The Interdependence of Geographic Phenomena – a Case for the Holistic Funding For the Montana Spatial Data Infrastructure

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by
The MLIAC Funding Subcommittee

Funding Proposal

Introduction

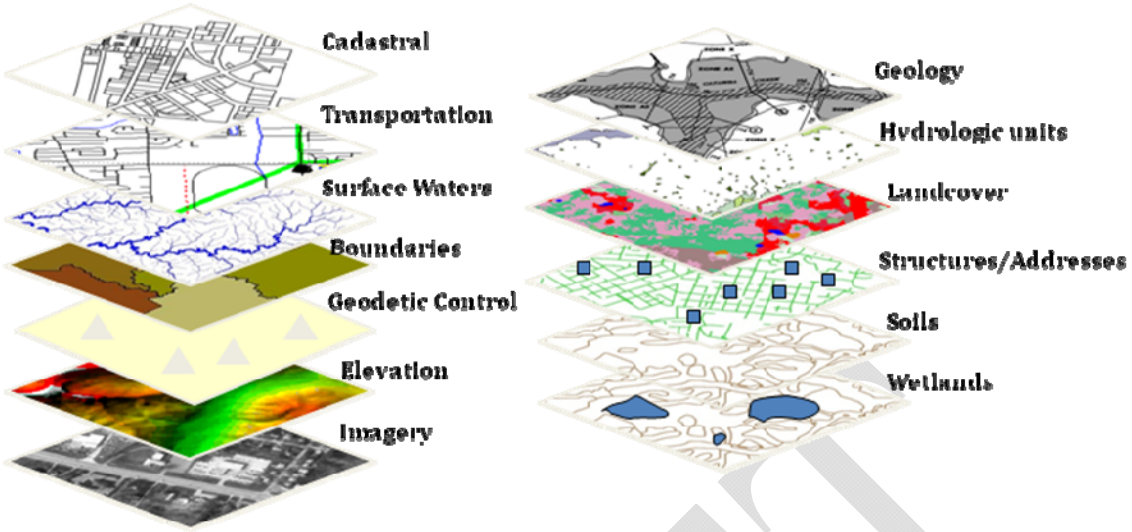
The math is simple. According to the U.S. Office of Management and Budget's Federal Enterprise Architecture framework, 74% of government data is location based. At the state and local level, the number is even higher: 80%, according to several organizations and publications. Montana's geographic information systems (GIS) professionals recognized this as far back as the late 1980s and pioneered the adoption of geospatial data and applications.

Recognizing the value of GIS, in 2005 the Montana State Legislature passed Senate Bill 98, the Montana Land Information Act (MLIA). The purpose of MLIA is to develop standardized methods to collect, maintain and disseminate information in digital formats about the natural and human land characteristics of Montana. MLIA defines the duties of the Council and the Department of Administration (DOA) as it relates to GIS in Montana. DOA is responsible for working with all federal, state, local, private and tribal entities to develop and maintain land information. DOA's major responsibilities include:

- developing an annual Land Information Plan
- establishing grant guidelines
- reviewing, prioritizing and administering all MLIA grants
- serving as a primary point of contact for GIS coordination.

MLIA also established the Montana Land Information Advisory Council (MLIAC). The MLIAC is tasked with providing advice to DOA and other Montana GIS producers and users to accomplish their duties under the statute. MLIAC helped institute Montana's geographic architecture, a blueprint establishing 13 framework layers as the Montana Spatial Data Infrastructure (MSDI). These layers are:

- Cadastral
- Structures and Addresses
- Elevation
- Geodetic Control
- Geology
- Governmental Units
- Hydrography
- Hydrologic Units
- Land Use/Land Cover
- Orthoimagery
- Soils
- Transportation
- Wetlands



Layers are stewarded by different agencies, both state and federal. The stewards work to create the necessary data, to keep the data up-to-date and to develop services and applications which make the data accessible both to internal agency staff, to external partners and to the public. The MSDI layers are in various stages of development. The pace of development is directly tied to funding. Even layers labeled as "complete' are never completely finished. For example, land ownership is continually in flux and therefore, the database must be constantly updated. Orthoimagery must be renewed periodically because roads, structures, and land cover changes with time. There is always the constant user demand for more current and accurate data accessed through new services driven by improved technology. Geographic data and GIS tools have become entrenched in agency business processes and citizen access to information.

Much of the work to enhance and maintain these datasets requires a great deal of coordination with and effort on the part of others agencies and local governments in particular. These local governments create a large amount of data at their level that is aggregated into statewide datasets. Additionally, local governments create and maintain services using both state and local data. The MSDI Cadastral Framework, an aggregation of both state and local data, is estimated to have an annual return on investment of nine million dollars. And while each layer is valuable in its own right, taken together, these data sets can be merged to create information systems and critical services that are much more valuable than the sum of their parts.

An example of one such information system that will more proactively address the changing landscape of the state is currently being developed by Montana Fish, Wildlife and Parks (FWP) and was presented to the Western Governors Association. The Crucial Areas and Connectivity Assessment uses a variety of MSDI and other spatial layers of information to identify and assess Montana's landscape for its biological and recreational importance, including aquatic, terrestrial and habitat values. Within each assessment component, several data types are used, evaluated separately and combined/weighed together for a final aquatic and terrestrial prioritization of the landscape. The companion product includes a series of FWP management recommendations associated with each data layer and a variety of potential risks.

The reGAP ecological classifications (land cover) and the 6th code hydrologic unit codes were the basis for the landscape habitat metrics generated. Background layers essential to the process included: hydrography, , cadastral, hydrography, shaded topography, and administrative boundaries, all MSDI components This is a primary example of one agency relying on the work

of many agencies to produce an application that could not be created without the work on data stewards around the state.

The following table further demonstrates the interdependence of geographic phenomena needed for core societal functions and emphasizes the need for a holistic approach to funding.

	MSDI Layers												
Business Process	Cadastral	Elevation	Geodetic control	Government units	Hydrography	Orthoimagry	Transportation	Structures/Addresses	Geology	Hydrologic units	Land use / land cover	Soils	Wetlands
Property Tax Appraisal	√	√	√	√		√	√	√			√	√	√
Energy Development	√	√	√	√	√	√	√	√	√	√	√	√	√
Conservation and Environmental Protection	√	√			√	√	√		√	√	√	√	√
Determining Water rights	√	√		√	√	√	√			√	√	√	√
Broadband expansion	√	√	√	√	√	√	√	√			√	√	√
Road Construction	√	√	√	√	√	√	√	√	√	√	√	√	√
Other Public Works (Water, Sewer etc.)	√	√	√	√	√	√	√	√	√		√	√	√
Recreation	√	√		√	√	√	√	√	√	√	√	√	√
Health and Social Work	√	√		√	√	√	√	√		√	√	√	√
Citizen Inquiry and Education	√	√	√	√	√	√	√	√	√	√	√	√	√

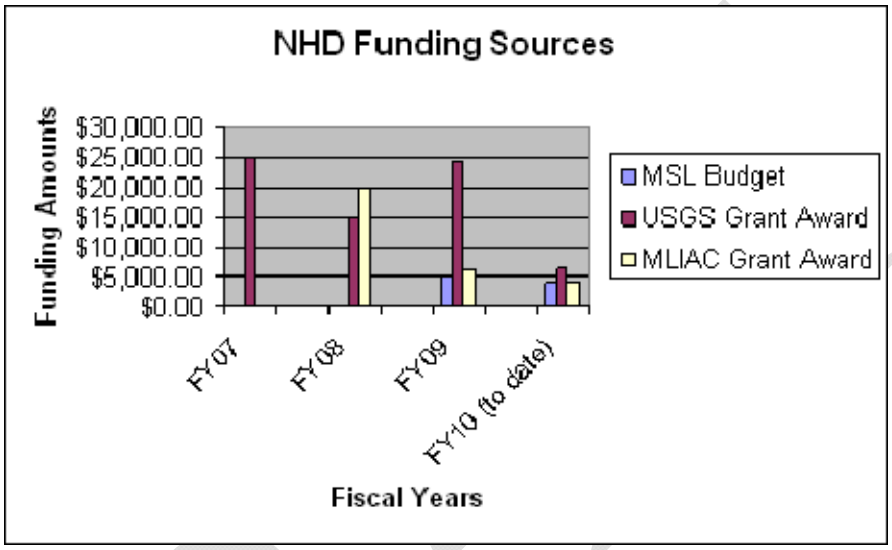
Current MSDI funding model:

MLIA also created a special revenue fund as a source of on-going grant funds to support the development of GIS in Montana. The act designates $1.00 per page from fees collected for recording standard documents to fund GIS work in Montana. $0.25 per page remains with local government and most of the remaining funds are made available by the State as grants to state, local, tribal and non-profit organizations. Since FY 2008 MLIA has funded over $2 million in GIS development statewide while leveraging over $3 million in additional funding. Over $1.1 million or more than 50% of the total funds have been targeted directly to MSDI theme stewards, primarily state and federal agencies, to continue to develop, integrate, enhance and maintain MSDI. An additional $300,000 helped to fund the 2009 purchase of statewide imagery, an overall 3 year re-occurring $600,000 state match to an approximate $2.5 million federal purchase.

Additional sources of MSDI funding consist primarily of federal grants. For example in 2006, the Bureau of Land Management (BLM) provided DOA $900,000 to increase the accuracy of the Cadastral Database, and in 2008 and 2009 the Montana State Library received $20,000 per year from the U. S. Geological Survey for the National Hydrography Framework. MLIA wetlands

grants have often been matched with funding from BLM and the Environmental Protection Agency (EPA). None of these funds are dedicated, stable sources allocated for the purpose of MSDI stewardship. As funding priorities change, stewards are forced to look elsewhere, and as these sources of funding dry up, the collection, enhancement, and worst of all maintenance of this critical data is threatened.

The following chart illustrates the unpredictable nature of funding flowing to the Montana State Library for stewardship of the National Hydrography Dataset (Montana's Hydrography framework layer when soft monies are relied upon to fund long-term stewardship.



Problem statement:

While MLIA funding has been critical to advancing MSDI in Montana, because of the reliance on these data for ongoing, critical public and private sector business practices, reliance on an unstable funding mechanism (i.e., grants) seems foolhardy.

- MSDI, the foundational GIS layers in Montana, requires stable, reliable funding for regular development and maintenance.
- MLIA Grant funds were never intended to fund the ongoing operation and maintenance of MSDI.
- Reliance on grant monies to fund basic GIS stewardship means that fewer funds are available for MSDI one time only enhancement
- Limited grant funds leave significant portions of the MSDI under-funded each year.
- Limited grant funds create competition among theme stewards that can lead to challenges when stewards are asked to work together.

City, county, tribal and other data contributors also incur substantial costs to maintain local data such as cadastral, road centerline, address and boundary data. Although these costs have not been quantified, they certainly exist. The Cadastral Return on Investment (ROI) Study which follows estimated the eight counties who maintain their own cadastral data expend slightly over $300,000 annually to keep those databases current. Any solution that stabilizes funding at a state level must also address the needs of data providers at the local level.

Without an improved funding mode, Montana's ability to provide access to GIS services and data will languish. Knowing the reliance of current governmental and private sector business processes on geographic data, the consequences of allowing GIS in Montana to decay will affect the ability of government agencies to provide core services, businesses to suffer economic impacts, and Montana citizens to access information they need for daily decisions. In order to fully fund the on-going collection, maintenance and disseminate of MSDI data, stewards must have stable, reliable, consistent funding.

The proposal by the MLIA Council is to do just that; develop a funding model that moves $1,275,000 (FY2012) and $1,320,000 (FY2013) from reliance on grants and other unstable/unreliable sources to more constant, dependable sources (i.e., ITSD Rates).

Solution:

It is clearly demonstrated, in the introduction to this document, through the Cadastral ROI study, and the accompanying use cases in Appendix 1, that robust and current digital geographic data is required to support local, tribal, state, federal and private business processes. This proposal seeks to correct problems created by being forced to rely upon uncertain annual funding for state-level MSDI, while strengthening the ability for source data producers at local and tribal levels to feed their data into the aggregated MSDI and produce localized services tailored to their jurisdiction.

In 2005, the Montana Geographic Information Council (MGIC), the forerunner of the statutorily formed MLIAC, recognized during legislative testimony in support of the MLIA, that MLIA funding was only part of the solution to stable funding for MSDI. When the 2011 Legislature meets, six years of funding under an acknowledged partial solution for permanent activities that are not just vital, but required for many governmental, private sector and public business processes, will have passed***. Recognizing difficult economic times, but yet having a statutorily appointed duty to put forth solutions, the MLIAC advises the Montana Department of Administration to move forward with the following approach for stabilizing permanent funding for MSDI***.

1. Recommendation One – Stable Funding for Imagery

The Department of Administration should recommend and advocate for an increase in the State ITSD budget of $200,000 annually, with those funds being deposited annually in an imagery account.

Net Fiscal Impact:

- This would produce the necessary $600,000 every three years needed for the state partnership in the Federal Department of Agriculture's National Aerial Imagery Program (the Federal government pays approximately 85% of the total cost of new statewide imagery acquisition). This would eliminate the need for MLIA funds to be allocated (as $300,000 of FY2010 funds were) towards imagery and for the state to go hat-in-hand to numerous organizations hoping to raise the necessary funds to support imagery acquisition.

- This allocation would free-up MLIA funds previously used for statewide imagery ($300,000 in FY2010) for funding tribal, state and local government projects that could benefit from these one-time only grant dollars.

2. Recommendation Two – ITSD Active Directory Rates, GF & Other ITSD Rates

The FY2010-2011 spending authority for DOA/ITSD is approximately $2.2 million per year, and includes the functional subject areas of statewide imagery, GIS coordination and grant management, MSDI stewardship, ITSD hosting, GIS management (GIO) and the ESRI Enterprise License Agreement (ELA). The recommendation is to add the functional subject areas of data archival (1 FTE) and data publishing (2 FTE), for a total requested FY2012-2013 spending authority of approximately $2.7 million per year. In addition, the request is to fund these appropriations using a mixture of General Fund (GF), ITSD Active Directory (AD) Rates, ELA Rates and MLIA funds.

The recommendation effectively moves current programs (statewide imagery, GIS coordination and MSDI stewardship) or adds new functionality (archival and publishing) funding of $1,275,000 (FY2012) and $1,320,000 (FY2013) from MLIA fees/grants to more reliable ITSD Rates/State budget.

These funds should be directed to the DOA/ITSD, Base Map Service Center (BMSC). Under the direction and supervision of the Montana Geographic Information Officer (GIO), these funds would be used to replace MLIA grant funding presently consumed by State organizations to fund critical MSDI theme layers (e.g., cadastral), GIS general statewide coordination duties other than MLIA grant administration, data hosting and archival costs (e.g., imagery) incurred by ITSD and the Montana State Library (MSL), and to produce web-based services, specifically intended to make the MSDI information more readily available to public and private spatial information consumers.

Net Funding Impact (see Appendix 2):

- This allocation would provide stable, reliable funding for regular development and maintenance of the 13 MSDI data layers. Annual allocations to theme stewards would be based on FY11 estimated grant requests and initially set at a total of $600,000. These funds would be administered by the GIO, with advice from the MLIA Council.
- Approximately $435,000 per year would be used to replace existing ITSD funding for data hosting and to add an allocation for archival costs incurred by the MSL (1 FTE).
- MSDI value added application services development activities are estimated at $200,000 (FY2012) per year and two (2) FTE.
- MLIA GIS coordination funding would be reduced by $140,000 to $100,000.
- This allocation would free-up grant monies to fund GIS projects which enhance and compliment MSDI efforts and could benefit from the one-time only grant funds available through MLIAC.
- The estimated impact on ITSD AD rates would be $9.00/month (FY2012) and $9.29/month (FY2013), an increase of approximately 7% over FY2010-2011 AD rates.

- ITSD ELA rates ($450,000) and collection methodology would remain consistent with the current biennium.

Basing many of the ITSD GIS rates on the AD count was favored because most organizations using the State network have access to geospatial information. For example, most State employees have access to Google Earth, MapQuest, GPS units, NRIS Topofinder, statewide imagery, cadastral information, roads, government unit boundaries, or other GIS applications specifically developed for their business activities (e.g., FWP biologists, DOR appraisers, DEQ environmental specialists, DNR water resource professionals, etc.).

3. Recommendation Three – Revise the MLIA

The Department of Administration should support and carry legislation that would revise the MLIA. The original fiscal note allocating $240,000 to the Department for administration would be reduced to $100,000 (the Department's estimated cost of administering the MLIA grants and support of the MLIA Council, and excluding statewide GIO coordination). The split of county/state funds would change from 25% county to 50% county and 50% state. DOA would still administer an annual grant process, however local, tribal and state project applications that supported MSDI or other projects that supported a federated GIS enterprise, would be prioritized as established by revised administrative rule.

Net Fiscal Impact:

- The MLIA grant fund would be increased by the $140,000 presently going to DOA for statewide GIS coordination.
- This change would ensure that more funds are available at the local level for one-time projects to develop and/or enhance data and services.
- Assuming an annual gross MLIA collection (this has been reduced by the recent recession from the anticipated 1.2 million dollars) of 1 million dollars, $500,000 would retained by local government and $500,000 would be sent to the State. Of the "State share," $100,000 would be allocated to the MLIA Council and the MLIA grant administration support. The remaining $400,000 would be distributed as grants, but since theme stewards would be funded through Recommendation #2 as noted above, the net impact would be to increase the annual amount available for viable, one-time projects that support the use of the MSDI spatial information and a federated approach to GIS.

It is extremely important to note that these recommendations are a package, particularly recommendations # 2 and 3. Changing one without the other would be disastrous to either local governments or MSDI theme layer creation/maintenance support.

Funding proposal justification:

This funding request is supported by the conclusions found in the ROI study, "Montana's Cadastral Layer Business Impact" As is demonstrated in this study, the total ROI for the Cadastral theme can be minimally estimated at $40 million and now annually, at over 9 million. This request can also be justified based on the three use cases documenting core government business processes dependent on MSDI data. One could justifiably and conservatively estimate the return on investment of multiple themes, when used in multiple critical applications, to be far

beyond the annual estimated cadastral ROI of $9 million. If an annual MSDI ROI estimate of 20 million dollars were used, this request for new funding would be less that 10% of that figure.

Conclusion:
A state's digital geographic infrastructure is as important to core state business processes as the Interstate System is to moving commercial goods across the county. A state's ability to compete with other states for development, tourism, safety and citizen amenities depends on these data. While Montana has been a leader in spatial data development, it has done so without the stable funding needed to maintain and improve. Applications are being developed on the data that depend upon the stability of the databases over time. Yet many MSDI efforts rely on year-to-year grant funding to survive. This house of cards scenario puts Montana at risk.

APPENDIX 1 – USE CASES

1. Crucial Areas and Connectivity – FWP
2. Forest and Agricultural Reappraisal – DOR
3. Case 3 – preferably local or private

Appendix 2 – FY2012-2013 GISA Budget Proposal