National Geospatial Advisory Committee Paper
3D Elevation Program Data Acquisition Coordination
December 4, 2015

Background

The Federal Geographic Data Committee (FGDC) provided guidance to the National Geospatial Advisory Committee (NGAC) for 2015, which included the following study question regarding the U.S. Geological Survey's (USGS) 3D Elevation Program (3DEP):

> 3DEP Data Acquisition Coordination - A Broad Agency Announcement (BAA) was announced by the USGS in July 2014 in FedBizOpps as a visible, publicly accessible partnering opportunity for 3DEP data acquisition. Along with the BAA process comes new rules related to Federal contracting about how the USGS can communicate and coordinate partnership opportunities. As a result, Liaison roles have changed. Given the new approach, what advice and/or recommendations does NGAC have for improving coordination and communication on 3DEP partnerships among community stakeholders?

This paper provides the NGAC's response to this study question.

Summary

- **Coordination and Education of Partners and Associations**
  - Continue to promote and engage the traditional geospatial practitioner community
  - Expand engagement and promotion of 3DEP to the non-technical State and local government executive community
- **Support Local Cost-Shares and Data Acquisition Coordination**
  - Enable the USGS National Map Liaisons to be more active in the upfront coordination
  - Five models of successful large scale LiDAR efforts

Study Question 2 - 3DEP Data Acquisition Coordination

The United States Government and the USGS have a long and successful history of developing and utilizing groundbreaking mapping technologies. This began with the USGS topographic map series that has been published since 1884, including the widely known 7.5-minute series maps, and continues today as the US Topo maps. In 1972, the USGS launched Landsat 1 and its 80 meter sensor that forever changed the way scientists study the earth. Then in 2001, the USDA's National Agriculture Imagery Program began to capture 1 meter leaf-on imagery and has provided three and four band imagery for the continental U.S. Finally, in 2014 the USGS

began its 3DEP program to systematically collect enhanced elevation data in the form of high-quality 0.7 meter or better light detection and ranging (LiDAR) data over the conterminous United States, Hawaii, and the U.S. territories, with data acquired over an 8-year period.

Coordination and Education of Partners and Associations

One of the challenges facing 3DEP's BAA process is that it is still not very widely known or understood as a LiDAR partnership funding opportunity at the local government level. Additionally, LiDAR is still a relatively new technology and its day-to-day uses are still largely unknown by most of the non-geospatial community. Even traditional geospatial practitioners can struggle to fully understand the utility of LiDAR to adequately justify the high cost of acquisition and processing to their organizations.

Recommendations:

- Continue to promote and engage stakeholders through expanded in-person outreach such as the 3D Elevation Program Stakeholder meetings, national webinars, and in-person workshops with the traditional geospatial practitioner community. These events have proven to be successful at sharing critical information about the program, objectives, and participation. The meetings also provide opportunities for local geospatial communities to openly discuss future plans for LiDAR acquisitions within regions. Some suggested topics of interest for future webinars include: what to expect when managing a large LiDAR project associated with 3DEP; what hardware, software, training, staff resources, and IT infrastructure are needed to support LiDAR within an entity; and sharing best practices on how to hydrologically enforce 3DEP LiDAR-derived DEMs so that models of water flow across the landscape can correctly route water through culverts and bridges.
- Expand engagement and promotion of 3DEP to the non-technical State and local government executive community including, but not limited to, the national associations of governors, counties, cities, regional councils, CIO's, engineers, assessors, planning, and utilities. We suggest that USGS NGP choose 2-3 organizations, such as NSGIC and NACo, with which to partner for outreach and communication efforts regarding the BAA process. Outreach should focus on justifying data quality requirements, standards, solutions, and benefits of participating in the program. To provide the most impact, outreach efforts should demonstrate uses and value of final products and tools that solve local problems. Target not-for-profit and private companies with nationwide interests as noted in the 2012 Dewberry National Enhanced Elevation Assessment Final Report Appendix D.
- Continue to promote the time savings for procurement of LiDAR using the USGS Geospatial Product and Service Contract (GPSC) and similar cooperative agreements.

- Continue to refine the BAA process schedule to align with the LiDAR spring flight season and continue to improve the application process structure, formatting, and pricing detail to streamline the submission process. One suggested improvement would be to strongly encourage participants to review and use the checklist provided by 3DEP as a tool for feedback to applicants of proposals that were not selected.

Support Local Cost-Shares and Data Acquisition Coordination

Currently, about $50 million is invested annually in LiDAR and interferometric synthetic aperture radar (IfSAR) data by all public agencies, and the U.S. Interagency Elevation Inventory shows that only 6% of the lower 49 States and territories have LiDAR data that meets Quality Level 2 (0.7m) that is required by the USGS. An additional $96 million is needed annually to implement 3DEP. Realizing this level of investment will involve substantial outreach, collaboration, and coordination efforts between not only Federal, State, and local government partners, but also with non-traditional elevation data users from academia, natural resources based organizations, utilities, and private industry.

Recommendations:

- Enable the USGS National Map Liaisons to be more active in outreach efforts and providing information while still adhering to the BAA protocols. This may include more in-person visits to network, cultivate, and maintain long-term relationships with participation in state level geospatial advisory councils, with State GIOs, or with regional government meetings and activities. These groups in turn could provide information on how best to localize the 3DEP message and focus outreach efforts.
- Further refine the 3DEP Public Areas of Interest Project Collector Tool mapping tool with improved project detail to include funding priority and fiscal year targets.

Models of Successful Large Scale LiDAR Efforts

There are a number of successful projects, with diverse funding sources, from which other States might learn. The five listed below are a sampling of these efforts. We suggest that USGS NGP publish 5-7 of these case studies on their BAA website as examples of successful projects.

- Tennessee Statewide LiDAR Program

  The Tennessee Department of Finance and Administration, Office for Information Resources, GIS Services (OIR) began an effort to update their elevation dataset in 2011 when they received funding assistance from the FGDC Cooperative Agreements Program (CAP) to develop a business plan for enhanced elevation. The business plan outlined the need for high-resolution elevation data to more accurately map its terrain to achieve synergy with other updated map layers. The better terrain data would help to protect

people and their future investments in property and land development by reducing the risk of potential damages due to decisions made with low-resolution data. Valuable uses and benefits of enhanced elevation data included: predicting extent and impact of flood events; improving natural resource management and agriculture; discovering and preserving cultural resources; route planning for transportation and utilities; and promoting new skill development through use of modern technologies such as LiDAR. Following a successful 3-county pilot in 2013 that demonstrated the utility of LiDAR based elevation data, OIR was able to expand the project into a $2.7 million 27-county regional flight with funding from the Tennessee Department of Transportation, Tennessee Department of Environment and Conservation, OIR, Hamilton County, and USGS. Future flights are planned with additional funding from the Tennessee Valley Authority, Department of Energy, Department of Agriculture, and local governments with the goal to fly a quarter of the State in alignment with the existing orthophotography program managed currently by Tennessee Department of Transportation.

- Indiana Statewide LiDAR Program

  In 2013, the Indiana Office of Information Technology completed a three-year program to acquire orthophotography and either 1.0 or 1.5 meter LiDAR using funding from state agencies, local governments, and grants. The project involved the acquisition of new LiDAR along with county and academic institution LiDAR contribution and compilation of hydro-enforced breaklines to support inclusion of the dataset in the National Elevation Dataset.

- Iowa Statewide LiDAR Program

  The successful implementation of Iowa's statewide LiDAR project, which utilized a revolving loan fund for water quality, has shown that creative solutions can be achieved to fund major GIS projects that resulted in estimated ROI benefits of $7.5M/yr. In 2008, the Iowa LiDAR Consortium (the Iowa Department of Agriculture and Land Stewardship, Iowa Department of Natural Resources, Iowa Department of Transportation, the USDA NRCS, and the USGS), led by the Iowa Department of Natural Resources, completed a $4 million statewide 1.4 meter LiDAR project. Funding for the project came together quickly to utilize the USGS Geospatial Product and Service Contract. To make this happen, Iowa DNR worked closely with key State agencies to evaluate the value of the proposed LiDAR data based on their current uses of elevation data and gave prospective partners estimates on their rate of return and made them think of additional uses. The acquisition was spread over three years and involved a FEMA-compliant product for 19 counties and a standard project for 80 counties.

- Minnesota Statewide LiDAR Program

  Minnesota began its efforts for a statewide LiDAR program in 2002 with the release of a white paper by the Minnesota Department of Natural Resources (MnDNR) and 24 partners on the development of high-resolution DEMs and a floodplain mapping program. Many of these entities moved forward independently with their own LiDAR acquisition projects with scattered geographic coverage, inconsistent specifications, higher production costs, and data access restrictions. Then in July 2009, the Minnesota Legislature appropriated $8.3 million from the Minnesota Legacy Amendment - Clean Water Fund, which; along with additional investment by several Federal agencies, counties, and cities; helped the MnDNR realize the goal of creating a seamless elevation model by filling in the areas where data either did not exist or was deemed old enough to need replacement.

- North Carolina Statewide LiDAR Program

  North Carolina originally flew a 3.0 meter LiDAR collection from 2000-2005. In 2014 the Geospatial & Technology Management Office, in coordination with the Department of Transportation, USGS, and NRCS, began a new five-year collection of Quality Level 2, 0.7 meter or better LiDAR. In 2016, with support from State and private agricultural, energy, and lumber industry entities, an eight county pilot area collection is planned for high density 20+ points per meter LiDAR.