



Evaluation of Geospatial Data Act Implementation High Level Summary

A Report of the National Geospatial Advisory Committee
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Table of Contents

1.0 Introduction	3
2.0 Aspirational Outcomes	3
3.0 Progress Towards the Aspirational Outcomes	5
4.0 Need for Improved NSDI Governance	5
5.0 Need for Improved Data Management	8
6.0 Need for Reporting Improvements	10
6.1 Summary and Next Steps.....	11
Acknowledgments:	11

1.0 Introduction

October 2022 marked the 4-year anniversary of the enactment of the Geospatial Data Act (GDA). Progress has been made in terms of implementation of the specific statutory requirements of the law. Several activities are intended to measure implementation of the statutory requirements. The National Geospatial Advisory Committee (NGAC) reviewed the implementation of the GDA by the geospatial community to date with a focus on evaluating the aspirational outcomes from the GDA, as opposed to an evaluation of progress by each covered Federal agency toward the specific GDA requirements. To accomplish this additional evaluation approach, the NGAC identified a discrete number of aspirational outcomes of the GDA and reviewed progress toward accomplishing those outcomes.

To develop this paper, the NGAC established a GDA Implementation Subcommittee to review the implementation of the GDA since 2018, assess progress toward the identified aspirational outcomes of the GDA, and develop recommendations for improvement. The NGAC, to meet other GDA directives, has previously established a GDA Reporting Subcommittee to gather and aggregate comments from NGAC members on the Federal Geographic Data Committee's (FGDC) annual summaries of the performance of the covered agencies and lead covered agencies toward meeting GDA requirements. The GDA Reporting Subcommittee develops annual reports that are included by statute in the biennial FGDC GDA Report to Congress. The latest NGAC report for FY 2022 is located at [<https://www.fgdc.gov/ngac/meetings/april-2023/ngac-paper-ngac-comments-on-fy-2022-fgdc-summary-of-gda-annual-report-april-2023.pdf>]. The GDA Implementation Subcommittee was formed to evaluate whether the GDA implementation is achieving desired outcomes, rather than simply determining if the specific requirements of the GDA are being met. This report is the first phase of the subcommittee's effort.

2.0 Aspirational Outcomes

While the GDA does not specify intended outcomes of the legislation, to some extent the intentions behind the legislation are clear. In the Findings, Sec. 751, the statute says **open and publicly available data** is essential and lays out the benefits of **greater access and use** of Government data. This intent is amplified in Sec. 755, including that **free and open access** for the public to geospatial data is an NSDI goal. The NGAC believes the FAIR data principles (Findable, Accessible, Interoperable, and Reusable) represent well the intent of the GDA regarding geospatial data.

In Sec. 753, the statute indicates that the FGDC is the "lead entity in the executive branch for the development, implementation, and review of policies, practices, and standards relating to geospatial data". The statute further indicates that the FGDC will promote **cooperation and coordination among all stakeholders**, which it identifies as Federal agencies, State, tribal, and local governments, institutions of higher education, and the private sector in collecting, producing, sharing, and using geospatial data, and the implementation of the NSDI. This is the

first of four instances where such cross-sector partnerships are called out in service of shared use and management of geospatial data.

In Sec. 752, the National Spatial Data Infrastructure is defined as “the technology, policies, criteria, standards, and employees necessary to promote geospatial data sharing throughout the Federal Government, State, tribal, and local governments, and the private sector (including nonprofit organizations and institutions of higher education)”. The geospatial infrastructure is often erroneously thought of simply as geospatial data, even though the definition in the Act explicitly includes all the elements to acquire and use the data. In order to make the data findable, accessible, interoperable, reusable (FAIR) and to maintain it over time in a way that fully realizes the value of the infrastructure investment, the other aspects of the infrastructure identified in the GDA must be taken into account.

In Sec. 755, the statute specifies that geospatial data from multiple sources is to be **available and easily integrated via the NSDI** to enhance the understanding of the physical and cultural world. This section also indicates that Federal information is to be **interoperable and easily shared** to enable resources from agencies to be fully leveraged. And Sec. 755 says that a goal of the **NSDI is to support the Global Spatial Data Infrastructure**. Further text in Sec. 756 and Sec. 757 emphasizes data standards development and compliance, which will further ensure that geospatial data is interoperable and easily shared. Commitment to this enables leveraging of resources across agencies and organizations.

After a review of the GDA language and discussions of the likely intent of the legislation, the NGAC identified the following aspirational outcomes of the GDA upon which to base its evaluation of GDA implementation:

1. **Make NSDI data available to all stakeholders, including Congress, to improve and support policy making and operations, respond to national priorities and circumstances, and support the national economy.** The return on the Federal investment in the NSDI must be realized in a substantial way to justify continued investment, principally through improved Federal agency operations. Similarly, the return on investment for all stakeholders, including Congress, must be substantially realized to justify continued investment, meaning that improvements to operations and policy making by all stakeholders must be shown. As such, the technology, policies, and standards to promote geospatial data sharing must be recognized as a key part of the necessary investment.
2. **Develop and foster meaningful partnerships with all NSDI stakeholders.** Specific stakeholder communities are identified several times in the GDA. Partnerships among and between all stakeholder communities are intended to increase collaboration in development and maintenance of the NSDI across the entire country. These partnerships must be mutually beneficial to all parties involved. Related to this outcome and the first noted above, FGDC could work with the stakeholder community to develop examples (climate, infrastructure, business opportunities, government programs, etc.) that show the value of ready-for-use data and demonstrate the value of greater collaboration across agencies and among national geospatial stakeholders.

3. **Complete and maintain NSDI data content nationwide.** The usefulness of the NSDI is severely diminished if the content is not complete and maintained nationwide. It is critical going forward to understand how to define and measure completeness of NSDI data content. It is likely that the content does not need to be of the same accuracy nationwide for all data sets. It is also likely that the periodicity (temporal timeframe) of all data sets nationwide does not need to be the same.
4. **Improve management of NSDI data.** NSDI data is derived from multiple sources that include all stakeholders identified in the GDA. If the NSDI data is to be properly managed, it must be collaboratively managed.
5. **Improve accessibility and availability of NSDI data.** This means the FAIR principles must be realized to optimize the openness and reuse of the NSDI data. In combination with a focus on standardization, maintenance and interoperability, FAIR principles will significantly improve the usefulness of the NSDI.
6. **Ensure NSDI compliance to established data standards.** This is called out directly in the GDA now and will result in reusability of the NSDI data, following the FAIR data principles. Content and exchange standards and criteria should be developed and maintained for each NSDI data set.

The outcomes above would lead to improved impact, such as accelerating planning, response, and recovery to better mitigate risk and reinforce resilience to disaster; strengthening the national and local economies; cost savings in national, State, and local infrastructure projects; equitable and consistent provision of government services to all residents, etc.

3.0 Progress Towards the Aspirational Outcomes

The Federal geospatial community and its partners and stakeholders, particularly the NGAC, continue to learn about the progress made and the impacts caused by the GDA over the past four years. In using their expansive sector experience, members of the NGAC conducted a preliminary GDA implementation assessment based on these aspirational outcomes and identified three main categories of impediment to continued advancement: governance, data management, and reporting. The NGAC proposes eight recommendations to make progress toward achieving the legislation's expected aspirational outcomes, to more effectively implement the GDA directives, and to support any agency in its geospatial responsibilities to all stakeholders. These barriers and proposed recommendations for improvement are explored more deeply in the following sections.

4.0 Need for Improved NSDI Governance

One of the great challenges of the 21st century is the crisis caused by the increase in frequency, intensity, and impact of weather-related disasters. Last year in the U.S. alone, twenty \$1-billion natural disasters led to at least 688 deaths and cost approximately \$145 billion in damage. This is just the cost of the most extreme events. There have been hundreds if not thousands of

smaller events. More alarming is that this is the seventh consecutive year in which ten or more separate \$1-billion disasters occurred in the U.S.¹

A number of causes are behind this disturbing trend, including increased exposure (more construction in “at-risk” areas), greater vulnerability (how much damage a hazard can cause at specific locations), and the fact that climate change is supercharging the frequency and intensity of extreme events.² In many States, emergency managers and government officials never truly recover from one disaster before being hit with another. This was certainly the case in 2020 when, amidst the COVID pandemic, communities around the U.S. confronted a record number of extreme weather events. The new reality is more affected communities and more upended lives, hitting those with fewer resources the hardest.

A key to addressing these challenges is to have an accessible, accurate, up-to-date NSDI to provide authoritative information to the public while improving decision making from the local to national level. While the U.S. has made strides since the inception of the NSDI concept in the 1990s and the enactment of the GDA, national leadership has yet to make the critical commitment to fully develop the NSDI. As a result, communities and community leaders across the country still suffer from a lack of the data, tools, and capabilities needed to better understand their risks and vulnerabilities, to identify the most effective resilience strategies, and to respond rapidly and reliably to unpredicted events. In summary, geospatial data providers and users need a more encompassing national framework for overall coordination of policies, data, technologies, and resources necessary to support geospatial data sharing, its interdisciplinary integration with other sources, and its successful application to the obvious need. Such action will ensure implementation of consistent nationwide data coverage and capabilities to meet our Nation's growing challenges, not only the drastic increase in weather-related disasters but the many other problems faced globally.³

While progress toward implementing the NSDI nationwide continues, government efforts to develop a national, consistent spatial data infrastructure remains a significant challenge. **The current vision and directive for the NSDI, as defined in the NSDI Strategic Plan, is focused predominantly on the creation and sharing of data, but an increased emphasis on the application of shared data toward solutions should be included in the revised version of the Plan.** A lot of work takes place every day at all levels of government to develop and use data aimed at addressing our shared needs, including creation of community resilience and

¹ NOAA. 2020 U.S. billion-dollar weather and climate disasters in historical context | NOAA Climate.gov. NOAA.gov. Published 2021. Accessed December 30, 2021. <https://www.climate.gov/disasters2020>

² <https://www.edf.org/climate/how-climate-change-makes-hurricanes-more-destructive?gclsrc=ds&gclsrc=ds>

³ The United Nations Global Geospatial Information Management Committee of Experts, representing UN member nations, builds on SDI concepts - many of which originated in the US - by encouraging alignment to an Integrated Geospatial Information Framework (IGIF) to achieve globally compatible national level geospatial information management policies and programs. <http://ggim.un.org>

mitigation of disasters, urban planning, digital agriculture, water management, invasive species control, homelessness, food insecurity, etc., but the significant and immediate challenge of having consistent local to national geospatial data coverage continues to be an elusive and unrealized target.

The 3D Elevation Program led by USGS is one of several examples of the success of the Federal government's coordination initiated under Presidential Executive Order 12906 and legislatively reinforced in the GDA. This program unites Federal, State, local, and Tribal government, and the private sector in advancing a nationwide, detailed elevation model of critical importance to addressing issues such as flooding and landslides, with a host of other potential benefits. The success of this program is dependent upon cooperative resourcing among the partners/users, with well-supported Federal leadership. Another good example comes from the Census Bureau which, through its annual engagement with all levels of government, collects changes to legal boundaries so that statistics collected each year accurately reflect the state of the people and economy.

Meanwhile, much other spatial data remain scattered and critical gaps in data coverage go unfulfilled in many areas of the nation. In some cases, the data is misaligned and can't answer the pressing questions we have to solve. Common operating pictures are left fragmented, incomplete, and overlapping in places. Today, it often takes longer than necessary to acquire and align data on an as-needed basis, which costs valuable time and money, not to mention lives. Thus, even though authoritative data providers are everywhere — across government and private sectors — these data authorities are often not working together coherently and collaboratively toward a common objective.

To optimize a shared, next-generation NSDI, substantially improved *national and international* organizational structures with collaborative agreements, integrated infrastructure for collection, access and distribution, and governance with designated cooperative leadership are needed to facilitate greater collaboration and coordination, with all sectors having representation in decision making to create a trusted data and technology environment. These structures must be designed to be persistent as a unified, connected whole rather than overly reliant on individual, sometimes-siloed parts.

Through the efforts of the FGDC and its stakeholders, and as outlined in the GDA, a set of National Geospatial Data Assets (NGDAs) commonly needed across a multitude of use cases has been identified. These foundational, or "framework," data can be maintained across all levels of government and the private sector, where maintenance responsibility is dictated by the type and resolution of data, collection methods, jurisdictional authority, and activities that trigger data updates, such as land ownership transactions. However, the process for identifying NGDAs resulted in a number of data sets that are not truly foundational and cannot be maintained across all stakeholders. Many of the currently identified NGDAs are not needed across all stakeholders and lack a multitude of use cases.

The current federally led NSDI governance and coordination process still does not reflect the full breadth of partners and stakeholder groups necessary to achieve a truly national SDI. Federal

agencies and key stakeholders representing regional, Tribal, State, local and private sector interests participate in NSDI governance under oversight by the FGDC. They are – in many cases – producers of critically important data that is aggregated to the national level by the Federal government and private sector. Too often, only the Federal government has a voting position on decisions made about such things as retention, integration into a larger data set, distribution, evaluation, standardization, etc. Non-Federal government stakeholders participate in an advisory capacity on the NGAC, as noted earlier. Still other stakeholder groups that stand to benefit from and contribute to the NSDI are not yet fully represented in the current Federal advisory process.

Well-functioning SDIs at local, regional, and State levels are too often based on fragile arrangements, reliant on individual champions rather than institutionalized processes. When leadership changes, geospatial coordination can deteriorate. New collaborative, shared SDI structures have potential to build upon and fundamentally improve the way government, businesses and nonprofits operate in challenging geopolitical and geo-economic environments. The efforts of government agencies at all levels in conjunction with the FGDC and its stakeholders to advance the NSDI have had measurable success toward achieving its goals. The GDA serves to further stimulate forward momentum. However, establishing consistent nationwide data coverage and equitable access to technical capability and capacity is a far reach. The work-to-date provides the foundation on which to build and expand to a more inclusive, multi-sector, national governance and coordination approach. Improved collaboration will advance the NSDI through significant expansion of stakeholder representation, engagement, coordination, and resource commitment.

Recommendations

1. The FGDC should participate in ongoing efforts to design a national organizational framework that will facilitate greater collaboration and coordination on the NSDI. All stakeholders would be represented in the design process and in the national organizational framework. The design process should be informed by the results of previous FGDC NSDI governance studies and activities.
2. The FGDC should re-examine the process for identifying NGDAs. NGAC recommends a tiered approach that would identify NGDAs based on priority, scope, and value of the data.

5.0 Need for Improved Data Management

The geospatial ecosystem has evolved considerably in the last five years. No one can deny the explosion of data from the perspective of volume, variety, velocity, and veracity of the national geospatial data holdings. Additionally, the recognition of the unique benefits of geospatial data and its uptake in creating value for its originators and users has significantly grown. There has been an increasing focus on making Federal data open and equitably accessible through legislation including the Geospatial Data Act and the Evidenced-Based Policymaking Act, both of which were enacted in 2018. The separation and specialization of general data management best practices from geospatial data management best practices requires review. Deliberate efforts should be made by the geospatial and standard data management communities to align

and share best practices for standard data governance and management functions, while at the same time highlighting the unique aspects and requirements of geospatial data management where necessary. The geospatial community should demonstrate leadership where its expertise exists – geospatial standards, technologies, and methodologies – and educate the broader data management community on the integration opportunities and benefits of geospatial data and programs with other data types. It would benefit the geospatial data management community to become more closely aligned with the overall data management community to share limited resources, highlight common data management approaches and seek shared solutions for shared requirements (e.g., metadata and catalog standards). A positive example of this type of integration is the inclusion of an Ex Officio member from the Federal Geographic Data Committee on the Federal Chief Data Officers (CDO) Council to ensure collaboration on areas of mutual interest.

To achieve the maximum return on investment and impact from U.S. Federal geospatial programs, including the creation of value from derivative uses of geospatial data, the data and services must be easily accessible to all users. This can be accomplished by complying with the established data management principles of Findable, Accessible, Interoperable, and Reusable (FAIR). Following these principles allows data users to proceed straightforwardly from raw data discovery to analysis-ready data to decision-ready information in a reproducible, trusted fashion. This kind of routine is critical in emergency situations where data needs to be discovered, trusted, integrated, analyzed, visualized, and shared usually with little notice—to save lives, to preserve the environment, and to expend money wisely. FAIR data and services must be attentively embedded in a reliable and well-resourced NSDI that can be leveraged by any entity from any sector, at the local, regional, national, or global scale.

Recommendations

3. FGDC member agencies should define and agree on comprehensive best practices and capabilities required to establish, enable, and sustain mature data governance and management programs for geospatial data.
4. FGDC member agencies should comply with all applicable international, national, sector, and voluntary standards and best practices for making geospatial data, information, and assets Findable, Accessible, Interoperable, and Reusable (FAIR), to ensure maximum use and value from agency geospatial programs, and work with the rest of the community to develop and advance relevant standards, specifications, community standards, profiles, good practices, and de facto standards.
5. NGAC and FGDC leadership should institute a comprehensive review and evaluation of the business case and existing governance and management practices of the GeoPlatform to ensure alignment with GDA requirements and benefit to the national geospatial community of users and the larger user community dependent on geospatial information.

6.0 Need for Reporting Improvements

In 2020, the NGAC recommended techniques to streamline the reporting process required for Federal agencies so that focused, efficient, and consistent reporting is ensured across government.

Steps were taken that incorporated new reporting tools and improved reporting processes that made it easier and took less time for agencies to comply with the reporting requirements, but not all the NGAC recommendations were fully realized. There have been some improvements over time since the GDA was implemented, partly based on mandated reporting and resulting recognition of the need for changes. While the FGDC and the Office of Management and Budget have engaged on the need for adequate resources to perform the necessary reporting directives specified in the GDA, specific steps in providing resources have not yet been identified, pursued, or fulfilled.

The GDA levies a progress-reporting responsibility on the participating agencies but provides little guidance except for the reporting intervals. The FGDC consolidates and summarizes those reports. From the outset, the FGDC recognized the need to facilitate a streamlined and, to the extent possible, standardized approach to that reporting process. But the outcome of such progress reporting is not simply to recognize progress or lack of progress. The outcome should be to improve various aspects of the NSDI (technology, data, policies, funding, people) that will benefit the Nation. As noted earlier, governance and data management improvements are essential to realize the benefits of the NSDI. Reporting on NSDI progress has led to the need for governance and data management improvements.

Geospatial data, used by any agency, may or may not be explicit in the mission of that agency. As a result, any likely investment of budgeted resources may not be sufficiently understood since the agency may discount its benefits and ignore making a shared investment commitment. Greater collaboration across agencies, as well as collaboration between and among the national geospatial stakeholders (Tribal, Federal, State, local, private, academic, etc.) is needed. The challenge is how to make the case that is understood and compelling for action. Having geospatial and geospatially referenced data that supports ready-for-use services, applications, etc., is one way to make this case: show what is needed and the deficiencies preventing implementation.

Recommendations

6. The FGDC should work with Congress to modify the GDA reporting requirements to include criteria for collaboration, governance, benefits, and outcomes, shifting the focus from reporting about general process-oriented compliance to an outcome-oriented reporting process that identifies and encourages collaboration among geospatial data providers, data managers, disseminators, and users of geospatial data. This kind of reporting would require explaining how an agency has coordinated with non-Federal entities, with the NGDA elevation theme annual reports used as an example.

7. The FGDC should require agencies to conduct full baseline reports every 2 years, with any change to particular datasets reported annually, working with Congress to modify the GDA for this purpose if necessary. Significant changes by an agency in collecting, managing, and disseminating geospatial information rarely occurs during a single reporting period. Establishing a baseline often reflects a similar state of progress with negligible changes from year to year. Having agencies report on annual changes within a timeframe that the agency specifies for particular data sets and activities before requiring a subsequent baseline full report adds to efficiency in reporting.
8. The FGDC should work with Congress to change GDA requirements to have each respective Inspector General conduct program evaluations of an agency's performance every two years rather than full audits. Full audits should be only done every four years, not every two years as currently required. While external reviews of geospatial data responsibility of an agency are beneficial, the extent to which the review occurs will have an impact on limited agency resources. This change will meet the intent of external reviews while potentially reducing resource requirements for both the agency and its Inspector General's Office.

6.1 Summary and Next Steps

Through this evaluation process, the subcommittee recognized that to fully understand the impacts of the GDA, further exploration would be beneficial. The NGAC will undertake a more in-depth review of GDA implementation, again with a focus on outcomes, in the coming year to include an evaluation of NGAC's role as authorized in the GDA.

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