

# Benefits and Barriers

## Using and Sharing Geospatial Information in the Department of Defense

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In the past decade, the amount of geospatial information—data about where things are located on the earth as contained in digital databases, specialized software applications, Web services, and even hard copy maps—has exploded. Not surprisingly, the use of such information by private and government organizations has also increased exponentially. The Department of Defense (DoD) is no exception and is putting this information to use in a variety of ways, from managing forests, infrastructure, and ranges on military bases to developing war plans. To facilitate the sharing and integration of the rapidly expanding amount of geospatial data, the DoD created a new organization, the Defense Installation Spatial Data Infrastructure (DISDI) office. Many of the benefits of using and sharing this information are obvious, but they are frequently difficult to quantify. DISDI asked the RAND National Defense Research Institute (NDRI) to assist by assessing the effects of developing, using, and sharing installations and environment geospatial data assets, by identifying barriers that inhibit such sharing, and by recommending ways to maximize the benefits. The results of the research appear in *Installation Mapping Enables Many Missions: The Benefits of and Barriers to Sharing Geospatial Data Assets*.

To carry out their assessment, NDRI researchers developed a three-step methodology:

1. Model the flow of information.
2. Apply a set of logic models.
3. Where feasible, quantify the logic models.

In the first step, researchers ascertain what information is used in the process, by whom, and for what purposes. Next, they apply a set of logic models, a straightforward process that diagrams the relation among inputs, activities, outputs, and outcomes. An input might be aerial imagery; an activity might be assessing safety zones, berm

### Abstract

The sharing of installations and environment geospatial information provides the Department of Defense (DoD) both opportunities and challenges. Benefits of access to such information include improved effectiveness resulting in better outcomes and efficiency in the form of reduced costs. Challenges include concern over security issues and technical difficulties in sharing information. Researchers recommend additional policy guidance on data sharing, enhanced DoD coordination with the National Geospatial-Intelligence Agency, development of data standards, and adoption of RAND methodology for assessing effects.

heights, and line of sight for live-fire training; an output might be choosing a safe place to locate a training range to keep small arms fire within the designated firing area; and the outcome would be safer training ranges. In the final step, researchers apply as much quantifiable information as possible to the model. Such information improves the precision of the model and enables a more accurate assessment of outcomes and benefits.

### Using and Sharing Geospatial Data Assets Provides Important Benefits

The research team identified four categories of benefits from using and sharing geospatial data assets: improved efficiency (e.g., time savings, cost avoidance), better effectiveness (improved outcomes), process changes, and other effects on missions. For example, researchers discovered that by using shared geospatial data assets, personnel from Langley Air Force Base were able to save 450–2,600 staff hours annually in just two labor-intensive activities: approving digging permits and processing construction orders.

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Even more impressive was the net present value savings of \$3 billion<sup>1</sup> over eight years that workers at Aberdeen Proving Ground estimated they could save by using and sharing geospatial data assets. Effectiveness benefits include better use of training ranges (such as being able to train longer or use more training space), improved emergency and homeland security planning and response, and better use of construction and maintenance assets.

Extrapolating the benefits obtained at one installation to similar functions across all DoD installations suggests that savings could be substantial. For example, extending the Langley use of geospatial information for granting digging permits and processing construction orders DoD-wide could yield annual savings equivalent to between 50 and 300 full-time personnel (about 100,000 to 600,000 hours per year). Although the calculations are admittedly rough approximations, they do indicate the scale of potential benefits, in this case primarily in workload reduction.

### **What Are the Barriers to Sharing Geospatial Data Assets?**

Even though sharing of geospatial data assets within the DoD has increased significantly, barriers to sharing still exist. In extensive interviews, researchers uncovered a number of these barriers. The primary reluctance to share stems from the concern that terrorists or criminals could use such information. However, much of the information is very general and consists of common knowledge that would be of little added value. Nonetheless, there is a need for clear security policy guidance that delineates what is sensitive and why and provides guidance on how to share sensitive data assets. Proprietary issues also become a concern when the DoD has, for example, bought geospatial datasets from a commercial firm and wishes to share those data with organizations outside the federal government, e.g., state or county governments or their contractors.

Other barriers result from information technology policies and procedures. Different organizations, such as different Services and individual installations, have their own information systems and firewalls, and often the data asset cannot be easily shared between them. In other cases, sharing is limited simply because of a lack of knowledge. Individuals do not know about the information, what it can do, how to get it, or how to use it.

Some barriers arise from communication disconnects between different functional organizations and individual disciplines. For example, both the facilities and environmental staffs on a given installation may be using geospatial installations and environment datasets, but they do not share

or coordinate their use. The different organizations' terminology, interests, and software systems and approaches can also limit sharing. A common example is that many facility engineers use Computer-Aided Drafting and Design systems for their building information but environmental staff members often use Geographic Information System software.

Sometimes, the stewards of data assets are reluctant to share because they do not know whom they are sharing with and how the data assets are to be used. In other cases, data asset sharing is limited simply because there are no policies or contracts in place to determine how it can or will be done. In addition, lack of sufficient development or adoption of common data and technology standards limits sharing. Researchers also found, at all levels, a lack of consistent long-term support for investing in and sharing installations and environment geospatial data assets. Many installations do not fund geospatial data experts, preferring instead to create an additional duty for a staff member. Nor do some installations fund the construction of a geospatial database or tool, or include the funds to keep it current if one is established. There are also risks from sharing undocumented, poor quality, or out-of-date data, which also can limit sharing.

### **Recommendations**

The researchers offered several recommendations for DISDI that ranged from establishing policy to ensuring that data assets are made available for sharing. More specifically, they recommended the following:

- DISDI should collaborate with the National Geospatial-Intelligence Agency (NGA) to provide additional official DoD policy guidance about the need to share installations and environment geospatial data assets, about security issues and how to address them, and about how to share such geospatial data assets; this guidance should include procedures for developing memoranda of understanding and agreement for data sharing.
- DISDI has an important role in coordination and outreach regarding developing installations and environment geospatial data assets and sharing them within the DoD as well as with organizations outside the DoD. It should continue and expand on these efforts inside the DoD, help OSD organizations acquire and use installations and environment geospatial data assets, cultivate a close working partnership with NGA, and expand outreach and coordination outside the DoD.
- DISDI, in partnership with NGA and the Service geospatial information offices, has an important facilitation role in standards, contracting, and quality control processes. It should help create and promote development and adoption of installations and environment geospatial data standards.

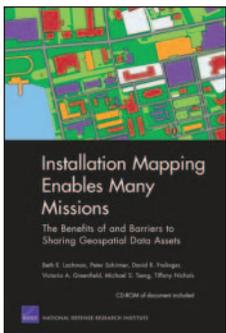
<sup>1</sup> In 1992 dollars.

It is also important that DISDI provide DoD policy and standard contracting language for military contracts that involve digital geospatial data and analysis.

- Given limited resources, DISDI needs to manage its investments wisely. It should
  - apply the NDRI methodology developed for assessing effects, i.e., use information flow models, logical models, and, when feasible, cost-benefit analysis and other quantifying methods
  - establish processes for managing future investments by applying the Government Accountability Office's

Information Technology Investment Management maturity model; long-term improvements in processes, policies, and organizational relationships can be planned systematically using this model.

Implementing the assessment methodology suggested in this research will help increase the development and sharing of installations and environment geospatial data assets and will continue to increase and accrue significant financial and operational benefits, helping to improve mission performance and thus saving lives and dollars. ■



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This research brief describes work done for the RAND National Defense Research Institute documented in *Installation Mapping Enables Many Missions: The Benefits of and Barriers to Sharing Geospatial Data Assets*, by Beth E. Lachman, Peter Schirmer, David R. Frelinger, Victoria A. Greenfield, Michael S. Tseng, and Tiffany Nichols, MG-552-OSD, 2007, 330 pp., \$40.00, ISBN: 978-0-8330-4034-3 (available at <http://www.rand.org/pubs/monographs/MG552/>). The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors. **RAND**® is a registered trademark.

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