

U.S. Department of Transportation

GIS Strategic Plan 2022-2024

Introduction

The U.S. Department of Transportation (DOT) is pleased to release its second Geographic Information Systems (GIS) Strategic Plan and Implementation Plan. This plan updates and replaces the first (2017-2020) US DOT GIS Strategic Plan. It aligns with the 2020 National Spatial Data Infrastructure (NSDI) Strategic Plan as well as DOT's FY2022-2026 Strategic Plan. This plan also serves as DOT's "strategy for advancing geographic information and related geospatial data and activities appropriate to the mission of the covered agency" as required by Section 759 of the Geospatial Data Act of 2018.

DOT's mission is to deliver the world's leading transportation system, serving the American people and economy through the safe, efficient, sustainable, and equitable movement of people and goods. This plan examines the current state of GIS at the Department and defines the strategies we will implement to grow and improve our geospatial program. A diverse, multi-agency group with support from both executive leadership and individual employees developed the Plan. We are committed to ensuring that the GIS Strategic Plan and Implementation Plan serve as a foundation for continued innovation and collaboration in our geospatial program. We welcome your comments and encourage you to send feedback to OCIO@dot.gov.

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1. Executive Summary

The Geospatial Data Act of 2018 (GDA) became law on October 5, 2018. It was a component of the FAA Reauthorization Act of 2018 (P.L. 115-254, Subtitle F). The GDA reflects growing recognition of the essential role of geospatial data and technology in understanding and managing our world. The GDA requires Federal agencies to formalize governance processes related to geospatial data, provides policy and requirements to empower the use of geospatial data and technology, and requires Federal agencies to cooperate between the public and private sector.¹

This Geographic Information Systems (GIS) Strategic Plan builds on and replaces the 2017-2020 GIS Strategic Plan. This plan sets out our goals for 2022-2024 and aligns with the 2020 National Spatial Data Infrastructure (NSDI) Strategic Plan, as well as the U.S. Department of Transportation's (DOT) FY2022-2026 Strategic Plan.

DOT creates, consumes, curates, analyzes, and disseminates geospatial data. We use this data and analysis to support field staff, assess risk, allocate resources, respond to accidents and natural disasters, strengthen policy analysis, perform research and development, plan safety initiatives (including at the state and local level) and raise public awareness. Our vision for GIS at DOT is:

DOT's innovative approach to transportation GIS is recognized worldwide. All DOT-owned authoritative geospatial data is accessible and shareable through a shared portal (https://maps.dot.gov/portal/home/). Spatial data and analytics support DOT's mission goals, data strategy, and leadership decisions.

Our 2022-2024 strategic goals for geospatial information are:

- Implement requirements from the GDA (and related statutes and policies) and monitor Operating Administration (OA)² compliance.
- Advance the Transportation Theme by maturing DOT geospatial data management practices, expanding DOT data sources, formalizing data acquisition, and ensuring the DOT National Geospatial Data Assets (NGDA) are findable, accessible, interoperable, and reusable.
- Grow DOT's GIS shared services by expanding available data and applications, enabling interoperability, and optimizing performance.
- Enable and promote collaborative governance and partnerships internally, across the Federal geospatial community, and with external stakeholders to meet DOT mission goals.
- Realize DOT's potential as a GIS leader and innovator by cultivating a 21st century geospatial workforce and adequately resourcing our geospatial program.

The GMO will oversee implementation of strategic goals and monitor OA compliance with the GDA. All applicable OAs will report on progress towards achieving the goals and will work to foster collaborative partnerships internally, across the Federal geospatial community, and with external stakeholders and partners.

¹ Paraphrased from the FGDC's GDA Fact Sheet, May 2019.

² In this plan, all components are referred to as OAs.

2. Introduction

In 2020, the Federal government confronted the unprecedented challenge of maintaining public safety, operations, and services during a global pandemic. GIS assisted DOT's response from the earliest days. In January 2020, the Federal Aviation Administration (FAA) and the Office of the Secretary of Transportation (OST) mapped the location of known COVID-19 cases and airports that were performing passenger screening. As the virus spread, DOT used maps and geospatial analysis to visualize the level of COVID-19 cases at air traffic control facilities, map the locations of pilots with expiring medical certifications, plan continuity of operations for offices impacted by COVID-19, determine incident response coverage while inspectors were working from their homes, and to show changes in transportation utilization. These products provided clear, impactful statements about the effects of the pandemic on transportation.



Figure 1. GIS for Continuity of Operations Planning. This map portrays when and where COVID-19 was forecast to reach peak intensity in early 2020. FAA managers used this to plan continuity of operations for field offices impacted by COVID-19.

Beyond pandemic response, GIS has been indispensable to the core mission of DOT through the development and dissemination of essential transportation data and as a business intelligence tool. GIS is not just information technology systems or computer systems; it includes management systems and related activities. DOT curates and shares authoritative spatial data layers through FAA's Enterprise Information Management (EIM) Platform, the National Transportation Atlas Database (NTAD), and the DOT GIS Shared Services (GSS). Geospatial data is information that is tied to a location on the earth through explicit or embedded coordinates (such as latitude/longitude) and is comprised of points, lines, or polygons. The data is stored in a geospatial file format, which can include but is not limited to shapefiles, feature classes, feature/map services, and/or geo jsons. Every OA except for Great Lakes Saint Lawrence Seaway Development Corporation (GLS) and the Office of the Inspector General (OIG) uses geospatial data to analyze and improve transportation safety. GLS works with its Canadian counterpart, the St. Lawrence Seaway Management Corporation, on data for improving operations and safety. For example:

- The FAA uses GIS as the backbone of emergency operations. Analysts incorporate spatial analysis and custom modeling to identify gaps in mission service areas and to optimize resource allocation.
- The Federal Highway Administration (FHWA) is creating the American Routable Network, a GIS network of roads which is ideal for modeling traffic flow.
- The Federal Motor Carrier Safety Administration (FMCSA) leverages GIS to better visualize crashes involving large trucks. It is integrating its data with NHTSA and FHWA data, and will use that product to perform a "hot spot" analysis. When complete, FMCSA will create a crash predictability tool.
- The Federal Railroad Administration (FRA) modernized its rail freight monitoring and analysis tools with geospatial network analysis.
- The Federal Transit Administration (FTA) makes available a ridership forecasting methodology to the transit industry called Simplified Trips on the Project Software (STOPS). GIS data, in General Transit Feed Specification (GTFS) format, is used to represent transit service in the STOPS model.
- The Maritime Administration (MARAD) translated text descriptions to spatial data for the waterway network dataset and distributed the final product to the ports to assist with analysis and tactical decisions.
- The National Highway Traffic Safety Administration (NHTSA) maps fatal crashes and performs spatial analysis to identify zones of concern on interstate highways.
- OST leads the GIS Task Force, comprised of volunteer geospatial SMEs from the OAs, which supplies the Secretary of Transportation with maps and geospatial analysis during a disaster to show affected transportation infrastructure.
- The Office of the Assistant Secretary of Research and Technology (OST-R) Bureau of Transportation Statistics (BTS) manages the Transportation Theme, an NGDA which contains curated versions of authoritative transportation geospatial data assets.
- The Pipeline and Hazardous Materials Safety Administration (PHMSA) collects geospatial data from pipeline operating companies annually and maintains the National Pipeline Mapping System (NPMS), which is used by PHMSA and other government partners to support pipeline safety initiatives at local, state, national and tribal levels. PHMSA also maintains geospatial consequence area data to support pipeline operators with pipeline integrity management decisions.



Figure 2. FHWA receives highway data from all U.S. states and must connect the data at state borders to create a flowable network. The connector segments they add in GIS are based on proximity and similar attribution.



Figure 3. PHMSA developed the Inspection Unit Modification Tool to assist pipeline inspectors in capturing data about the extent and attributes of their inspection area.

This GIS Strategic Plan builds on and replaces the 2017-2020 GIS Strategic Plan. This plan sets out our goals for 2022-2024 and aligns with the 2020 National Spatial Data Infrastructure (NSDI) Strategic Plan and DOT's FY2022-2026 Strategic Plan. Our initial strategic goals were to mature an enterprise GIS program, centralize and strengthen GIS governance, and leverage emerging geospatial technology. Since then, the strategic context for DOT's geospatial program has changed due to:

- The Geospatial Data Act, signed in 2018, which formalizes governance processes for geospatial data and codifies responsibilities of covered agencies including DOT.
- The Foundations for Evidence-Based Policymaking Act, signed in 2019, which requires Federal agencies to manage data as an asset and addresses open data and data sharing. Geospatial data is subject to all Federal data policies, strategies, and initiatives. This act includes the OPEN Government Data Act, which requires agency CDOs (in partnership with agency CIOs) to assess the IT infrastructure of the agency. The GSS was assessed as part of a DestinationsDIGITAL initiative and included an architecture review and recommendations.
- Creation of DOT's Geospatial Management Office, including a Chief Geospatial Information Officer (GIO), Deputy GIO, GIS IT Manager, and a GSS which hosts geospatial data and applications from multiple OAs.
- Designation of OA GIOs who lead geospatial programs in DOT's OAs (based on a recommendation from the 2017 GIS Strategic Plan).
- Increasing interest in feature and map services, which allow the user to consume and display the most current geospatial data from an external source.
- Recruitment of a volunteer GIS Task Force, which has provided maps and analysis to the Secretary of Transportation and the Transportation Operations Center (TOC) during hurricanes, earthquakes, wildfire, flooding, and other disasters.
- A revitalized GIS User Group/ Community of Practice, including approximately 350 DOT staff,



• Evolving open data and interoperability requirements.

Figure 4. MARAD developed an interactive map by analyzing Automatic Identification System data for the privately-owned U.S.-flag fleet engaged in international trade. It shows the fleet's regular service routes and port calls from 2015 – present.

DOT has played a leading role in coordinating and facilitating the creation of nationwide geospatial transportation datasets. Since issuing the 2017 Strategic Plan, we have also increased collaboration with inter- and intra-agency teams collaborating on policy and data sources. As a member of the Federal Geographic Data Committee (FGDC), we manage the Transportation Theme, which includes 15 geospatial datasets and is a National Geospatial Data Asset Theme. Airport and runway data in the Transportation Theme allows the public and private organizations to have access to geospatial data for reference and aid in planning around the airport environment. The data provided includes all U.S. landing facilities and runway information stored in FAA databases.

DOT and Census co-lead the Address Theme. The National Address Database (NAD) is an NGDA which contains geospatial data that are critical to transportation safety and are essential to the Next Generation 9-1-1 initiative. DOT standardizes, aggregates, hosts and distributes address data provided by partners from state, local, and tribal governments. DOT houses, maintains, and distributes the NAD and Census takes the lead role in theme management, including strategy related to the Address theme.

DOT also leads the Work Zone Data Exchange, a common geospatial data standard which promotes interoperability between infrastructure owners/operators and commercial data providers, with the goal of keeping construction workers and the public safe in work zone areas. In the research phase of this strategic plan, managers and technical staff from every DOT mode with geospatial activity were interviewed. Their input reaffirmed that location-based analysis and innovative maps, applications, and geospatial visualizations are being widely used to support DOT's mission goals.

3. Vision

Our vision for GIS at DOT is:

DOT's innovative approach to transportation GIS is recognized worldwide. All DOTowned authoritative geospatial data is secure, accessible, and shareable through a shared portal. Spatial data and analytics support DOT's mission goals, data strategy, and leadership decisions.

4. Current State

Our Geospatial Program

The U.S. Department of Transportation has approximately 59,000 employees nationwide. The DOT is organized into 10 OAs. Representatives from nine OAs were interviewed for this plan:

- Federal Aviation Administration (FAA)
- Federal Highway Administration (FHWA)
- Federal Motor Carrier Safety Administration (FMCSA)
- Federal Railroad Administration (FRA)
- Federal Transit Administration (FTA)
- Maritime Administration (MARAD)
- National Highway Traffic Safety Administration (NHTSA)
- Pipeline and Hazardous Materials Safety Administration (PHMSA)

• Office of the Secretary of Transportation (OST), including the Office of the Assistant Secretary of Research and Technology (OST-R) and the Office of Intelligence, Security, and Emergency Response (S-60)



Figure 5. Rail commodity flow across the continental U.S.

A representative from the Volpe National Transportation Systems Center, an OST component that provides support to the DOT and other Federal agencies and customers, was also interviewed. The GLS and the Office of the Inspector General (OIG) do not have GIS programs and were not interviewed. The interviewees were a mixture of leadership and hands-on GIS users.

Since the 2017 GIS Strategic Plan was published, DOT has grown its geospatial leadership. A GMO has been established as part of the Office of the Chief Information Officer (OCIO). It is comprised of the Chief GIO, a Deputy GIO, a GSS Manager, and contractor staff. The GMO is tasked with:

- Implementing the Geospatial Data Act (GDA) and other relevant legislation.
- Maintaining the DOT GSS.
- Leading the GIS Task Force, a volunteer group of geospatial SMEs from the OAs which provides maps and analysis for the Secretary's office and the Office of Intelligence, Security, and Emergency Response.
- Coordinating with OA GIOs to monitor geospatial programs in the OAs and (in collaboration with the Office of Strategic Portfolio Management in OCIO) tracking geospatial expenditures.
- Leading the GIS User Group.

- Maintaining the Enterprise License Agreement with ESRI for GIS desktop and server software, in collaboration with the FAA.
- Leading department efforts to find the best tool for the job by identifying alternative GIS software applications and tools and administering approval processes to minimize entry barriers and support OA access to innovative solutions.



Figure 6. Map produced by the GIS Task Force for the Secretary's team during Hurricane Florence.

DOT is designated by the Federal Geographic Data Committee (FGDC) as the lead agency for the NGDA Transportation Theme, and BTS is statutorily tasked with leading the NGDA theme. The Transportation Theme includes both physical and nonphysical components related to all modes of travel that allow the movement of goods and people between locations. The Transportation Theme portfolio currently includes 15 transportation-related geospatial datasets provided by DOT, Census, or the U.S. Army Corps of Engineers. The Transportation Theme datasets are hosted on the DOT GSS and registered on the GeoPlatform (https://www.geoplatform.gov/).

Staffing and Software

The table below shows the number of Federal GIS FTEs at DOT in 2016 and 2020 (when research for this Strategic Plan began).

OA	2016 GIS FTEs	2020 GIS FTEs	Percentage change from 2016
FAA	137	97	-41%
All other OAs	20*	29	+45%
Total	157	126	-19%

*Corrected to add Volpe GIS FTEs, who were inadvertently excluded from official 2016 count. Table 1. 2016 versus 2020 GIS Federal FTEs.

The increase in most OAs is testament to increased use of spatial data (including data in native non-spatial formats which can be spatialized) and growing awareness of the power of spatial analysis for transportation data. (The decrease in FAA FTEs is due to attrition; Federal FTEs left or retired and were replaced by contractors.) Growing the GMO, restarting the GUG, renewing the software ELA with ESRI, and awareness events such as GIS Day have contributed to this rise. However, DOT's geospatial workload has increased even faster. Interviewees spoke about the resource gap they are still encountering with staffing. This has contributed to lags in data processing, deferred research regarding new analytics and technology, decreased ability to keep GIS skills current, no resources to update inefficient workflows, and, in some cases, backlogs of data from state or industry partners that needs to be processed before DOT can disseminate the dataset. The table below shows FTEs by mode and evaluates whether the current staffing level is optimal to support mission goals. The evaluation is based on interviews with representatives of each mode, including the OA GIOs. DOT has a geospatial staffing gap, with 15.5 fewer FTEs than optimal staffing. DOT leadership is strategizing on the best method to bring staffing to optimal levels.

	Current	Optimal	
O A	GIS FTEs	GIS FTEs	Evaluation of current staffing level
FAA	97	97	FAA IT needs broader exposure to GIS knowledge
1 / 1/ 1	21	51	Aeronautical Information Services sees the need for their
			entire workforce to become proficient in GIS.
FHWA	6	7	One additional position would assist in geospatial data
			translation, evaluation, and product prototyping for the
			American Routable Network. The FTE would also be
			responsible for geospatial data QA/QC, and map product
			development and maintenance.
FMCSA	0	1	The sole GIS FTE left in 2014 and has not been replaced.
			FMCSA is currently unable to perform any true spatial
			analysis. A GIS FIE would allow FMCSA to better
	1	2	ETEs with CIS shills are possed for detabase and sorror
ΓΙΛΛ	1	5	management and application development. No GIS positions
			are currently being advertised
FTA	1	3	FTA Staff perform geospatial work on a part time, as needed
			basis, and full-time during emergency response situations.
			Two additional FTEs (one junior and one senior) could
			support data visualization, process optimization, policy
			decisions, and regulatory activities.
MARAD	1	2.5	1.5 additional FTEs are needed in order to perform geospatial
			analysis and visualization related to the waterway network
	4		dataset.
NHISA	1	2	One additional FTE is needed to support GIS technology
OST	3	1	A database administrator with experience in geospatial
(GMO)	5	+	database software (such as PostGres and SOL) is needed to
(0110)			maintain the GSS.
OST-R	13	15	Two FTEs are needed. One will serve as the NGDA Dataset
(includes			Manager for Intermodal and Transit datasets. Half of an FTE
Volpe			will be the Spatial Data Development Specialist and will
Center)			develop new geospatial datasets and products. Half of an FTE
			will be the Spatial and Network Analyst and will analyze
			spatial data and create related products.
PHMSA	3	7	Additional GIS FTEs would allow PHMSA to increase GIS
			support and training for field staff, increase GIS system
			integration with other PHMSA data systems and increase data
			submit their data or who submit subpar data
Existing			out and and of the output output data
vs			
Optimal			
FTEs	126	141.5	

Table 2. GIS Federal FTEs at DOT.

ESRI GIS desktop software is widely used for geospatial data analysis and processing. DOT renewed its Enterprise License Agreement (ELA) with ESRI in September 2020. Non-FAA DOT has approximately 500 ESRI desktop GIS users. With a few exceptions for full-time GIS professionals, these users share 70 concurrent use licenses (20 licenses for ArcGIS Pro and 50 licenses for ArcGIS Desktop). FAA has approximately 375 ESRI desktop GIS users. DOT is charged for support from ESRI based on the number of licenses DOT is using, and during ELA renewal, pricing is negotiated based on the number of licenses installed during the outgoing contract. Periodically, users' activity with ArcGIS desktop software is examined and inactive users are removed from the connection to the license server (or the software is uninstalled, in FAA's case).



Figure 7. GIS for Airport Planning. This visualization shows airport design surfaces, runway pavement condition, certain airport infrastructure, and on- and off-airport obstructions in relation to runway 13R at Dallas Love Field. GIS enhances FAA's project planning in support of implementing the Airport Improvement Program (AIP).

Analytical Activities

DOT creates, consumes, curates, analyzes, and disseminates geospatial data. We use this data and analysis to support field staff, assess risk, allocate resources, respond to accidents and natural disasters, strengthen policy analysis, perform research and development, plan safety initiatives (including at the state and local level) and raise public awareness. To achieve optimal results with geospatial analysis, DOT will need to:

• Improve data standardization, accuracy (spatial and attribute) and completeness.

- Possess the statutory or regulatory authority to require complete and accurate GIS data from state, local, and industry partners who submit data.
- Broaden our use of open source and non-ESRI geospatial software.
- Create and maintain a complete set of data and symbology standards.
- Promote the use of geospatial analysis for risk assessment, performance optimization, and resource allocation, and develop analytical best practices.

Interviewees offered positive feedback on the restarted DOT GIS User Group (GUG), which began meeting regularly in 2019, and the FAA Geospatial Community of Practice (GeoCoP), which was established as a formal FAA community of practice in 2018. Respondents indicated they have engaged with the GUG collaboration site, with GIS day activities, and with GeoCoP community events. Many are seeking additional training to increase their expertise.

Users appreciate the flexibility offered by the ELA with ESRI. They believe that GIS is recognized as a key tool for visualization across DOT, and that spatial potential is considered in the requirements phase of new data projects. DOT has raised awareness of GIS among senior leadership by proving that GIS provides impactful visualizations of important datasets. Our next step is to continue educating leadership about the analytical potential of GIS.



Figure 8. The Bureau of Transportation Statistics developed a national transportation noise map using a 24-hr equivalent A-weighted sound level (denoted by 24-hr LAeq) noise metric. The results represent the approximate average noise energy due to transportation noise sources (aviation, road, and passenger rail) over a 24-hour period at the receptor locations where noise is computed, expressed in decibels.

Challenges and Opportunities

Funding and FTEs were near-universal concerns. The current level of funding for geospatial programs does not provide for optimal data procurement, application upgrades, tool development, training, and hiring. Many OAs have a suboptimal level of FTEs to perform geospatial work which helps meet their mission goals. Although some OAs have trained a wide number of staff in basic GIS skills, staff tend to lose that knowledge if they do not have frequent opportunities to use GIS software. Training the geospatial FTEs that exist can take a year or longer as the staff becomes conversant with specialized datasets, models, tools, and systems. Effectively using foundational geospatial datasets often requires specialized and/or institutional knowledge: this poses a problem with contractors who have excellent GIS skills but inadequate knowledge of the data. The GMO currently has limited funding for non-ESRI software testing or travel to GIS conferences and meetings. The GIS Task Force is all-volunteer unless an action memorandum or Secretarial order requires participation by GIS FTEs.

While software is generally sufficient, hardware options present challenges to daily GIS users. The "engineering build" laptop at DOT does not have sufficient graphics capability to meet ESRI's required specs for current versions of ArcGIS Desktop and ArcGIS Pro. The GMO worked with ITSS to gain approval for a new laptop build with adequate specs, but the "GIS build" laptop is only used by a few FTEs so far. It is more costly than the "engineering build" and must be specially ordered (unlike the engineering laptop, which is kept in-stock). Users who perform heavy data geoprocessing on a standard or an engineering laptop reported that their scripts and models take days to run, and often end in errors. Rendering faster data can be unreliable or time-prohibitive on the standard or engineering laptop.

Most DOT geospatial datasets are curated from state government or industry submissions. Relatively few datasets are developed in-house. For some OAs, the lack of sufficient regulatory authority over these data submissions means that the GIS PM or analyst cannot require the submitter to correct data that is poor quality or missing attributes. Adding new requirements to data collections can take several years when a rulemaking or information collection is needed. New regulations or initiatives which include geospatial data (or data which can be spatialized) should include a geospatial SME at the planning stage.

Within FAA, studying organizational structure could lead to improvements. FAA operates their geospatial program, license manager, infrastructure, and user group separately from the other OAs. FAA users often were not aware of the GMO or did not think GMO staff were available to support them. Certain FAA staff function as a GMO, but with no formal authority. This problem is exacerbated by physical barriers between FAA and the other OAs that extend beyond separate buildings. The dedicated GSS Manager in the GMO has no access to the FAA environment, and the Microsoft Teams sites are completely separate for FAA versus non-FAA OAs.

FAA respondents collectively stated their need for foundational FAA geospatial data hosted at an enterprise level. The FAA Office of Information Technology has deployed an Enterprise GIS, and the next step is to curate and host FAA geospatial data.

Air Traffic Operations indicated a need for GIS weather data that would provide basic aviation weather information in a geospatial format. Multiple offices recognized the need to incorporate 3D GIS into visualization and analysis.

The FAA geospatial workforce needs foundational GIS training for all analysts and additional training for analysts that use specialized ESRI aeronautical product extensions. In addition, FAA IT staff needs broader exposure to GIS knowledge and a basic understanding of what GIS can do.

5. GIS Strategic Goals

The Geospatial Data Act states that a covered agency must prepare, maintain, publish, and implement a strategy for advancing geographic information and related geospatial data and activities appropriate to the mission of the covered agency, in support of the strategic plan for the National Spatial Data Infrastructure. 43 U.S.C. § 2808.

Table 3 shows how the DOT GIS strategic goals support the NSDI strategic goals while capturing themes that emerged during the interview and research phases of this project. Tie-ins to the DOT strategic goals are included in the GIS strategic goal descriptions. DOT will implement these goals to advance geographic information and related geospatial data and activities appropriate to our mission. The Implementation Plan assigns action items to staff and provides milestones and approximate costs.

NSDI Strategic Goal	DOT GIS Strategic Goal
Implement the national geospatial policy	Implement requirements from the GDA (and
and governance framework as defined by	related statutes and policies) and monitor OA
the GDA and related statutes and policies.	compliance.
Advance the maturity of, accelerate the	Advance the Transportation Theme by maturing
acquisition of, and expand the sources of	DOT geospatial data management practices,
NGDAs to ensure that they are findable,	expanding DOT data sources, formalizing data
accessible, interoperable, and reusable.	acquisition, and ensuring the DOT National
	Geospatial Data Assets (NGDA) are findable,
	accessible, interoperable, and reusable.
Ensure open standards-based	Grow DOT's GIS shared services by expanding
interoperability to enable geospatial shared	available data and applications, enabling
services.	interoperability, and optimizing performance.
Enable and promote collaborative	Enable and promote collaborative governance and
governance and partnerships to meet	partnerships internally, across the Federal geospatial
national needs, priorities, and	community, and with external stakeholders to meet
circumstances.	DOT mission goals.
	Realize DOT's potential as a GIS leader and
	innovator by cultivating a 21st century geospatial
	workforce and adequately resourcing our geospatial
	program.

Table 3. Strategic Goals.

Goal 1: Implement requirements from the GDA (and related statutes and policies) and monitor OA compliance.

Supports DOT Strategic Goals of Transformation and Organizational Excellence.

Objectives

- Work with the CDO, OA GIOs, OCIO staff, NARA liaisons, and geospatial system owners to comply with the Geospatial Data Act (and related statutes and policies).
- Standardize geospatial data governance policies and procedures, including data quality, metadata, data dissemination and data integration.
- Understand geospatial resource allocation and budget needs.
- Ensure that GIS users have the best tools for their work.
- Eliminate duplication in geospatial data development, data procurement, and application development.
- Achieve full compliance with records management procedures and privacy policies for geospatial datasets and systems.
- Remove organizational or structural barriers that are hindering efficient requirement implementation.

Actions

- Monitor progress of GDA (and related statute and policy) implementation through (at minimum) quarterly progress reviews which include the GMO, CDO, OA GIOs, and other relevant representatives.
- Establish, document, and implement a process to monitor progress of strategic goals through quarterly reviews by the GMO.
- Work as a team (led by the GMO and including OA GIOs) to catalogue IT systems containing geospatial data and track geospatial spending; update CSAM with these IT systems so that their Authorization to Operate (ATO) and Privacy Impact Assessments can be monitored.
- Work with Records Management officers in each OA to schedule all applicable geospatial records.
- Develop, disseminate, and implement a uniform process for all OAs to perform a quality review of geospatial data and metadata to verify compliance with DOT's information quality guidelines and metadata requirements. This process will include a method of ensuring recipients of DOT funds for geospatial data collection meet appropriate quality standards, as well as an assessment of stakeholder and peer reviews in order to validate the quality of all disseminated information.
- Leverage DOT's IT Spend Plan and Data Inventory to track geospatial spending and eliminate duplicative spending as described in the Geospatial Policy on Reducing Duplication; enforce requirement for OAs to search the GeoPlatform (geospatial clearinghouse) before expending funds on geospatial data creation or procurement.
- Update the DOT Privacy Risk Management Policy to include guidelines for geospatial data, including a process for the OAs to verify that geospatial data and metadata does not

inappropriately disclose personally identified information to external parties, and a requirement for privacy risk management activities to be completed for geospatial information systems prior to system reauthorization.

- Work with FAA to establish better lines of communication between the GMO and FAA; specific actions could include establishing an OA GIO Team at FAA. Document and remediate gaps at FAA related to geospatial support or hardware, software, or data access.
- When Office of Management and Budget (OMB) releases the awaited revision to Circular A-16, identify impacts to existing geospatial data activities, policies, and procedures.
- Work to educate GIS users about the advantages of the GIS laptop build and promote it as an option when users are due for a laptop refresh.

Goal 2: Advance the Transportation Theme by maturing DOT geospatial data management practices, expanding DOT data sources, formalizing data acquisition, and ensuring the DOT National Geospatial Data Assets (NGDA) are findable, accessible, interoperable, and reusable.

Supports DOT Strategic Goals of Safety, Equity, and Climate & Sustainability.

Objectives

- Develop and implement a plan for adding new DOT data sources to the Transportation Theme.
- Promote the adoption of geospatial data standards for DOT's Transportation Theme datasets.

Actions

- Work with OA GIOs, CDOs, and appropriate representatives in the OAs to add new datasets to the Transportation Theme.
- Work with Transportation Theme dataset owners to define and track geospatial data and metadata quality standards and compliance.

Goal 3: Grow DOT's GIS shared services by expanding available data and applications, enabling interoperability, and optimizing performance.

Supports DOT Strategic Goals of Safety, Equity, Transformation, and Organizational Excellence.

Objectives

- Curate a DOT geospatial portal which provides one-stop access to DOT's publicly available geospatial datasets and web-based geospatial applications.
- Realize cost savings for the OAs by moving appropriate geospatial datasets and applications from OA servers to the GSS.

- Provide fast, reliable performance to users of the GSS.
- Ensure interoperability of DOT's geospatial data.
- Provide API access through a common platform that is consistent with open standards.
- Provide all online map products in accessible formats for people with disabilities.

Actions

- Work with OA GIOs and CDOs to explore opportunities to move geospatial datasets and applications to the GSS.
- Establish a uniform DOT-wide policy for disseminating and sharing geospatial data and applications on public-facing sites.
- Evaluate the GSS architecture for opportunities to improve performance.
- Create a "test lab" to determine how non-ESRI software with open data formats can be integrated into the DOT Common Operating Environment and, if applicable, be added to the GSS.
- Lead department efforts to find the best tool for the job by administering software approval processes and removing barriers to investing in alternative GIS software and tools.

Goal 4: Enable and promote collaborative governance and partnerships internally, across the Federal geospatial community, and with external stakeholders to meet DOT mission goals

Supports DOT Strategic Goals of Safety, Economic Strength & Global Competitiveness, Equity, Climate & Sustainability, and Organizational Excellence.

Objectives

- Remove organizational or structural barriers that hinder internal collaboration.
- Cultivate the OA GIO group as liaisons to implement requirements and strategic goals in the OAs and as primary contacts to support geospatial projects and DOT mission goals.
- Add value to the GIS user groups by providing training opportunities.
- Represent DOT at Federal and external geospatial group meetings and form partnerships to assist in meeting DOT mission goals.
- Provide resources to assist partners in adopting published national standards, where they exist, or creating national standards for transportation data.
- Assist state and local partners in improving practices to facilitate greater geospatial data sharing.

Actions

- Acquire and map locations for all DOT grant projects.
- Strengthen collaboration and support between the GMO and FAA and within the GIS User Group (GUG) and the GeoCoP.
- Offer software training options to user group members.

- Participate in cross-Federal geospatial working groups [e.g. GDA Covered Agencies Working Group, FGDC, Homeland Infrastructure Foundation Level Data (HIFLD), and U.S. Geospatial Executives Organization (U.S. GEO)].
- Participate in external geospatial working groups [e.g. National Geospatial Advisory Committee (NGAC), Transportation Research Board (TRB), Open Geospatial Consortium (OGC), American Association of State Highway and Transportation Officials (AASHTO), Aeronautical Information Exchange Model change control board (AIXM), and National States Geographic Information Council (NSGIC)].
- On a semi-annual basis, track benefits to mission and strategic goals derived through work with partnerships.

Goal 5: Realize DOT's potential as a GIS leader and innovator by cultivating a 21st century geospatial workforce and adequately resourcing our geospatial program. *Supports DOT Strategic Goals of Transformation and Organizational Excellence.*

Objectives

- Optimally staff geospatial programs in the OAs.
- Maintain and grow geospatial skills which enable interoperability and inspire innovation.
- Ensure adequate and equitable resources for geospatial activities which support DOT's mission goals.

Actions

- Identify critical staffing gaps and work with DOT leadership and OA GIOs to create a business case to hire or detail Federal FTEs to fill them. FTEs could be hired as part of the GMO (using Working Capital funding) and shared with the OAs as needed.
- Provide training and other continuing education to geospatial SMEs and other FTEs which wish to grow their geospatial skills.
- Optimally fund the GMO by working with the OA GIOs to gain consensus approval from the OAs to increase Working Capital Fund contributions for geospatial activities.
- Offer opportunities to attend events which showcase innovative geospatial products, applications, and techniques.

6. Reporting

Reports are required by the GDA, and DOT's OIG issued recommendations based on their 2020 audit of GDA compliance. The 2022 OIG audit began in March 2022, and was not completed at publication date. The table below shows how DOT will fulfill those requirements.

Requirement	Deadline or Reporting Period	Status
Covered Agency Report (GDA,	Annually in January or as	Reports filed on time in January
Section 759(b)(1))	determined by the FGDC	2021 and 2022
Lead Covered Agency Report	Annually in January or as	Reports filed on time in January
(GDA, Section 756(b)(3)) for	determined by the FGDC	2021 and 2022
the Transportation Theme		

GIS Strategic Plan (GDA,	When NSDI Strategic Plan is	NSDI plan adopted in
Section 759(a)(1))	updated	November 2020; this plan was
		finalized in 2022 due to
		administration change
Geospatial Budget and Data	Annually, but first due date	Gathering information through
Inventory (GDA, Section	TBD by OMB	the IT Spend Plan and DOT's
759(b)(2))		Data Inventory
OIG Audit recommendations	By 9/30/21	Requested closure or set
		completion dates for all
		recommendations

Table 4. Requirement reporting approach.

7. Conclusion

During the first GIS Strategic Plan's timespan (2017-2020), DOT's GIS staffing, management, governance, users, and capabilities grew significantly. More data was spatialized, and our geospatial analysis matured and expanded. The Geospatial Data Act was passed and laid the groundwork for formalizing governance procedures already in place. It added measures to monitor and report on an agency's geospatial progress. Our updated geospatial strategy will guide DOT as we increase the reach of analysis, dashboards, visualizations, and services that are powered by GIS. We will strengthen our use of geospatial data and technology to "*ensure America has the safest, most efficient and modern transportation system in the world, which boosts our economic productivity and global competitiveness and enhances the quality of life in communities both rural and urban.*"

8. Implementation Plan

DOT's GIS strategic goals and objectives can be found in Section 5. This Implementation Plan provides resource estimates, responsible parties and high-level tasks, a communication plan, timelines, and performance metrics for actions needed to implement the strategic goals and objectives. Roles and responsibilities of DOT staff are also included. Although some flexibility can be assumed, if budget and staffing resources are not available at the levels specified, goal implementation may be compromised.

Resource Estimates

Resources needed to accomplish the strategic goals are as follows. Staffing

A modest increase in Federal FTEs is needed to implement our strategic goals by accomplishing the related objectives. As shown in Table 1, the number of GIS FTEs has decreased since the 2017 Strategic Plan. Many departing Federal GIS FTEs were replaced with contractors. Particularly impacted were the 2017 objectives: "Advance mission goals with geospatial analysis" and "Cultivate a 21st century geospatial workforce." Contractor turnover is much higher than Federal employee turnover, so Federal employees are needed to implement the 2022-2024 strategic goals. The optimal staffing level is in Table 2. Additionally, due to the size of the FAA relative to the other OAs, a GIO Team at FAA should be formalized.

Budget

Expanding shared services (including but not limited to the GSS; for example, a large-format plotter is a necessary shared service) and enterprise-level GIS data storage in support of strategic goal #3 will require significant budgetary resources. The Deputy GIO and GSS Manager's salaries are paid by WCF contributions. However, the only GMO activity funded by the WCF is the ESRI Enterprise License Agreement. Although the GMO is part of OCIO, which has historically served only internal customers, the GMO has external customers such as the GSS users, and contains DOT's representatives for key government and external partnerships. OA WCF contributions could be increased to cover resources (hardware, software, and staff) to expand and maintain the GSS and implement other shared services. A stronger GSS could increase OA participation in the shared service and allow the OAs to realize cost savings over maintaining their own GIS servers. Additionally, users have repeatedly asked for information about non-ESRI geospatial software packages. Increased WCF funding would allow the GMO to host a "test lab" for this software and determine whether they are suitable to add to DOT's Common Operating Environment and GSS. Ultimately, this software could assist DOT in making our data more open and accessible. Increased funding for the GMO would also assist in accomplishing Goal #4 by creating a small outreach budget for the GIO and Deputy GIO to participate in offsite conferences held by partners and stakeholders.

Hardware and Software

Acquisition of dedicated servers and/or leveraging cloud-based storage options will assist in expanding the use of APIs and improving performance and continuity of operations for remote GIS staff. Population of foundational data on the FAA's new GIS capable EIM platform will require software that is not part of the ESRI Enterprise License Agreement (ELA) to create geometry from existing non-geospatial data stores. A method for overcoming limitations of older, but mission relevant, versions of software to replicate data in the GSS is needed. Older versions are often used when custom tools are built for a specific version of the software: the tools would need to be tested and upgraded to move to the current version. As mentioned above, an investment in procuring and testing non-ESRI software could assist in making DOT's geospatial data more open and interoperable, as well as providing geoprocessing functions that are not available through ESRI.

Skill Enhancement

GIS technology at DOT has advanced since the first strategic plan; for example, creating and using feature and map services is now much more common. These skills need to be learned and maintained to advance the geospatial initiatives at the department. One of the top requests during the interview phase was for formal GIS training at the beginner and intermediate levels and refresher training for occasional GIS users. WCF contributions from the OAs could enable DOT-wide GIS instructor-led training. Emphasis should also be placed on expanding understanding of best practices for data management as well as GIS metadata standards. IT staff familiarity with geospatial software can be increased within the OAs.

Responsible Parties and High-Level Tasks

The following positions or groups will have key roles in the implementation of this strategic plan.

Office of the Secretary of Transportation (OST) Staff

The GMO resides in the OCIO inside OST. The CIO serves as the principal advisor to the Secretary of Transportation on matters involving information and technology. The DOT CIO has oversight responsibility for the entire DOT IT portfolio and operational responsibilities for the DOT Common Operating Environment. The GMO provides strategic, programmatic, and technical leadership for geospatial activities across the Department. The GMO works collaboratively with counterparts in the OAs as well as other internal and external stakeholders.

The GIO serves as the principal advisor to the Chief Data Officer, CIO and other DOT leadership on cross-cutting program matters related to all aspects of geospatial policy, programs and technology. The GIO also serves as the Senior Agency Official for Geospatial Information and represents DOT on the FGDC Steering Committee.

Within OST, OCIO has the ability to allocate resources (such as FTEs) to the geospatial endeavor. The GMO has expert-level knowledge of GIS and is responsible for implementing DOT's geospatial strategy. The OCIO should read this Strategic Plan and be briefed if additional information on DOT's geospatial program is desired. It is crucial that OCIO understand the depth of GIS analysis that is possible and specific ways that GIS can help DOT meet its mission goals. The GMO will work closely with the CIO to obtain resources needed to meet the strategic goals. OST staff will lead the actions below during implementation of the strategic goals:

- Oversee the creation of shared services architecture which would improve performance of geospatial applications.
- Advocate for increased WCF contributions to assist the GMO in supporting the OAs.
- Conduct meetings with OA GIOs on at least a quarterly basis to monitor progress on meeting GDA requirements and strategic plan goals.
- Support exploration of open data formats and non-ESRI software options by providing necessary software and hardware and leading security approval processes.
- Oversee OA use of GeoPlatform to meet GDA requirements; publish all non-sensitive datasets as open data on geoplatform.gov.
- Maintain a data inventory of geospatial datasets.
- Monitor OA compliance with DOT's records management and privacy policies for geospatial data.
- Formalize policy for collecting, maintaining, disseminating and preserving geospatial data such that resulting data, information, or products can be readily shared with other Federal agencies and non-Federal users, as appropriate.

OA Geospatial Information Officers

Designating an OA GIO for each DOT OA was a goal during the previous strategic plan. These OA GIOs are FTEs with knowledge of an OA's geospatial program. They identify tasks and projects that would benefit from a geospatial approach, assist the GMO in overseeing DOT-wide geospatial activities, and implement and monitor policy at the OA level. OA GIOs will support the GMO in the implementation of the strategic plan within their individual OA. The OA GIOs will lead the actions below:

- Advocate for increased WCF contributions to assist the GMO in supporting the OAs.
- Identify opportunities to expand geospatial operations in their OA.
- Review OA rulemakings and information collections during the planning phase to identify how geospatial data and technology can be leveraged or optimized.
- Assess the staff's geospatial skills and recommend training to enhance skillsets.
- Allocate additional resources based on their geospatial goals and current level of resources.
- Review datasets at the OA level for publication on the DOT shared services and add geospatial functionality to additional non-spatial datasets if resources allow.
- Create a GIO Team at FAA to strengthen internal collaboration at DOT.
- Meet with the GMO quarterly to monitor progress on the strategic goals and compliance with GDA.

- Monitor submissions to DOT's IT Spend Plan and Data Inventory, which track geospatial spending and eliminate duplicative spending.
- Investigate non-ESRI software options to meet geospatial program needs.
- Comply with records management policy for geospatial data.
- Ensure OA compliance with all DOT geospatial policies and programs.
- Provide information regarding training, conferences, and networking events.

GIS User Group (GUG) Members and Dataset Owners

Employees who use ESRI GIS software are invited to join the GUG. The GUG is comprised of DOT employees (in all OAs except FAA) whose job duties include GIS analysis and visualization and/or managing geospatial projects. The FAA has their own GeoCoP which functions in a similar role. At the meetings, members have discussed geospatial products (such as the ESRI ELA), opportunities or events (such as conferences, training opportunities, and GIS Day) and have the opportunity to showcase their geospatial visualizations, analysis, and applications. These groups have also been valuable for networking; attendees learn about what other users are doing with GIS, exchange information about new technology, and can troubleshoot issues as a peer group.

The GIS user groups (GUG and GeoCoP) will assist in implementing the strategic goals through their daily work, including quality control for geospatial data, creating and maintaining metadata, identifying and resolving data gaps, applying standards, and fostering best practices. They comply with cybersecurity, privacy, and records requirements related to geospatial datasets. At user group meetings, they discuss obstacles and issues that the OA GIOs and/or the GMO can help resolve. The group will also participate in outreach efforts which are targeted at GIS "laypeople," such as the annual GIS Day.

The GIS user groups will lead the actions below during implementation of the strategic goals:

- Utilize Teams or other available technology to share information and help each other resolve issues.
- Invite speakers from cross- Federal and external geospatial working groups to present at meetings.
- Discuss and identify ways to implement DOT geospatial strategic goals and GDA requirements.
- Facilitate GUG and GeoCoP cooperation to encourage cross OA communication.
- Participate in annual GIS Day events and create other opportunities for GIS Users to showcase their work.
- Advocate to geospatial data consumers the use of GeoPlatform as clearinghouse of GIS source data.
- Encourage testing and exploration of open data formats and non-ESRI software.

GIS Dataset owners, who are also members of the user groups, will lead the actions below during implementation of the strategic goals:

• Work with the GMO and the OA GIOs to create a definitive list of geospatial systems and spending: maintain current ATOs and Privacy Impact Assessments.

- Work with Records Management officers in each OA to schedule all applicable geospatial records.
- Perform quality reviews of their geospatial data and metadata to verify compliance with DOT's information quality guidelines and metadata requirements.
- Submit information to DOT's IT Spend Plan and Data Inventory to track geospatial spending and eliminate duplicative spending.
- Search the GeoPlatform (geospatial clearinghouse) before expending funds on geospatial data creation or procurement.
- Work with OA GIOs to explore opportunities to move geospatial datasets and applications to the GSS.

Communication Plan

This Strategic Plan is written for all DOT employees, but it is especially relevant to those with responsibility for geospatial data. Input from all levels of DOT employees is necessary to implement requirements of the GDA and define requirements for the services that the GMO provides. The GIO and OCIO are well aware of the power of geospatial visualization and analysis. Although senior leadership appreciates impactful geospatial data visualizations (such as the maps provided to the Secretary's team during disasters), many employees do not realize the full power of geospatial data analysis, which can model networks, reveal "hot spots," and provide multivariable risk ranking. The communication plan focuses on bringing this enhanced level of knowledge to senior leadership. Specific communication tasks are included in Table 5. Some opportunities for disseminating this information and the vision for GIS at DOT include:

- An executive briefing by industry GIS leaders.
- A storymap (multimedia animation containing maps or visualizations) showing this plan's strategic goals and how they relate to DOT strategic goals and data strategy. The storymap can be displayed on building monitors and at All Hands meetings.
- Leveraging GIS Day to draw in senior leadership.
- Distributing the strategic plan to OA leadership, external stakeholders by posting it on DOT's web site, and to the user group via the Teams site and upcoming meetings.
- Working with OAs to further understanding of how geospatial data and technology supports their mission and strategic goals.
- Working with communications/public affairs offices to publish articles and geospatial information in OA newsletters.

Implementation Summary

Due to the unknown level of future funding, many of the metrics are qualitative rather than quantitative. A detailed IGCE should be written before any procurement takes place, so the budget figures are rough estimates. The timetable reflects the effective dates of this plan (2021-2024).

Task	Metrics and Milestones	Budgetary	Calendar
		impact ³	Year
Comply with the	Metric= 2022 audit report shows	\$\$\$	2022-2024
Geospatial Data Act	measurable progress since 2020 audit.	(includes	
(and related statutes	Milestones include developing policies	existing	
and policies)	described below, implementing them at	GMO	
1 /	the OA level through the OA GIOs, and	FTEs)	
	the GMO monitoring OA compliance.	,	
Standardize geospatial	Metric= successful OA compliance once	\$	2022
data governance	policies/procedures are written.		
policies and procedures	Milestones include best practices		
÷ ÷	documentation, guidelines for geospatial		
	data governance, and a procedure for		
	monitoring OA compliance.		
Understand current	Metric= complete OA participation in IT	\$	2022 (spend
geospatial spending and	spend plan. Milestones include adding a		plan is
budget needs	"geospatial" option to the spend plan.		updated)
Eliminate duplication in	Metric= successful OA compliance with	\$	2022 (policy
geospatial data	a revised Geospatial Policy on Preventing		is
procurement and	Duplication. Milestones include		implemented)
application	publishing that policy and a procedure		
development.	for monitoring OA compliance.		
Achieve full compliance	Metric= successful OA compliance with	\$	2022
with records	records management procedures and		(procedure is
management	privacy policies. Milestones include		developed)
procedures and privacy	developing a procedure for monitoring		
policies for geospatial	OA compliance.		
datasets and systems.			
Remove organizational	Metric= successful communication and	\$	2022-2023
or structural barriers	support between the GMO and all OAs,		
that are hindering	but especially FAA. Milestones include		
efficient requirement	designating a GIO Team at FAA and		
implementation and	meeting to define support that is needed		
internal collaboration.	from the GMO for FAA and vice versa.		
Curate DOT geospatial	Geospatial Portal populated with data	\$\$\$	Ongoing
Portal	from participating OAs; data published in		
	open standards and accessible through		
	APIs		

³ All figures are approximate, but \$=\$0-20K, \$\$=\$20K-\$100K, \$\$\$=\$100K+.

Realize cost savings for the OAs by moving appropriate geospatial datasets and applications from OA servers to the GSS.	Metric= expanded data and applications on the GSS. Milestones include meeting with OAs that do not currently participate in the GSS and assessing their needs.	\$\$\$	Ongoing
Provide fast, reliable performance to users of the GSS and provide APIs consistent with open standards.	Metric= improved performance for GSS users. Milestones include reviewing system architecture and investigating techniques for better performance, such as vector tile mapping.	\$\$\$	Ongoing
Explore methods to improve interoperability of DOT geospatial data.	Metric= geospatial data is accessible and sharable. Milestones include developing a test environment for OpenGIS or nonstandard geospatial software and procuring that software.	\$\$	2022-2024
Cultivate the OA GIO group as liaisons to implement requirements and strategic goals in the OAs.	Metric= quarterly meetings with the OA GIOs. Milestones include developing a procedure for monitoring requirement and strategic goal implementation.	\$	Ongoing
Identify critical staffing gaps and hire or detail Federal FTEs to fill them.	Metric= optimal staffing levels shown in Table 1 are achieved.	\$\$\$	Ongoing
Provide training and other continuing education to geospatial SMEs and other FTEs which wish to grow their geospatial skills and keep abreast of innovations in geospatial technology.	Metric= depends upon funding. Milestones include assessing user needs and, if funding is available, providing instructor-led training at DOT Headquarters, and identifying events which showcase innovative advances in GIS.	\$\$	2022-2024
Adequately fund the GMO and geospatial activities in the OAs.	Metric= depends upon funding. Milestones include developing a cost estimate for critical activities which support the DOT mission and securing increased WCF contributions for the GMO.	\$\$\$	Ongoing
Represent DOT at Federal and external geospatial group meetings.	Metric= participation by the GMO in at least two geospatial groups. Milestones include obtaining funding to travel to offsite meetings and conferences.	\$	Ongoing

Table 5. Implementation Summary.

9. Appendix

Acronym List

AASHTO	American Association of State Highway and Transportation Officials
API	Application Programming Interface
ATO	Authorization to Operate
BTS	Bureau of Transportation Statistics
CDO	Chief Data Officer
CSAM	Cyber Security Assessment and Management
DOT	Department of Transportation
EIM	Enterprise Information Management
ELA	Enterprise License Agreement
ESRI	Environmental Systems Research Institute
FAA	Federal Aviation Administration
FGDC	Federal Geographic Data Committee
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FTE	Full-time equivalent
GDA	Geospatial Data Act
GeoCoP	Geospatial Community of Practice
GIO	Chief Geospatial Information Officer
GIS	Geographic Information Systems
GLS	Great Lakes Saint Lawrence Seaway Development Corporation
GMO	Geospatial Management Office
GSS	GIS Shared Services
GUG	GIS User Group
HIFLD	Homeland Infrastructure Foundation Level Data
IGCE	Independent Government Cost Estimate
MARAD	Maritime Administration
NGAC	National Geospatial Advisory Committee
NGDA	National Geospatial Data Asset
NHTSA	National Highway Traffic Safety Administration
NSDI	National Spatial Data Infrastructure
NSGIC	National States BTS Information Council
NTAD	National Transportation Atlas Database
OA	Operating Administration
OCIO	Office of the Chief Information Officer
OGC	Open Geospatial Consortium

Office of the Inspector General
Office of Management and Budget
Office of the Secretary of Transportation
Office of the Assistant Secretary of Research and Technology
Pipeline and Hazardous Materials Safety Administration
Office of Intelligence, Security, and Emergency Response
Subject-matter Experts
Transportation Operations Center
Transportation Research Board
U.S. Geospatial Executives Organization
Working Capital Fund

About this Document

DOT's second GIS Strategic Plan was researched and written between May 2020 and March 2022. The authors were Amy Nelson, Deputy GIO at OST, Dennis Nicholas, FAA Operations Research Analyst, and Heidemarie Gauss, FAA Aeronautical Information Specialist. Information used to create the Strategic Plan came from the following sources:

- 1) Interviews and input from with each of the OAs mentioned in the Introduction, as well as key staff such as the Chief Data Officer, GIO, and Deputy CIO.
- 2) The NSDI Strategic Plan, published in 2020.
- 3) The Geospatial Data Act, signed into law in October 2018.

This Strategic Plan is effective from the date of publication until 12/31/2024.