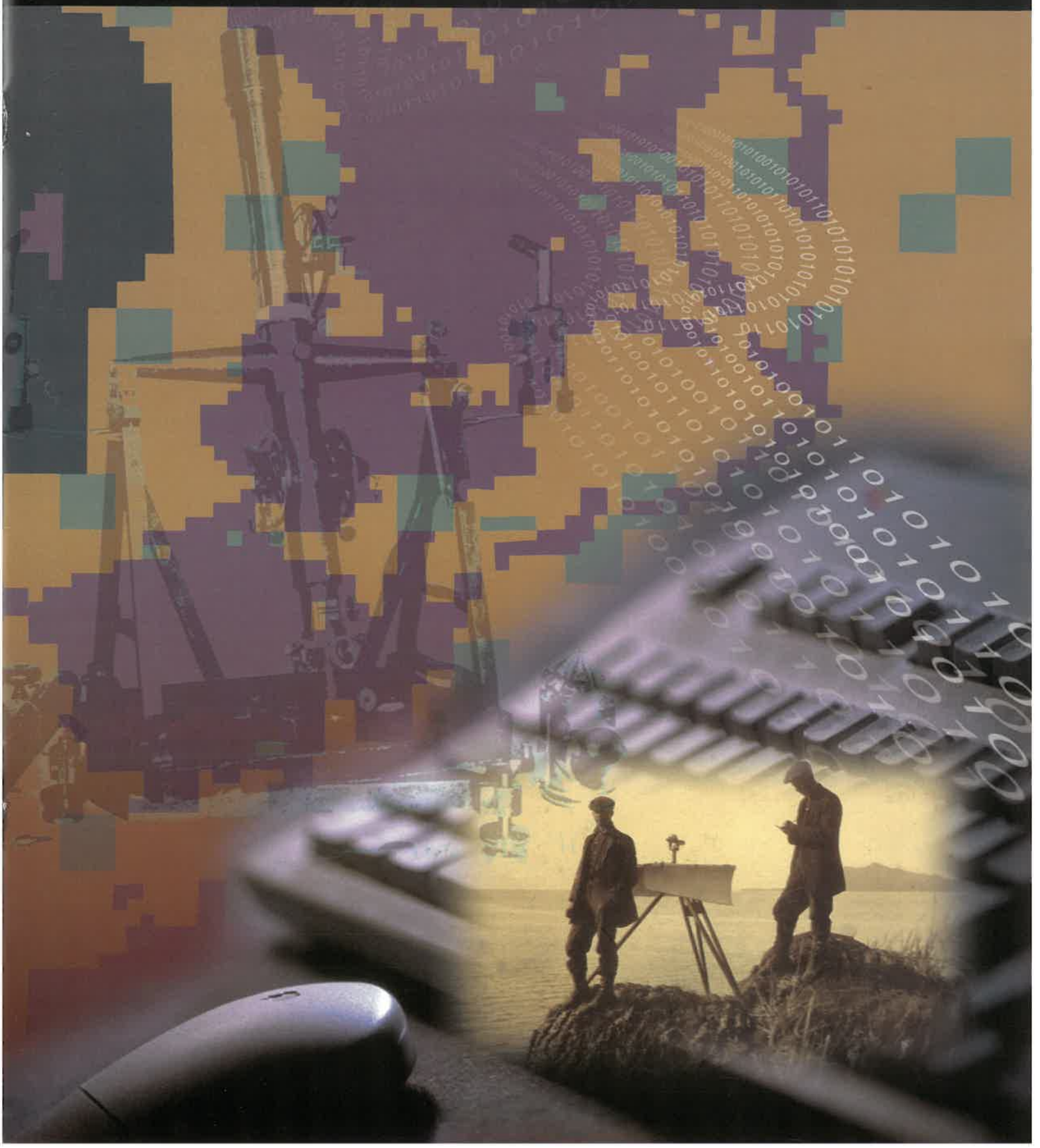
Western Cadastral Data & Policy Report



This report was made possible by funding from the U.S. Bureau of Land Management (BLM), the Federal Emergency Management Agency (FEMA), and the Federal Geographic Data Committee (FGDC). The views expressed herein are a summary of consensus ideas and recommendations made by 250 people attending the Western Cadastral Data and Policy Forum. The recommendations are not official policy of BLM, FEMA, FGDC or the Western Governors' Association or its individual members.

The Western Governors' Association is an independent, nonprofit organization representing the governors of 18 states, American Samoa, Guam and the Northern Mariana Islands. Through their Association, the Western governors identify and address key policy and governance issues in natural resources, the environment, human services, economic development, international relations and public management. Information on the association is available on the Web at www.westgov.org.

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Western Cadastral Data and Policy 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 Cadastral Data and Policy 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 in the 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 help 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

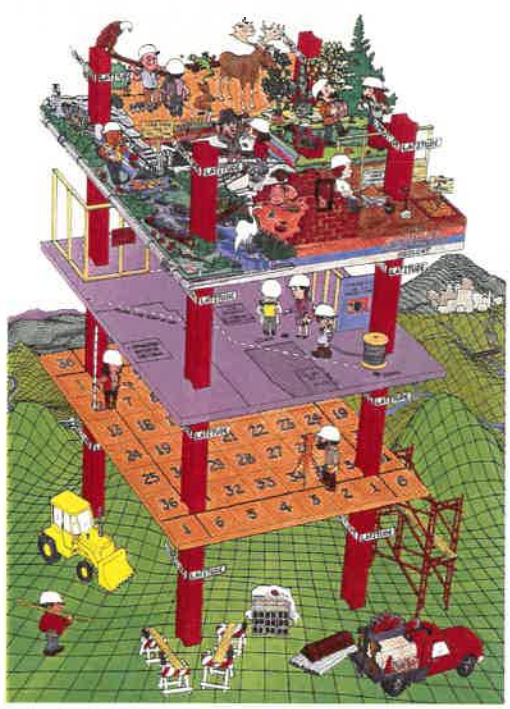
Develop partnerships that maximize state, tribal, federal and local participation and collaboration in important programs for cadastral data collection and maintenance.

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.

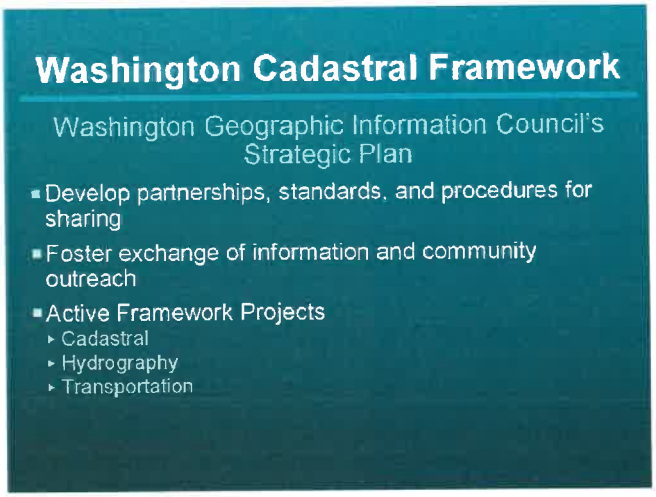
9. Education and Outreach - Policy Makers
10. Education and Outreach - Extended Community
11. Education and Outreach - State Commissions
12. Education and Outreach - Work Flow

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.



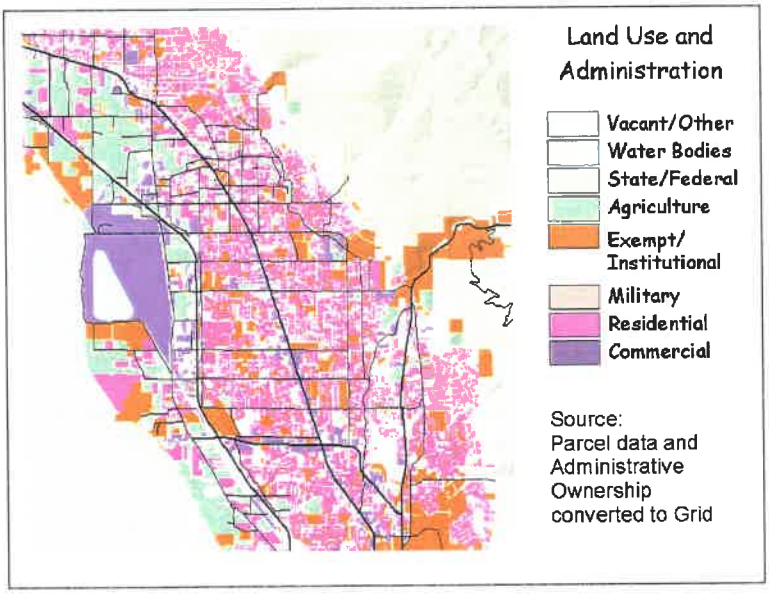
This recommendation requires coordination with the National Geodetic Survey (NGS) for survey control by cadastral agencies and coordinating PLSS corner monumentation among all agencies. Some of the issues that will need to be addressed are monumentation standards, access to monuments and monument information,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

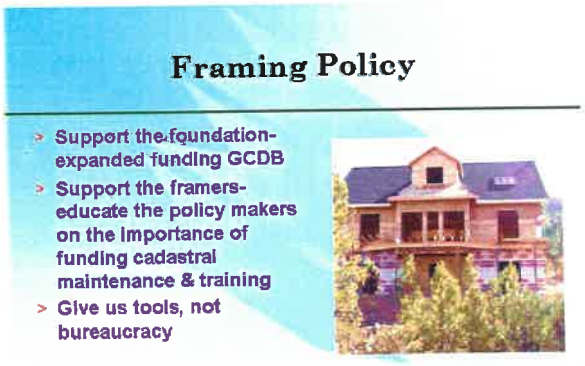
Incorporating communication, data sharing, and integration into organizations is an ongoing and long-term effort. It is necessary to developing shared and common standards to support this recommendation.

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).

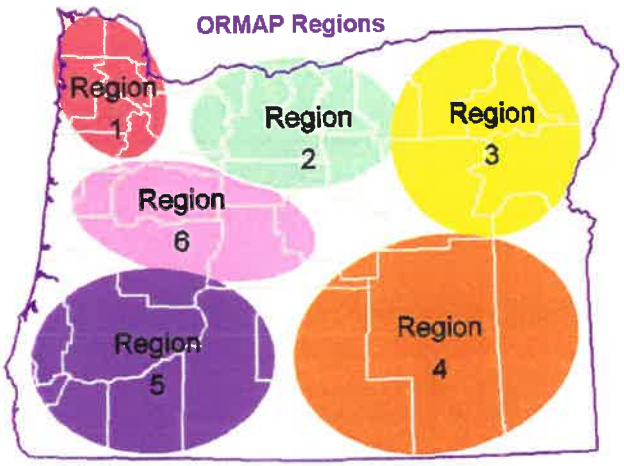
Western Governors urge BLM to complete, enhance, and maintain the GCDB in coordination and partnership with states. Western Governors call on Congress to provide the necessary funding for BLM to undertake this important effort.

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 model structures, defining necessary funding, and providing sample legislation and agreements if 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.

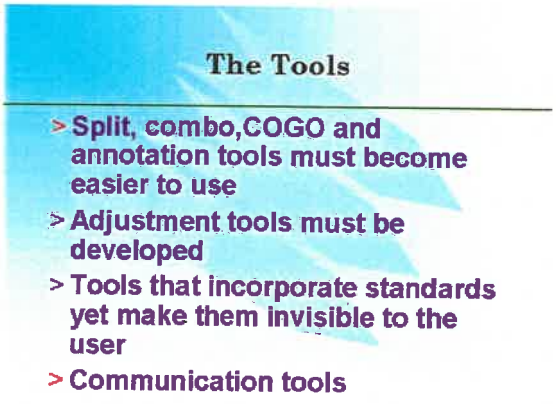
The development of core cadastral data national standards has begun. The BLM has applied for and received a small grant to facilitate the development of core cadastral data for public access and publication. Defining and adopting a core set of cadastral elements is critical to other recommendations and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

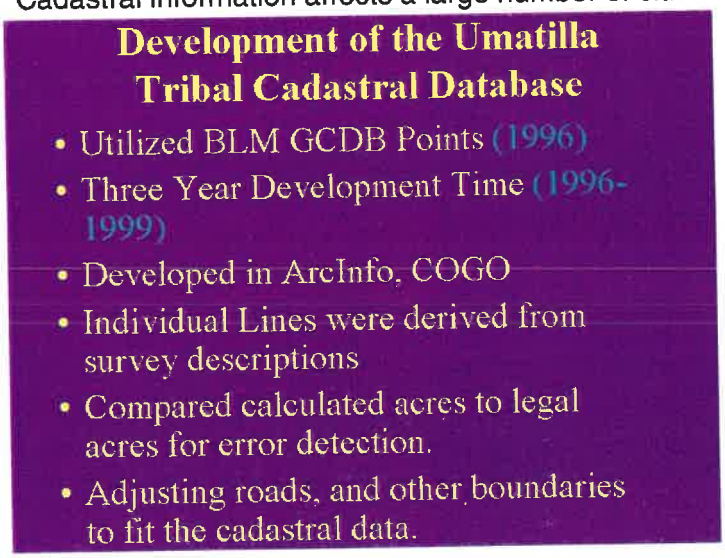
The visions and goals for cadastral information need to be clearly described in a brochure or similar format. The success stories identified and documented in other recommendations will support developing these educational materials.

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.

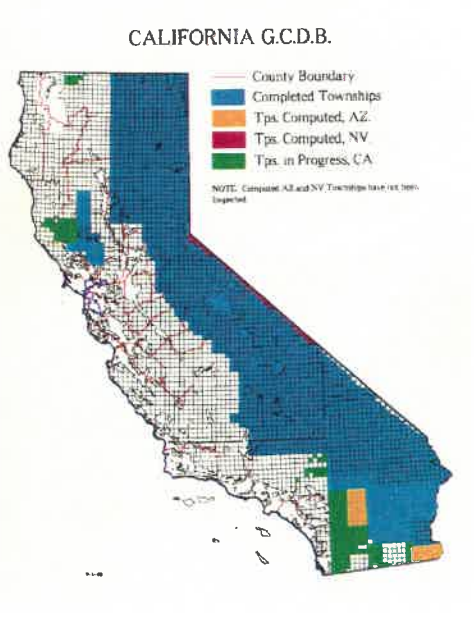
To facilitate this communication, each state and each tribe was provided with a pre-forum survey to get a snap shot of the state of cadastral data in each state and with each tribe. The results of the pre-forum surveys are discussed in Section 4. The survey forms are in Appendix B.

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.

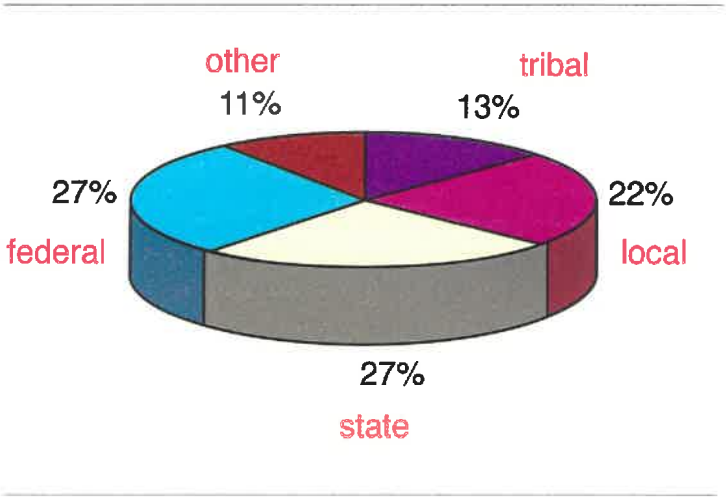


Figure 1 - Forum Participants

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.

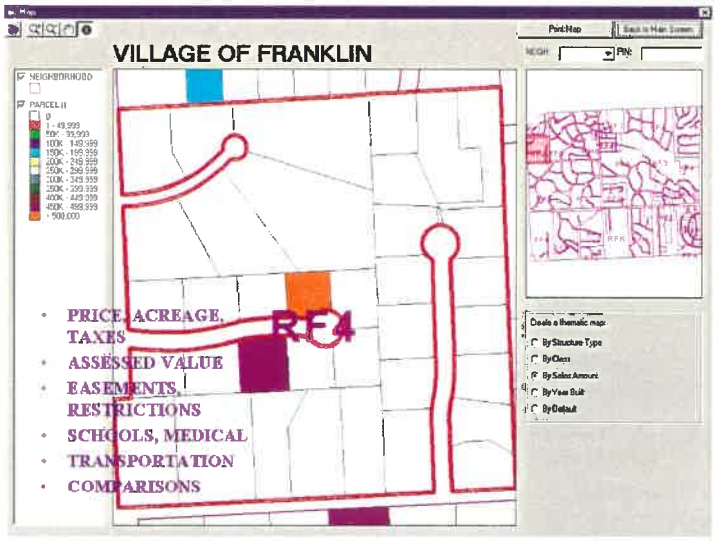
4. Pre-Forum Surveys

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

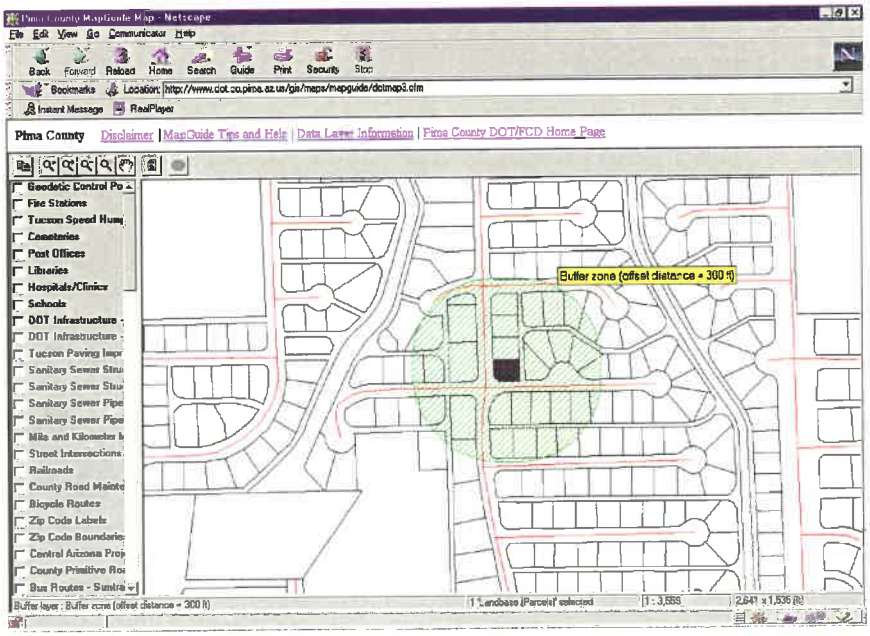
digital form, even though these urban counties represent a small percentage of the total land area in any state.

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
WGA	Western Governors' Association

Appendix B - WGA GCDB Resolution

POLICY RESOLUTION 00 - 005

Public Lands Survey System and Ownership Database

SPONSORS: Governors Leavitt and Geringer

A. BACKGROUND

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.

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