell	Jack	Land Services Director	Nez Perce Tribes
Bennett	John	Chief Cadastral Surveyor	Bureau of Land Management
Bewley	Bob	Team Leader for Geosciences	Bureau of Land Management
Bietz	Dori		CA Indian Lands Office
Bishop	Lance	Chief Branch of Geographic Services	Bureau of Land Management
Blair	Brent	Lands Specialist	Bureau of Land Management
Blaseg	Joseph	Division Director	South Dakota Department of Revenue
Bohnenstiehl	Kyle	Directory LIS Office	Hopi Indian Tribe
Breckenridge	Rick	GIS Manager	Flathead County
Brown	Jim	State Surveyor	State Surveyor's Office
Bryson	Mary	Agency Director	MT. Dept. of Revenue

Buhler	Don	Cadastral Lead	Bureau of Land Management
Burns-Braidlow	Kimberly		Federal Geographic Data Committee
Butler	Vaughn	Surveyor	Salt Lake County
Butz	Phillip	GIS Administrator	Luna County
Camarata	SJ	Director	ESRI
Carl	Bob	GIS Manager	Clallam County
Carroll	Robin	Director	Geospatial Service and Technology Center
Carter	Linda	County Recorder	Millard County
Challender	Stuart	Senior Project Manager	Automated Geographic Reference Center
Chambers	Don	Manager Consulting Services	ESRI
Cherry	Fran	Director BLM State Office	Bureau of Land Management
Ching	David	Executive Assistant to the Mayor	Maui County
Ciscell	Mike	Senior GIS Analyst	Department of Water Resources
Clark	David	Chief Geographic Services	Bureau of Land Management
Clark	Jack		Ada County
Clark	Cindy	Data Base Administrator	Utah AGRC
Clarke	Gar	GIS Manager	City of Santa Fe
Colville	Linda	Deputy State Director	Bureau of Land Management
Cone	Leslie	NILS Project Manager	Bureau of Land Management
Cortina	Gabriel	Assistant Director	Department of Information Technology
Covington	Randall	Register of Deeds	Utah County
Craig	Will		University Minnesota
Curry	Pamela	GIS Specialist	Sublette County
Daidone	Tony	GIS Coordinator	Nevada DOT
Danks	Paul	GIS Coordinator	Fort Berthold Tribe
Danks	Kayla	Realty Specialist	BIA
Darling	Gary	Chief Information Officer	California Resource Agency
Delporte	Martha	ALP Project Manager	USDA. Forest Service
Dickman	Rick	NILS	Bureau of Land Management
Dowers	Lee	Cartographer	US Bureau of Reclamation
Dunnigan	Brian	Head - Floodplain Management	Nebr. Natural Resources Commission
Dwyer	Mike	Project Manager	Bureau of Land Management
Edwards	Scott	GIS Coordinator	
Encinas	Carlos	Registered Land Surveyor	Gila River Indian Community
Farnsworth	John	Program Coordinator, GeoSciences	Bureau of Land Management
Ferguson	Bill	County Commissioner	Ouray County
Fox	Liza	State GIS Coordinator	Information Technology Resource

			Management Council
Friedman	Richard	GIS Coordinator	McKinley County GIS Center
Fuller	Tracy	Federal Framework Coordiator	USGS
Fusaro	Randy	Chief, TIGER Operations Branch	U.S. Bureau of the Census
Ganesan	Arvina	Vice Pres Software Development	UCLID Software, LLC.
Garcia	Santiago	Assistant State Cartographer	Arizona State Land Department
Gerst	Andy	Facilities Engineering Manager	WA Parks and Recreation Commission
Gilbert	Petuuche	Realty Officer	Pueblo of Acoma
Goodtracks	Pathimi	Lands Div. Head	Southern UTE Tribe
Goreham	Dennis	Chair, GIS Advisory Committee	Automated Geographic Reference Center
Graves	Chris	Community Development Specialist	NE Council of Governments
Gray	Don	Geoscience Liaison	Bureau of Land Management
Gruenhagen	Dave	GIS Manager	Department of Lands
Haines	Dick	State Representative	Montana State Legislature
Hamerlinck	Jeff	S.D.V.C.	University of Wyoming
Hampton	Rod	Drafting Administrator	Assessor's Office
Hartman	Lynn	PR and Assistant Planner	Ute Mountain Ute
Haverfield	Sue	Clerk and Recorder/Surveyor	Flathead County
Heap	Arlene	ALP Spatial Data Coordinator	USDA. Forest Service
Henry	Bob	Deputy State Director, Operations	Bureau of Land Management
Hess	Ronald H.	Executive Secretary	Nevada State Mapping Advisory Committee
Hickey	Patrick	Regional Land Surveyor	USDA. Forest Service
Hope	Steven	Surveyor	Bureau of Land Management
Houston	Cathy	Realty Specialist	Suquamish Tribe
Hubl	Erik	Computer Records Supervisor	Lancaster County Assessors Office
James	Alvin	Realty Manager	Pyramid Lake Paiute Tribe
Johnson	Curt	Commissioner	Office of School and Public Lands
Johnson	Keith	GIS Specialist	Salt River Pima-Maricopa Indian Community
Keith	John Kerwyn	Assistant Deputy State Director	Bureau of Land Management
Kent	Tim		USDA. Forest Service
Kinney	Andrew	GIS Manager	Thurston County
Kirkpatrick	Stu	GIS Services Manager	Department of Administration
Kitchkumme	Rey	Tribal Council Member-NAGPRA	Prairie Band Potawatomi Nation
Kitto	Felix	Water Res. Tech	Santee Sioux Tribes
Koch	Jim		Nebr. Dept. of Property Assessment & Taxation
Koleis	Marv	Chief of Mapping/Mitigation	Colorado Department of Local Affairs
Krauss	Rick	GIS Analyst	Warm Springs Reservation

Kremke	Kurt	County Assessor	Weston County
Krohn	Milbert	GCDB Manager	Bureau of Land Management
Leonard	Jon	Region 4 Land Surveyor	USDA. Forest Service
Lestinsky	Helmut	Supervisory Cartographer	USGS
Lukacovic	Paul	GCDB Outreach Coordinator	Bureau of Land Management
Luther	Mark	Liason	North Dakota Governors Office
Magee	Pete	GIS Coordinator	San Lius Valley GIS Authority
Maier	Carol	Realty Specialist	USDA. Forest Service
Manary	Jim	Deputy Director	Oregon Dept of Revenue
Marlett	Jim	GPS/GIS Field Coordinator	Clark County Surveyors Office
Martinez	Rod	Digital Conversion Survey Tech	State Land Office
Martinez	AJ	Special Assistant to Director	Bureau of Land Management
Martinez	Roselyn	Land Classification Spec.	Standing Rock Sioux
Mates	Dan	Cadastral Survey Chief	Bureau of Land Management
McCall	C. Elizabeth	GIS Coordinator	Laramie County
McCann	Nancy	Wyoming State Contact	State Engineers Office
McCauley	John	Land Surveyor	Bureau of Land Management
McKay	Dennis	Cadastral Survey Automation Coord.	Bureau of Land Management
McKinnon	Chris	Program Manager	Western Governors Association
McMahon	Richard	Realty/Lands Specialist	Alaska Department of Natural Resources
McMullen	Wes	Water Management Specialist	Wyoming State Engineers Office
Memmel	Richard	GIS Coordinator	Information Technology Division
Mesteth	Perry	GIS Manager	Oglala Sioux
Minkel	Dave	State Geodetic Advisor	National Geodetic Survey
Monson	Larry	GIS Coordinator	Assiniboine Sioux Tribe of the Fort Peck Reservation
Montoya	Raymond	GIS Specialist	Walker River Pauite Tribe
Murphy	Dennis	GIS Applications Manager	Potlatch Corportation
Nagel	Robert		Automated Geographic Reference Center
Nielsen	Garry	Surveying Division	NM State Highway & Transportation Department
O'Brien	Mark	GIS Coordinator	Bureau of Land Management
O'Danial	Scott	GIS Analyst	Conf. Tribes of Umatilla Indian Reservation
O'Hara	Dave	Rogue River National Forest	USDA. Forest Service
Odum	Jerry	Nebr. Geodetic Advisor	National Geodetic Survey
Oviatt	George	Manager/Director/ Department Head	Bureau of Land Management
Paiva	Joseph	Director, Business Development	Trimble Navigation

Panos	Gust	Cartography / Mapper / Geographer	Bureau of Land Management
Petersen	Charnel	Planning & Development	Sisseton-Wahpeton Sioux Tribe
Platt	Ron	MMP GIS Manager	City of Tucson
Purchase	Steve	Assistant Director	Oregon Division of State Lands
Quarles	Jim	GIS Project Manager	Weber County
Redthunder	Sharon	Realty Officer	BIA
Reid	Stan	Director Texas County Info Project	Texas Association of Counties
Rindlisbacher	Craig	GIS Coordinator	City of Rexburg
Roberts	Frank	GIS Coordinator	Couer d'Alene Reservation
Robinson	Milo		Federal Geographic Data Committee
Roe	Jeff	D.P. Manager	School & Institutional Trust Lands Admin
Russett	Tom	Surveyor	MARLS
Schroeder	Darrel	Wyoming State GIS Coordinator	NRCS
Schultz	Val	ALP Coordinator	GSTC
Sempek	Jerry	State GIS Manager	Bureau of Land Management
Servatius	Jeff	GIS Analyst	Idaho State Tax Commission
Shakespeare	Jim	GIS Coordinator	Shoshone & Arapahoe Band
Shincke	Jack	Land Survey Manager	WA Dept of Fish and Wildlife
Sides	Pam		Planning and Development District III
Siegel	Steve	GIS Analyst	Department of Admin & Information
Simon	Lisa	Ag Researcher	Tribal Land Enterprises
Skillings	Ron	Manager/Director/Department Head	USDA. Forest Service
Smith	Gary	GIS/CAD Supervisor	Assessor's Cartography
Sockzehigh	Roxanne	GIS Operator	Shoshone-Bannock Tribe
Spencer	Tom	GCDB Manager	U.S. Bureau of Land Management
Springer	Bob	GIS Coordinator	Oklahoma
Steele	Dave	Survey Manager	WA Dept of Natural Resources
Stolsig	Cory	Survey Manager	US Bureau of Reclamation
Stone	William	State Geodetic Advisor	National Geodetic Survey
Sumpter	Carl	Supervisory Forest Land Surveyor	USDA. Forest Service
Szymanski	Curt	President/CEO	UCLID Software, LLC.
Tessar	Paul	GIS Manager	Boulder County
Titla	Steve	General Council	San Carlos Apache Tribe
Tortalita	Floyd	Environment Department	Sandia Pueblo
Trimmer	Edie	Mineral Analyst	Forestry, Fire, & State Lands
Trobia	Gene	State Cartographer	State Land Department

Tudor	Greg	GIS Project Manager	WA Dept of Natural Resources
Tuttle	Gregory	Manager of SRP's Land Survey Divisi	Salt River Project
Van Aartsen	Steve	GIS Coordinator	City of Sioux Falls
Villegas	CloAnn	CS&K Tribes	Intertribal GIS Council
Vincent	David	Cartographer	USGS
Von Essen	Ian	GIS Manager	Spokane County
von Meyer	Nancy	Vice President	Fairview Industries
Wassinger	Chuck	Associate State Director	Bureau of Land Management
Webb	Daniel	Chief, Branch of Geographic Science	Bureau of Land Management
Weinberg	Neal	Albuquerque Planning/AGIS	City of Albuquerque
Wenstrom	Beth	GIS Coordinator	Agua Caliente Band of Cahuilla Indians
White	Ron	Accounty Manager State and Local Go	Premier Data Services
Whitehead	Ron		Bush and Gudell
Whitney	Steve	GIS Manager	DOT Technical Services
Williams	Chip	GIS Coordinator	Fremont County
Williams	Dee	Director	Jamestown S'Klallam Tribe
Williamson	Dave	Mapping Supervisor	Kootenai County Assessor's Office
Wingert	Everett	Professor	University of Hawaii-Geography Dept.
Wiseman	Ray	GIS Coordinator	Yakama Nation
Wood	Don	I T Manager / GIS Coordinator	Wasatch County
Woodburn	Ron	Agency Integration Specialist	State of South Dakota
Workman	Nancy	Recorder	Salt Lake County
Wright	Erle	GIS Coordinator	Santa Fe County
Yazzie	Lemont		Navajo Land
Yeager	Patrick	Chief Land Surveyor	Nevada DOT
Yellowfat	Annette	Data Tech.	Standing Rock Sioux Tribe
Zander	Jeff	Trust Resource Director	Pauite Indian Tribe of Utah
Zink	Larry K	Coordinator	Nebraska GIS Steering Committee

Appendix E - Final Agenda

March 20

1:00 - 1:45 Welcome and Keynote
Keynote Speaker - Vaughn Butler – President of the National Association of County Surveyors and Salt Lake County Surveyor

1:45 – 3:45 Opening Session
This session will focus on the demand for cadastral data in the west, technical strategies for meeting the needs, and information policies related to cadastral data. This session will include presentations on success stories and examples of cadastral system solutions. This session will set the stage for the work of the forum

Don Buhler, Bureau of Land Management, The Importance of Cadastral Data

Partnerships and Cooperative Decision Making

Stuart Challender – Parcel Data for Smart Growth

Mike Dwyer - Cooperative Land Planning and Land Exchanges

Ian von Essen and Dave Steele – Cooperative Strategic Planning

Access and Communication

Santiago Garcia - Statewide coordination and Partnerships

Common Understanding of Data, Technology and Requirements

David Ching – Integrating Cadastral Data

Brent Blair – The Common Language of Land Exchange

Dave O'Hara – The Vision of Sharing: Responsible Stewardship

Ray Wiseman - Extending GCDB for Tribal Ownership

3:45 - 4:00 Break

4:00 - 5:00 Vision Setting Breakout

Establishing a vision by describing an ideal system. The goal of the sessions will be identify bullet points of a vision or the ideal system.

5:30 - 7:00 Reception at the Capitol

Brad Barber - Smart Growth Project
SJ Camarata - ESRI

March 21 - Tuesday

8:00 - 8:45 The National Integrated Land System (NILS) – Update and Progress - moderated by Nancy von Meyer, Leslie Cone – BLM NILS Project Manager and Don Chambers, ESRI.

8:45 – 9:00 Dave Terry – Policy Implications of Cadastral Data

9:00 - 9:15 Plenary session – Review the elements of the visions and ideal system and discuss the commonalties and differences. Agree to the commonalties that we will take forward and identify the differences that we will keep in mind.

9:15 - 10:15 Four presentations from four perspectives related to an example cadastral implementation, successes, impedance, and problems yet to be solved.

Cadastral Spotlights

Randall Covington - A County Approach to Cadastral Data

Scott O'Danial– A Tribal Approach to Cadastral Data

Stu Kirkpatrick - A Statewide Approach to Cadastral Data

James Manary – A Statewide Approach to Organizing Cadastral Data

10:15 - 10:30 Break

10:30 - noon Breakout to discuss impedance to implementation. The groups will list impediments to reaching their goals and then prioritize the impediments. They will also describe outstanding issues that may not be an impedance but are concerns and prioritize those concerns as well. Facilitation may be as follows:

noon - 1:15 Lunch - Technology for Solutions - Joseph V.R. Paiva - Trimble Navigation

1:15 - 3:00 Discussion of issues and impediments from the morning sessions. The discussion will be followed by presentations on successful implementations of cadastral systems. These implementations are examples of successful partnerships and innovative technology.

Reaching for Success

Paul Tessar– Distributed use and shared custodianship of cadastral data.

Lance Bishop – Integrating Federal and County from the Start

Greg Tudor – Sharing the Data

Steve Whitney – Web based solutions for cadastral data

3:00 - 5:00. Breakout to discuss recommendations on the solutions to impedance. Each breakout group will discuss what we should be doing next.

March 22 - Wednesday

8:00 - 8:30 Review of Previous Day's Breakout

8:30 – 9:00 Keynote - Utah's Lt Governor Olene Walker

9:00 - 10:30 Group discussion to refine recommendations.

Vision summary
Technology policies
Information policies

10:30 - 10:45 Break

10:45 - noon Wrap up and close conference

Noon Adjourn

1:00 - 3:00 Optional session to work on reports and Forum documentation.

Appendix F

SURVEY OF STATES

Ten states responded to the survey, providing descriptions of cadastral activities within their borders. A summary of their responses is provided in Section 4 in the body of the text. This appendix provides more original information from Section 1 of the survey, providing overviews of the states.

Description of Land Records

Alaska

Appraisal-assessment-property taxation system

Local jurisdictions that level a property tax must assess at full value for all properties and tax all at the same rate. Statewide tax exists on one type of property only -- oil and gas.

Current status of cadastral automation

Each organization has its own responsibility for automation. State has 90% of its parcel boundaries in digital form; survey & land status plats have been scanned and will be deployed on the Internet. Municipalities and boroughs have automated much of their records. Several native corporations have automated their parcels. BLM is collecting, managing, and distributing Public Land Survey information. US Forest Service is about 20% complete in implementing its Automated Land Project, linking tabular data to a spatial base.

Cadastral successes

The Cadastral Subcommittee of the Alaska Geographic Data Committee, comprised of people from diverse agency backgrounds, is working to promote the concept of a common cadastral layer across political boundaries in Alaska. BLM is working with Alaska Native Corporations to survey and convey 44 million acres as chartered by the Alaska Native Claims Settlement Act. The Alaska DNR and the US Forest Service are both advanced in their land records systems.

Barriers to automation

The enormous size and remote character of Alaska are the biggest impediments. Early uncoordinated efforts have left incompatible (and sometimes unsustainable) legacy systems. State monies for cadastral and land record systems have dropped considerably in the last 10 years.

Arizona

Appraisal-assessment-property taxation system

The state Department of Revenue (DOR) has data on all taxable parcels in the state, providing administrative services for most counties and equalization for all. Four larger counties do their own work and send copies of data to the state.

Current status of cadastral automation

There is no state GIS program. The larger counties have developed their own GIS and others are beginning to follow. Smaller cities and triba to th8a4lyn272.5 -12.775 TD -0.19 Tc

Cadastral successes

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growing in importance. A working group of the Arizona Geographical Information Council is being to develop a physical implementation of the cadastral content standard.

Barriers to automation

Lack of standards, budget, policy, and procedures. Lack of standards hurts development of a consistent statewide cadastral database. Lack of money for development or cost-recovery policies similarly impede development of a statewide resource. No state organization is mandated to maintain such a statewide database. DOR has the parcel record data and cadastral drafting standards, but no GIS/LIS standards.

Hawaii

Appraisal-assessment-property taxation system

County level work.

Current status of cadastral automation

All parcels automated. The City and County of Honolulu maintains an automated database and has been charging a license fee for its use, but is taking steps to eliminate this. The other three counties had their parcels digitized by a private firm and make data available for a fee.

Cadastral successes

All parcels successfully converted to digital form.

Barriers to automation

Question of how some of the parcels were mapped originally. There are instances of discrepancies when combining with other maps.

Montana

Appraisal-assessment-property taxation system

All appraisals are made by the state Department of Revenue (MDOR); values are passed to the individual counties to levy taxes.

Current status of cadastral automation

Before 1997, only five counties were advanced in digital parcel conversion. In 1997, the legislature approved the Montana Cadastral Database Project to produce a statewide standardized digital parcel layer through a cooperatively financed private/public effort by 2002. The Information Systems Division, Department of Administration is the lead agency; ultimately maintenance will fall to the individual county or MDOT.

Cadastral successes

Montana Cadastral Database Project is being tied to the Geographic Coordinate Data Base (GCDB). Data will be available over the Internet.

Barriers to automation

Five original counties will need time to become compatible. Parcel maintenance will be a large issue with a need to train local staff in many agencies involved and the need to adjust the parcel database as the GCDB is improved incrementally.

Nebraska

Appraisal-assessment-property taxation system

Property tax is essentially a local issue. The state Department of Property Assessment and Taxation (PAT) provides general guidelines. Over the last 4-5 years the state legislature has allowed counties to request PAT to assume their overall assessment responsibilities; nine (of 93) counties have made such a request to-date.

Current status of cadastral automation

Four counties have automated and another two are in the development stage; together they account for almost 50% of the state's population, but a small percentage of the land-mass. To help the counties with their tax work, the legislature has provided some funding to the State Surveyor's Office to assist local government automate mapping.

Cadastral successes

Four counties have successfully implemented multipurpose GISs integrated across multiple local agencies. Successful pilot project in three counties developing an upgradeable PLSS database. An intergovernmental advisory committee is developing standards, guidelines, and a guidebook for local government to assist planning and implementation.

Barriers to automation

Rural nature of the state: small counties with small budgets and a lack of skilled staff. No state agency with the clear responsibility for this work. Limited finances to provide assistance.

New Mexico

Appraisal-assessment-property taxation system

Most work done at the county level. State Property Tax Division handles valuation of railroads, minerals, communication systems, pipelines, public utilities, and airlines.

Current status of cadastral automation

New Mexico law requires every county to have a digitized set of maps in place by June 2002. Twenty-two of the 33 counties currently have at least some of their maps in digital form.

Cadastral successes

During the 1970s there was a statewide effort put mapping systems in county assessor offices across the state. The goal now is to have a state-wide seamless parcel layer. A number of local successes have come from collaborations including regional government, private utility, county, and city governments.

Barriers to automation

Limited funding. Hard to find good staff, then lose them to the market. Earlier lack of coordination across state agencies has been solved by the revival of the State GIS Advisory Committee.

Oregon

Appraisal-assessment-property taxation system

Counties do most of the work, but the state Department of Revenue (DOR) supports the counties in their role; this assistance is supported by a $10 recording fee per document. DOR values utilities and the larger industrial properties (>$1million)

Current status of cadastral automation

Half of all parcels are in digital form. DOR provides 50/50 cost sharing to counties that choose to convert paper maps to digital. DOR is responsible for cadastral mapping standards.

Cadastral successes

Since the late 1950s all 36 counties have been maintaining the maps to state standards. Recently funding for this effort has come from a $1 recording fee per document, a fee that will raise $1 million annually.

Barriers to automation

Lack of money for conversion and for staff to maintain the digital maps.

Texas

Appraisal-assessment-property taxation system

The property tax is a local government responsibility, starting with an appraisal district in each county. Texas law allows the Office of the Controller of Public Accounts to advise local governments (and taxpayers), but it cannot intervene in local tax matters.

Current status of cadastral automation

Most rural counties rely on manually drawn maps and notes. Most urban counties use digital tools. Several advanced counties are committed to fully interactive GIS serving cadastral information on the Internet. The are no standards set by the state or appraisal districts of the development, maintenance, or sharing of cadastral datasets. State agencies are working to make original survey information available over the Internet.

Cadastral successes

Good base in the Texas Orthoimagery Program. GIS implementation in many counties, especially the growing ones. Interest in web-based application using parcel information.

Barriers to automation

Cost of conversion, especially given small budgets and conservative view of government in rural Texas. Lack of standards and the authority to impose them.

Utah

Appraisal-assessment-property taxation system

County focused activity. Four major urban counties are in a consortium using Computer Assistance Mass Appraisal (CAMA). Midsize counties are also using CAMA. Smaller counties base value strictly on comparable sales.

Current status of cadastral automation

Populated urban counties all have mapping programs underway. The standard adopted by all County Recorders is to base their maps on the coordinate geometry (COGO) of the document description. Such maps need good survey control and the state's Automated Geographic Reference Center (AGRC) is working in partnership with BLM to provide GCDB data. Rural counties do not have good survey control yet.

Cadastral successes

GCDB is becoming available for approximately 90% of the state. Processes being developed to include local GPS corner data.

Barriers to automation

Limited resources in rural counties. Need to complete the GCDB. Need to adjust parcel data as improved corner location update the GCDB. Need to develop cadastral attribute standards. Checkerboard ownership pattern means different entities competing to properly locate corners.

Washington

Appraisal-assessment-property taxation system

Entirely a county responsibility. Counties collect a real estate excise tax for the state.

Current status of cadastral automation

Ten of the state's 39 counties use GIS; all of these counties are significantly

urbanized. Large cities operate GIS, some independent but using county parcel data and others working with the county in a single system. Many state and county agencies scanning survey and deed documents. Only one state agency using GIS for ownership information.

Cadastral successes

The Washington Cadastral Framework Project is a partnership for sharing data among levels of government and private organizations; data and tools are in place and funds are being sought to strengthen the project. Washington Council of County Surveyors has developed tools for sharing geodetic control point and PLS corner data. All survey maps are submitted to the counties and thence to the Department of Natural Resources; many of the surveys are in digital image format and all are available on a fee basis.

Barriers to automation

Lack of funding and staff to do the work. Cost recovery inhibits sharing. Lack of standards inhibits sharing.

Land Ownership (percent distribution of ownership by state)

	AK[2]	AZ	HI	NE	NM[3]	OR	TX	UT	WA
Tribal/Native	10	27		<1	8	1	<1	5	7
Federal	64	42	8	3	81	50	1	66	29
State	25	13	29	3	11	3	2	8	8
Local govt.	<1	<1	<1	<1		<1	<1	<1	<1
Private	<1	18	62	94		45	96	22	56
Land Area[4] (thousands of square miles)	570	114	6	77	121	96	262	82	67

[2] These are current percentages for Alaska. Entitlements will allow significant increases in native, state, and local government lands.

[3] New Mexico supplied area for tribal, federal, and state only. Percentages are based on a total of that area alone, ignoring local government and private ownership.

[4] *Statistical Abstract of the United States*, 1993.