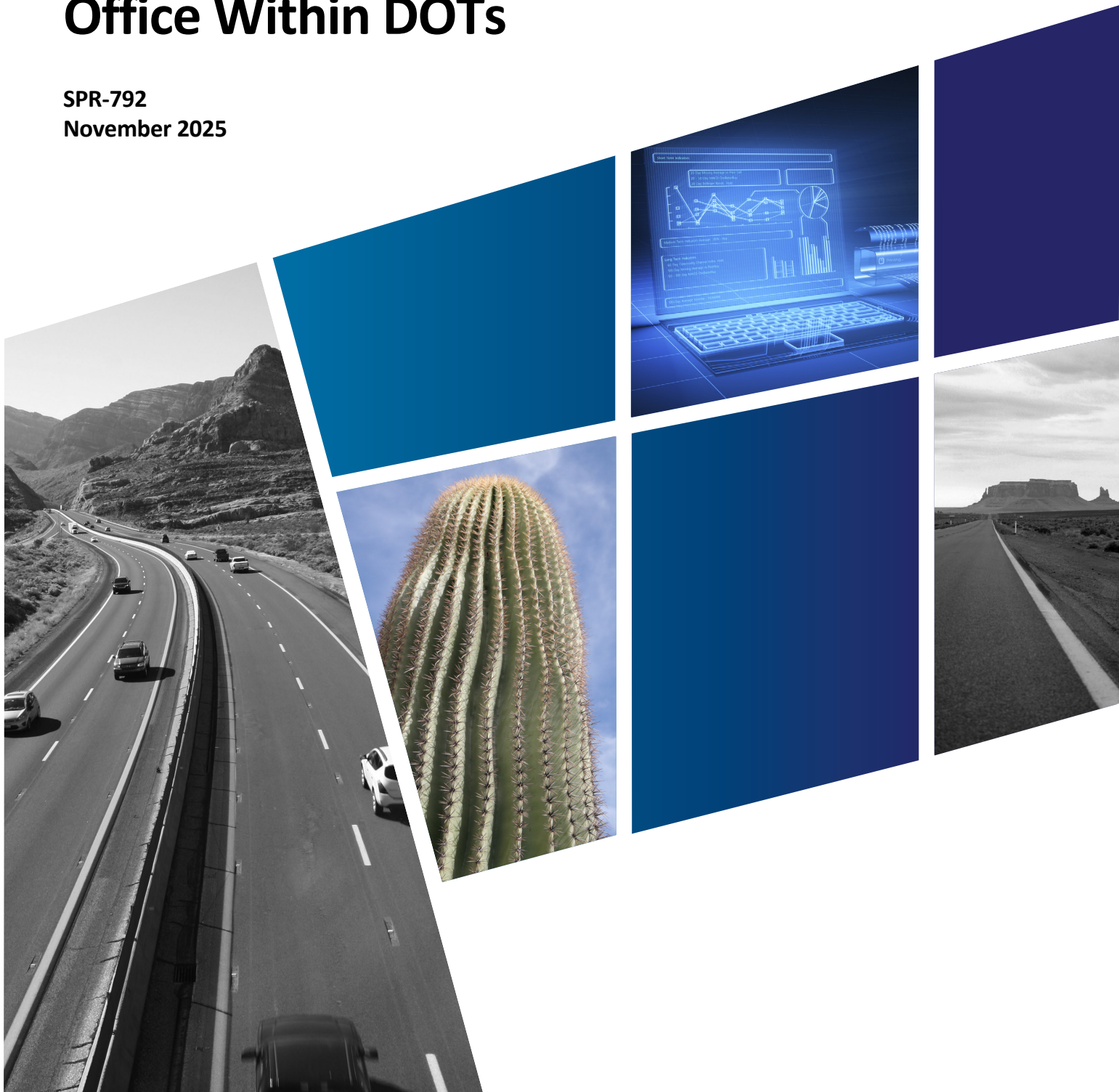


# State of The Practice of a Data Management Office Within DOTs

SPR-792  
November 2025



18-386



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*November 2025*

**Published by:**

Arizona Department of Transportation  
206 South 17th Avenue  
Phoenix, Arizona 85007

In cooperation with  
U.S. Department of Transportation  
Federal Highway Administration

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## Technical Report Documentation Page

1. Report No. SPR-792		2. Government Accession No. none		3. Recipient's Catalog No. none	
4. Title and Subtitle  State of The Practice of a Data Management Office Within DOTs				5. Report Date	
				6. Performing Organization Code none	
7. Authors Mingfeng Shang, ORCID: 0000-0003-1192-8472  Yao-Jan Wu, ORCID: 0000-0002-0456-7915  Gabriel Geffen, ORCID: 0000-0002-1419-7276				8. Performing Organization Report No. none	
9. Performing Organization Name and Address University of Arizona 1209 E 2nd St Tucson, AZ 85719				10. Work Unit No. none	
				11. Contract or Grant No.	
12. Sponsoring Agency Name and Address Arizona Department of Transportation 206 S. 17th Avenue Phoenix, AZ 85007				13. Type of Report & Period Covered Final Report	
				14. Sponsoring Agency Code none	
15. Supplementary Notes Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration					
16. Abstract The Arizona Department of Transportation (ADOT) is evaluating the feasibility of establishing a data management office (DMO) to enhance the accessibility, quality, and coordination of its data assets. As data grows in volume and strategic importance, transportation agencies nationwide have adopted formal structures to improve data governance. This study examines national practices related to the organizational and financial structures of DMOs, including roles, staffing models, funding strategies, and implementation challenges. The research also explores the potential benefits of creating leadership positions such as a chief data officer (CDO) and geographic information officer (GIO) within ADOT. Findings support informed decision-making by identifying best practices and key lessons learned to guide the development of a DMO tailored to ADOT's needs.					
17. Key Words Data Management Office; Chief Data Officer; Geographic Information Officer; data governance; organizational structure			18. Distribution Statement Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161		23. Registrant's Seal
19. Security Classification Unclassified	20. Security Classification Unclassified	21. No. of Pages 25	22. Price none		

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## Acronyms and Abbreviations

ADOA	Arizona Department of Administration
ADOT	Arizona Department of Transportation
AGIC	Arizona Geographic Information Council
Caltrans	California Department of Transportation
CDO	chief data officer
CTDOT	Connecticut Department of Transportation
DelDOT	Delaware Department of Transportation
DMO	data management office
DOT	department of transportation
FDOT	Florida Department of Transportation
FTE	full-time employee
GIO	geographic information officer
GIS	geographic information system
HSIP	Highway Safety Improvement Program
IT	information technology
ITG	Information Technology Group
MPD	Multimodal Planning Division
ODOT	Ohio Department of Transportation
ROI	return on investment
SPR	State Planning and Research
WSDOT	Washington Department of Transportation

# Introduction

The Arizona Department of Transportation (ADOT) is increasingly recognizing the need for an agency-wide strategy to improve the accessibility, quality, and coordination of its data assets. As the volume, variety, and value of transportation data continue to grow, many transportation agencies across the country have established formal offices dedicated to data governance and management. These data management offices (DMOs) typically provide strategic oversight to ensure that data are accurate, accessible, secure, and usable across the agency. ADOT is now exploring the feasibility of establishing a DMO within the agency, along with the potential creation of two new leadership positions: a chief data officer (CDO) and a geographic information officer (GIO).

The goal of this study is to explore how a DMO could benefit ADOT and provide ADOT with information to consider concerning the structure, staffing, funding, and implementation of such an office. Specifically, the research investigates how other agencies, at the federal and state levels, have approached the development and integration of DMOs and data governance frameworks into their organizational structures. This includes examining common organizational models, funding strategies, personnel roles, and implementation challenges. The research also supports ADOT by identifying best practices, key lessons learned, and potential return on investment (ROI) to assist in making informed recommendations tailored to ADOT's needs.

ADOT envisions a DMO that improves the coordination, maintenance, sharing, and strategic use of data across the agency. Figure 1 illustrates the key functions such an office may fulfill, ranging from data governance and security to stakeholder coordination and policy development. These functions underscore the importance of not only technical data management but also institutional alignment and strategic oversight.



**Figure 1. Typical Key Functions of a DMO Within a State DOT.**

The scope of this report centers on two primary focuses: (1) the organizational structure of DMOs, including roles and responsibilities, staffing models, and placement within agency hierarchies; and (2) financial practices, including funding sources, budget planning, and approaches to measuring the ROI. These focuses reflect the core concerns outlined by ADOT and serve as a framework for synthesizing national practices and evaluating their potential applicability within ADOT.

# Recommendations

The findings from this study from a survey of other departments of transportation (DOTs) along with internal discussions with ADOT shaped the tailored recommendations for ADOT to consider in potentially establishing a DMO within their organization. These suggestions also incorporate the best practices and agency considerations concerning the operational environment, focusing on organizational structure, staffing, financial planning, and potential implementation strategy.

## Organizational Structure

Establishing a successful DMO requires thoughtful consideration of both its placement within the organizational structure and the governance model under which it will operate. These decisions directly affect the office's ability to set agency-wide data standards, coordinate across business units, and support effective, data-driven decision-making. This subsection outlines the research team's recommendations for the organizational placement of the DMO and proposes a governance model suited to ADOT's operational needs and organizational culture.

### *Placement Within ADOT*

The research team recommends the DMO be situated in a way that gives it the authority and visibility needed to lead enterprise-level data governance efforts. Best practices emphasize the importance of placement in ensuring that the office has the necessary influence to establish standards, reintegrate isolated or separated data (i.e., data silos), and promote consistent data stewardship (i.e., the responsible management, quality assurance, and proper use of data across their lifecycle, typically carried out by designated data stewards and custodians) across the agency. Note that a data custodian is a staff member responsible for the technical management, security, and storage of data systems that support business needs. In some state DOTs, the DMO (or its equivalent) operates as a standalone division that reports directly to the state engineer or another senior executive. This structure can provide strong strategic alignment and formal authority to lead agency-wide data initiatives.

However, while this structure is feasible and occasionally adopted, the research team recommends a more practical and commonly implemented approach for ADOT: embedding the DMO within the Multimodal Planning Division (MPD). MPD is a natural fit for several reasons. First, it already maintains agency-wide programs that rely on integrated data and agency-wide coordination, providing a strong foundation for the DMO's activities. Second, MPD has relatively greater flexibility in managing funding and staffing than some other divisions, which is critical for launching DMO projects and hiring necessary personnel. MPD has several funding mechanisms including State Planning and Research (SPR), Highway Safety Improvement Program (HSIP), and other federal funding programs. Considerable thought needs to be put into identifying a sustainable funding source for the DMO to properly support the agency. This funding is vital for performing projects and hiring DMO staff and will be the driving force for where the DMO ultimately resides. Having the DMO within MPD or the state engineer's office may provide more flexibility than departments that are funded predominantly by state funds. Coordination with ADOT's

Information Technology Group (ITG) would remain essential under this structure, as ITG would provide technical support, system integration, and cybersecurity expertise to complement the DMO's governance role.

Regardless of where the DMO is placed within the organization, the research team recommends the DMO be empowered with a clear charter and the authority to set standards, enforce data governance policies, and facilitate collaboration across divisions and throughout the agency.

### *Governance Model*

Equally important as organizational placement is the governance model that supports the DMO's activities. Data governance structures generally fall into one of three categories: centralized, decentralized, and federated. Each model has strengths and weaknesses, and the best approach will balance enterprise-wide coordination with the autonomy and expertise of individual business units.

A centralized governance model, where a single entity manages all data activities, can promote standardization but often proves ineffective in large, complex agencies since decision-making can become overly centralized, slowing down responses to program-specific needs and creating obstructions that hinder innovation. If ADOT were to adopt this model, data owners and domain experts (i.e., staff with subject-matter expertise in particular datasets) might be marginalized, operational bottlenecks could develop, and flexibility and innovation at the department or division level could be restricted.

A decentralized model allows individual teams to manage their own data independently. This approach aligns with how ADOT currently operates. However, it can also lead to significant challenges. Data silos are common, duplication of effort can be widespread, and the agency lacks comprehensive visibility of all its data assets. These limitations may reduce data quality, impede cross-functional collaboration, and hinder strategic decision-making.

To address these challenges while preserving the strengths of both models, the research team recommends ADOT consider adopting a federated governance model. In a federated model, data ownership remains with individual business groups, but shared standards, coordinated governance policies, and collaborative structures ensure consistency and transparency across the organization. A federated approach offers the following benefits:

- Respects expertise of subject-matter experts and local ownership of data
- Promotes agency-wide alignment on data definitions, standards, and metadata
- Establishes clear roles for data stewards and custodians across departments/divisions
- Enhances collaboration on cross-department efforts such as performance monitoring, planning, and compliance

A federated model also positions the DMO as a facilitator rather than an enforcer. In this role, the DMO helps align efforts, resolve conflicts, and foster a shared understanding of data governance practices without diminishing the autonomy of individual teams. This approach is also particularly well-suited with ADOT's existing structure, which already supports valuable data initiatives that may benefit from increased coordination and strategic oversight.

## **Roles and Responsibilities**

The effectiveness of a DMO depends heavily on the leadership and operational capacity it is given. This includes identifying key roles, defining their responsibilities, and ensuring that the organizational structure reflects the importance of the DMO's mission. This section outlines the recommended roles of a CDO and a GIO as well as the various support positions necessary for sustained implementation and success.

### ***Chief Data Officer***

The CDO may serve as the executive lead for data governance across the agency. This role is responsible for setting agency-wide data standards, overseeing data quality and accessibility, coordinating cross-divisional data efforts in collaboration with ADOT's ITG, and fostering a culture that treats data as a strategic asset. The CDO should have the authority to implement governance frameworks, resolve data conflicts between departments/divisions, and align data management efforts with ADOT's strategic priorities.

Given the executive-level scope of responsibility, the CDO position would require a classification that reflects its senior leadership role and ability to influence agency-wide initiatives. This classification reflects not only the complexity of the role but also the level of influence required to engage with senior leadership, lead enterprise-wide initiatives, and ensure compliance with federal and state-level data mandates. Ideally, the CDO would report to the head of the MPD or directly to the state engineer, depending on the final placement of the DMO.

### ***Geographic Information Officer***

The GIO could potentially be responsible for the strategic oversight and coordination of ADOT's geospatial data and geographic information system (GIS) infrastructure. The GIO could work closely with the CDO to ensure that geospatial data governance aligns with broader enterprise standards while also focusing on spatial data accuracy, usability, and compliance with national geospatial frameworks.

While ADOT already has strong GIS leadership in place, the GIO role could provide an enterprise-level bridge between those operational teams and broader data governance strategies. The GIO could coordinate with business units to standardize GIS practices, reduce redundancy, and support agency-wide geospatial initiatives such as asset management, work zone mapping, and multimodal planning.

The GIO position would also need to be established at a senior leadership level to ensure it has the authority and capacity to coordinate horizontally across the agency. Currently, there is no Arizona Department of Administration (ADOA) job description for the GIO role, so one would need to be created to implement this position.

### ***Support Staff***

To be effective, the DMO would also need support staff with both technical expertise and the ability to coordinate across divisions, facilitate communication between data owners and leadership, and ensure consistency in implementing governance policies. These may include data analysts, GIS specialists, data

stewards, and liaisons responsible for communication and implementation of governance policies within each business unit. However, if financing and staffing constraints are a concern, the research team recommends a more flexible approach to fulfilling these support roles. Rather than hiring a large, permanent team, ADOT can explore cost-effective alternatives such as:

- Repurposing existing staff from divisions with demonstrated interest or capacity in data governance
- Hiring staff contractors to perform specialized roles on a short- or medium-term basis
- Borrowing personnel on rotation from units like ITG, where staff may already have technical expertise and require only a brief onboarding into DMO standards and processes

These approaches could allow the DMO to scale operations based on needs and available funding while still building internal capacity and momentum over time. Detailed discussion of funding mechanisms and staffing models is provided in the following *Finance and Implementation Strategy* section, but it is important to acknowledge here that support staff will be essential to the DMO's success, even if implemented incrementally.

## **Finance and Implementation Strategy**

A DMO is a strategic investment that can be accomplished with thoughtful planning and modest initial resources. The recommendations outlined in this section are designed to align with ADOT's operational structure and budgetary realities while still enabling a strong foundation for long-term success. This section addresses key considerations related to staffing and budgeting, potential funding mechanisms, and a recommended phased implementation strategy. It emphasizes that while startup costs may be limited, sustained growth and institutionalization of the DMO will benefit from a well-planned approach to resource allocation and internal engagement.

### ***Staffing and Budgeting Approach***

Initial startup costs for a DMO are relatively modest. The most critical expenditures are associated with establishing key leadership positions (e.g., CDO or equivalent). In addition, the hiring of new full-time staff within ADOT may also present significant challenges due to current statewide caps on headcounts. While the statewide cap is not a hiring freeze, it does limit the overall number of full-time employee (FTE) positions that can be filled. As a result, the research team recommends that the DMO implement a flexible and creative staffing strategy that balances resource needs with organizational constraints.

To balance resource needs with organizational constraints, the DMO may use a staffing approach that emphasizes cost efficiency:

- Leveraging existing employees reduces the need for new hires, allowing the agency to tap into existing salary lines rather than expanding payroll.
- Using staff contractors allows ADOT to cover specialized technical needs while avoiding long-term benefit costs and permanent headcount increases.
- Rotating personnel from divisions such as ITG minimizes onboarding expenses and leverages sunk training costs, ensuring expertise is shared without duplicating resources.

All of these staffing models reduce the burden of formal hiring processes while still allowing the DMO to build the capacity needed for effective early-stage implementation of its governance framework and activities.

Additionally, best practices recommend the use of vendor or consultant support during the early phases of DMO establishment, particularly for activities such as developing a formal data governance framework, drafting a business plan, or facilitating cross-divisional stakeholder engagement. These services can be selectively used depending on funding availability and internal capacity.

### *Funding Mechanisms*

A variety of federal and internal funding mechanisms can be used and leveraged to support the DMO's initial launch and sustaining operations. These include:

- SPR funds, which are commonly used for planning, coordination, and program development activities
- HSIP or other federal sub-programs, particularly when DMO work contributes to safety data, performance reporting, or compliance
- Dedicated project-based funding, such as task-specific contracts or research grants, which can be used to support pilot initiatives, build shared data infrastructure, or develop internal guidance materials.

Using a mixture of these sources may help reduce reliance on the agency's general funds and may support flexible staffing approaches (e.g., contractors or temporary rotations), which is particularly useful given ADOT's current headcount cap constraints. Over time, additional funding opportunities may arise through competitive grants or demonstrated value from the DMO's early progress and efforts.

### *Implementation Strategy*

If ADOT decides to move forward with the creation of a DMO, the research team recommends a phased approach to the establishment of the DMO. This method could allow ADOT to begin with a smaller and more manageable scope, show early successes, and improve its processes before expanding across the agency. A phased approach is consistent with best practices and is more likely to gain internal buy-in, especially in complex organizations with diverse data systems and cultures.

The implementation should begin by selecting a small number of candidate business units that are already engaged in data-centric activities or have expressed interest in improving data governance. By piloting governance standards, workflows, and support tools in these areas, the DMO can generate practical insights and success stories to inform a broader rollout later. Lessons learned during this pilot phase can be incorporated into the data management business plan, which will serve as a roadmap for scaling the DMO's efforts over time. This business plan should include a vision and mission for data governance at ADOT, clear goals and milestones, defined roles and responsibilities for stakeholders, and a timeline for expanding governance practices across additional departments/divisions. While consultant support may be helpful for drafting this plan, it is not essential. The CDO and GIO can lead this effort directly, reinforcing their leadership role and ownership of the governance framework.



# Findings

The primary purpose of this research study was to conduct a literature review and a state of the practice concerning the establishment of a DMO for ADOT to consider. National trends and agency-specific considerations were examined with a focus on how comparable organizations structured and funded their data governance efforts. The study was divided into two main areas: organizational structure and financial considerations. These two domains form the foundation for understanding which models have proved effective, common challenges, and emerging best practices in public-sector data management. The findings in this section summarize key observations from these areas and provide the basis on which the recommendations in the previous section were based upon.

## Organizational Structure

The internal structure of a DMO plays a critical role in determining its effectiveness, authority, and strategic alignment within a state DOT. This section reviews how DMOs are currently structured across state DOTs, focusing on institutional placement, staff roles and responsibilities, governance frameworks, and financial practices. While no two DOTs have adopted identical models, several consistent patterns and decision points have emerged, particularly in relation to leadership configuration and the balance between centralized and distributed oversight.

To contextualize Arizona's position nationally, Figure 2 provides a bar chart showing the number of DOTs within each governance configuration category, which summarizes the distribution of key data governance roles across the 21 states that responded to the ADOT DMO Survey (ADOT 2024). This survey, conducted by ADOT, gathered information on data governance structures and key leadership roles across state transportation agencies.

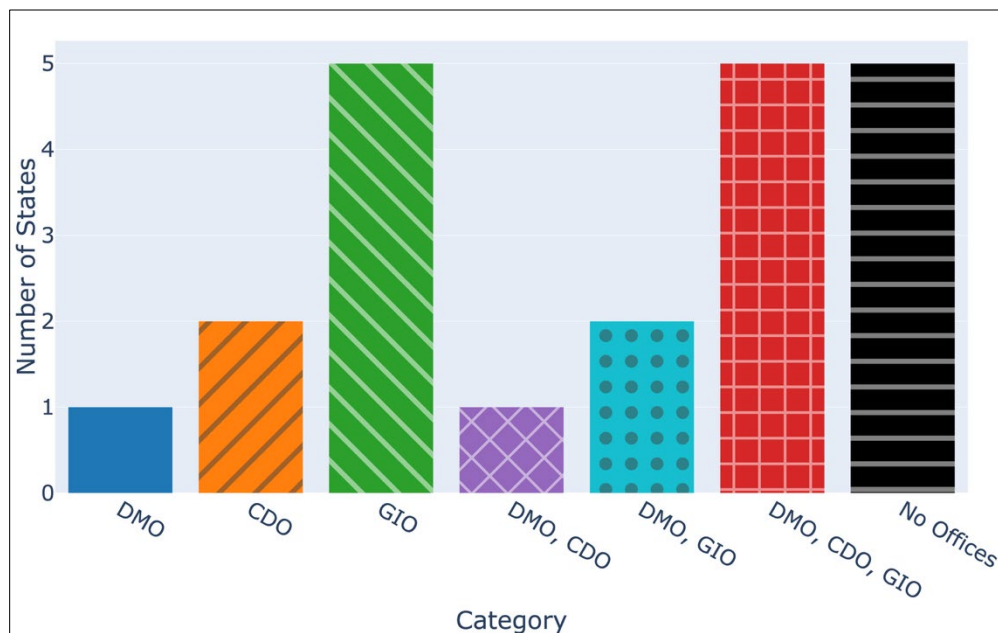


Figure 2. DOTs that Participated in the ADOT Survey that have DMO, CDO, and/or GIO.

Understanding these variations helps inform how agencies structure data governance and provides ADOT with comparative examples of how other agencies institutionalize data coordination and oversight.

### *Institutional Placement Within the Agency*

The placement of a DMO within a DOT's organization influences its access to decision-makers, its ability to secure funding, and has impacts long-term sustainability. The state DOT interviews conducted for this study revealed four common models of institutional placement (Shang et al. 2025).

The most frequently cited placement was within a planning division. This alignment supports strategic objectives such as performance monitoring, capital planning, and statewide data initiatives. DMOs embedded in planning often benefit from closer engagement with executive leadership, which can enhance cross-departmental coordination. However, despite these strategic benefits, planning-based DMOs may face limitations in terms of authority over technical systems or operational data governance.

Alternatively, some agencies position the DMO within the IT department. This model leverages the technical expertise and proximity to enterprise systems available within IT, which enables stronger enforcement of data standards, system integration, and security protocols. While technically robust, this placement can sometimes limit the DMO's interaction with data owners and policy-driven staff or reduce its visibility in broader strategic conversations.

A few DOTs experimented with situating the DMO in operational, risk management, or legal divisions. However, these arrangements were typically short-lived. Agencies found that such placements often lacked the necessary domain expertise and did not align well with strategic data management goals, leading to limited impact and sustainability.

Lastly, a small number of agencies opted to establish the DMO as an independent office with authority comparable to planning or ITG. This structure offers wide-ranging influence and organizational flexibility, allowing the DMO to function as a neutral coordinator across departments. Despite these benefits, agencies noted that standalone DMOs sometimes encountered resistance from other departments and struggled with shared budgeting or governance mechanisms.

As organizational priorities and contexts have evolved, so has the placement of the DMO within DOTs.

Table 1 presents the current placement of the DMO in each agency at the time of the interviews, providing a snapshot of how agencies are structuring their data governance efforts.

**Table 1. Placement and Structure of DMOs.**

State DOT	DMO Name	Department Placement
Washington (WSDOT)	Enterprise AI and Data Services	Technology Services (functions as the agency's IT department)
Ohio (ODOT)	Data Governance Office	Planning
California (Caltrans)	CTDATA (Caltrans Data is Authoritative, Trusted, and Accessible)	Planning and Modal Program (PMP)
Maryland DOT	Asset Management Office (acting as a DMO while being established)	Each division has its own DMO. The Key Performance Office is part of the Office of Policy and Research and resides within the State Highway Administration
Connecticut (CTDOT)	Data Management Integration and Governance	Bureau of Policy and Planning*
Delaware (DelDOT)	No designated office for data management; responsibilities are handled by the Technology and Innovation Division	The DMO is its own division and reports directly to the Secretary of Transportation

\* The Bureau of Policy and Planning is an internal division within CTDOT, not an independent agency.

Ultimately, the optimal placement depends on agency-specific factors, including leadership priorities, internal culture, and data maturity. Regardless of placement, successful DMOs were those that maintained strong interdepartmental coordination and were empowered to influence agency-wide practices.

### ***Key Roles and Responsibilities***

A successful DMO relies on assembling a structured team of professionals responsible for guiding data strategy, governance, quality assurance, and integration. While organizational structures vary by state, a review of current practice and national examples reveals a consistent set of roles that support both strategic oversight and day-to-day data operations. These include strategic leadership positions such as the CDO and GIO, operational staff like data stewards and custodians, and cross-functional coordinators who connect centralized governance to departmental practices. As DOTs face increasing demands for secure, reliable, and actionable data, understanding these roles is essential for evaluating the feasibility and design of a future DMO at ADOT.

### **Chief Data Officer**

The CDO is a senior executive who leads agency-wide data governance efforts and serves as a champion for aligning data assets with organizational goals. Rather than serving as a technical IT lead, the CDO typically operates as a business strategist who shapes policy, builds cross-departmental partnerships,

and oversees the development of internal data policies, standards, and performance metrics (Maryland DOT 2017; State of Florida 2024). In most states, this role reports directly to the agency's executive leadership—underscoring its broad strategic influence (CT OPM 2022).

CDOs are responsible for coordinating the development and implementation of data governance frameworks, including policies on data retention, access, and sharing (Maryland DOT 2017; CTDOT 2022). Their responsibilities often extend to workforce development, including recruiting data professionals, building internal training programs, and leading the cultural shift toward more data-informed decision-making (State of Florida 2024; CTDOT, 2022). For example, in Connecticut, the CDO supports the development of an enterprise GIS unit and leads efforts to expand staff capacity for data analysis and geospatial insight (CTDOT 2022). Other DOTs, such as those in Florida and at the federal level, emphasize the CDO's role in aligning internal initiatives with federal requirements around open data, cybersecurity, and privacy compliance (USDOT 2023; State of Florida 2024).

The CDO also plays a central role in maintaining data quality and metadata standards. This includes developing systems for tracking data integrity, addressing quality issues, and ensuring that all documentation is accurate and up to date (Maryland DOT 2017). These practices form the foundation for reliable data exchange across departments and improve transparency in decision-making processes.

### **Geographic Information Officer**

While the CDO provides enterprise-level oversight, the GIO leads the agency's strategy and infrastructure for geospatial data. This role has grown in importance as GIS tools are increasingly used in transportation planning, asset management, and performance analysis. In some states, the GIO reports to the CDO, while in other states the two roles operate as peers with distinct but complementary responsibilities (CDT 2023; CT OPM 2021).

The GIO is responsible for setting geospatial standards, managing GIS platforms, and ensuring interoperability across departments. Responsibilities include supervising GIS staff and vendor contracts, overseeing procurement for spatial data systems, and managing budget allocations related to geospatial technologies (CT OPM 2021). The GIO also plays a critical coordination role—serving as a liaison between technical teams, executive leadership, regional partners, and federal or local stakeholders. For example, Arizona's participation in the Arizona Geographic Information Council (AGIC) demonstrates how this coordination supports broader geospatial governance goals, though AGIC itself is housed outside of ADOT (GARC 2024).

In DOTs that have embedded GIOs internally, such as Florida and California, these roles support specific transportation applications, like snowplow routing, crash hotspot analysis, and infrastructure vulnerability mapping. These cases demonstrate the value of integrating GIS into both operations and long-range planning (CDT 2023; CT OPM 2021).

## **Data Stewards**

Data stewards serve as the bridge between technical infrastructure and business operations, ensuring that data meet internal and external quality standards. They are typically responsible for maintaining data documentation, facilitating standardization, and verifying accuracy across the data lifecycle. In some DOTs, data stewardship is not assigned to individuals but to entire business units, which helps ensure continuity even amid staff turnover (WSDOT 2022).

Agencies such as the Washington State Department of Transportation (WSDOT), Florida Department of Transportation (FDOT), and Michigan DOT have institutionalized these roles to safeguard the integrity and usability of data products (State of California 2024; Maryland DOT 2019; WSDOT 2022). Data stewards also support compliance with open-data mandates and help coordinate the release of datasets to the public and other stakeholders. As data sharing becomes more central to DOT operations and partnerships, this role is expected to expand in both scope and visibility.

## **Data Custodians and Technical Staff**

Where stewards focus on business rules and documentation, data custodians and technical staff manage the systems that store, secure, and deliver the agency's data. These roles include database administrators, systems architects, and IT professionals responsible for implementing governance standards at the infrastructure level. Their work ensures that platforms are secure, scalable, and aligned with enterprise data strategies.

In several agencies, including FDOT and Maryland DOT, data custodians work closely with data stewards to execute shared governance frameworks and enforce access controls, validation protocols, and system-level safeguards (FHWA 2020, Maryland DOT 2019).

## **Coordinating and Specialized Roles**

As DMOs expand in scope, many DOTs are introducing new roles to facilitate coordination across departments and elevate agency-wide initiatives. Two notable roles are the Data Coordinator (or Executive-Level Sponsor) and the Enterprise Data Steward.

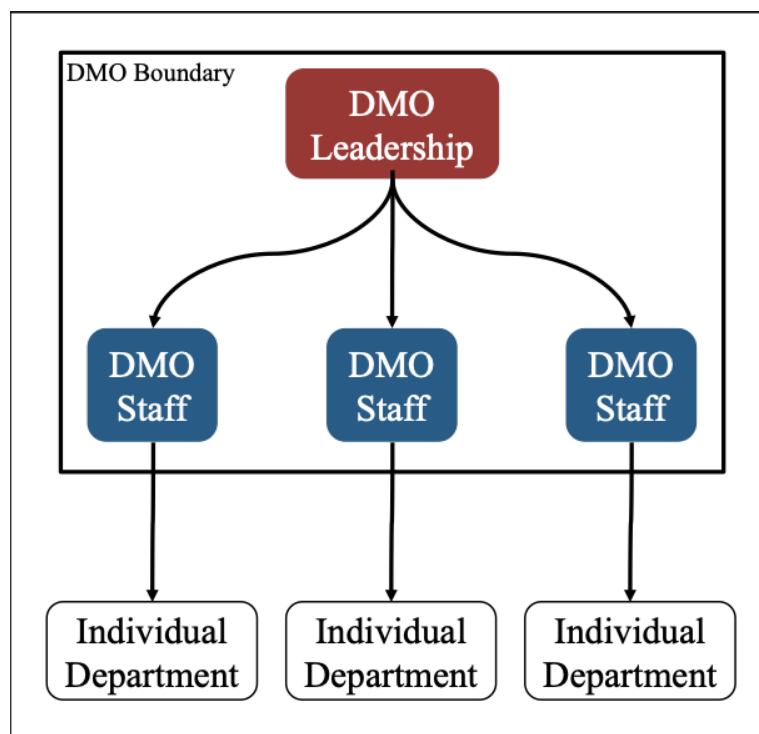
Data Coordinators are typically senior staff members embedded within departments who act as liaisons between local operations and enterprise governance teams. While they do not report directly to the CDO, they are tasked with implementing data initiatives within their home divisions, enforcing policies, and escalating issues that require agency-wide coordination. These roles have been institutionalized in agencies like FDOT, WSDOT, and Caltrans, where data coordinators help ensure that governance frameworks are executed consistently across all units (State of California 2024; FHWA 2020; WSDOT 2022).

Enterprise data stewards represent a broader cross-functional role that oversees domain-specific stewards and custodians across multiple areas. At FDOT, for example, enterprise data stewards lead data governance working groups and report directly to executive teams. They help align stewardship activities with strategic goals, creating a unified framework that supports analytics, compliance, and performance measurement (FHWA 2020).

## Governance Models

The structure of a data governance framework within a DOT greatly influences how staff roles are coordinated and how effectively the agency can manage its data assets. This section outlines three commonly observed models—centralized, decentralized, and federated—that DOTs use to manage data oversight and implementation responsibilities. Each approach reflects a different method of distributing authority, managing accountability, and facilitating coordination, and the choice of model has a direct impact on a DMO’s ability to implement policies, engage stakeholders, and adapt to evolving agency needs.

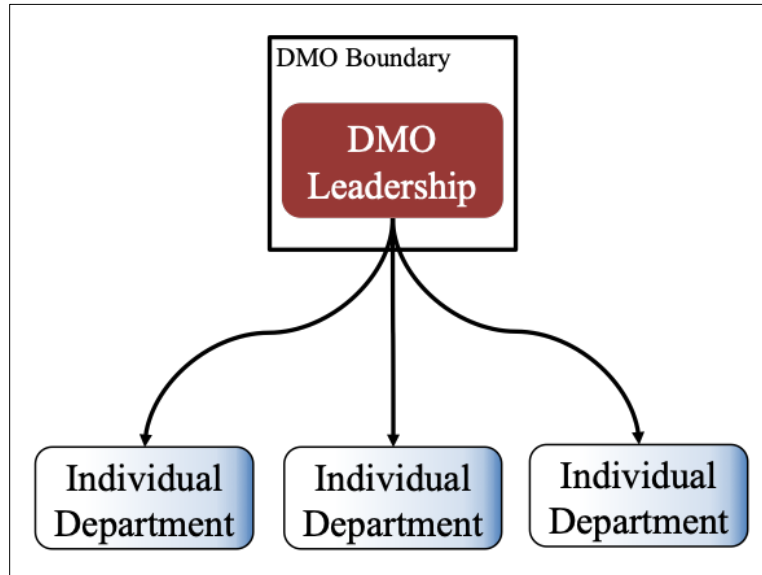
In a centralized model, the DMO is positioned in a high-level leadership role, typically situated within the executive office or a central department. Staff within this structure report directly to DMO leadership, giving the office consolidated authority over data-related decisions. This structure supports consistent standards, streamlined operations, and top-down policy enforcement across the agency. It is often favored by DOT agencies looking to build consistency across departments or strengthen their data maturity. However, this model can be less adaptable to the unique needs of specific departments and may face challenges in sustaining buy-in from all business areas over time. Figure 3 illustrates a simplified view of the centralized governance model, with the DMO leadership and staff directing data functions across all departments.



**Figure 3. Centralized Governance Model.**

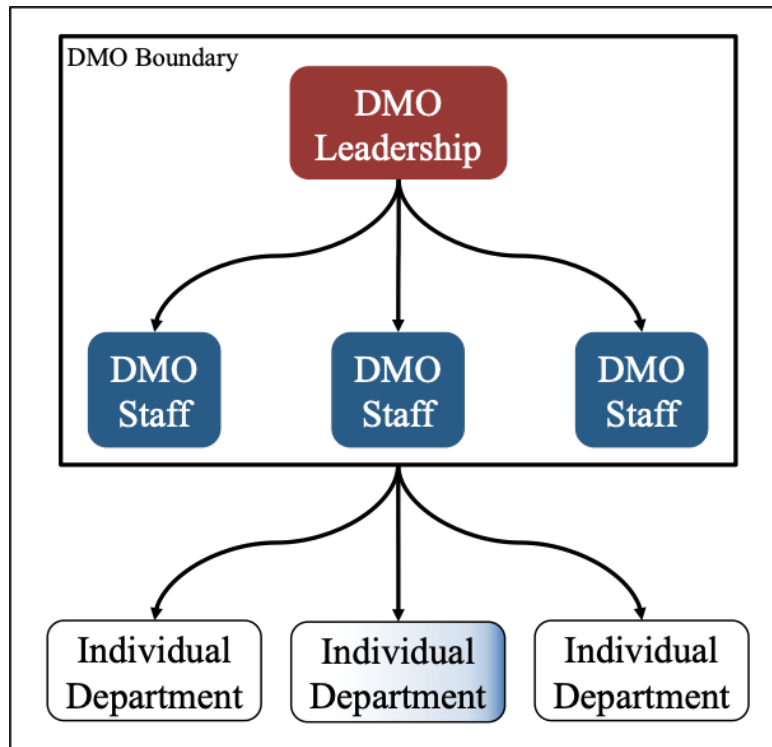
A decentralized model takes a different approach by allowing individual departments or business units to manage their own data practices. In this configuration, a central DMO or lead may still exist, but their role is more advisory than directive. Data stewards and technical staff are embedded within specific departments/divisions, and each unit develops its own workflows, tools, and data standards. While this

model promotes autonomy and allows departments to tailor solutions to their specific needs, it often results in fragmented data systems, limited coordination, and inconsistent practices across the agency. Figure 4 demonstrates the structure of this model, emphasizing the autonomy of each department and the limited direct control exercised by DMO leadership.



**Figure 4. Decentralized Governance Model.**

The federated model offers a hybrid approach that combines elements of centralized oversight and departmental autonomy. Under this structure, the DMO sets broad policies and provides strategic direction, while operational control over implementation remains with the individual departments. Strong communication and coordination roles, such as enterprise data stewards or data coordinators, are key to making this model work effectively. These roles help align local practices with enterprise goals, ensuring a balance between consistency and flexibility. This model is often well-suited for large or complex DOTs, where operational diversity makes a strictly centralized approach impractical. Figure 5 depicts the federated model, showing the dual relationship between centralized leadership and distributed departmental authority.



**Figure 5. Federated Governance Model.**

## Financial Practices

Establishing and sustaining a DMO within a state DOT requires thoughtful financial planning. While the specific costs and funding models vary from state to state, common financial considerations include startup investments, ongoing operational expenses, staffing strategies, and long-term funding mechanisms. This section outlines the financial structures reported by peer agencies and highlights both the challenges and opportunities associated with budgeting for data governance activities.

### *Startup and Operational Costs*

Launching a DMO requires both initial investments and sustained operational funding. This section draws on interviews with DOT staff in three states to summarize cost patterns and budget strategies used during DMO development (Shang et al. 2025). Most DOTs begin by appointing key personnel, such as a CDO and a GIO, in addition to hiring a small team of staff or hiring consultants to launch the initial DMO effort. External consultant support is often used during the startup phase to conduct data maturity assessments, design governance frameworks, and align internal stakeholders around a unified vision. The total startup costs reported by peer agencies vary significantly, ranging from approximately \$200,000 to more than \$3 million, depending on the scale of consultant engagement and the scope of early activities (Shang et al. 2025). Table 2 summarizes the reported startup cost estimates from the three DOTs interviewed for this task. These values reflect the costs incurred in each state and have not been adjusted for inflation or regional differences in salary scales, procurement practices, or cost of living.



**Table 2. Startup Costs Associated with DMOs.**

State DOT	Year of DMO Establishment <sup>1</sup>	Startup Cost Category	Estimated Cost <sup>2</sup>
Ohio (ODOT)	2019	Contracts with third parties	\$2–3 million
California (Caltrans)	2017	Initial staffing; contracts with third parties	\$350,000; \$2 million
Connecticut (CTDOT)	2024	Initial staffing	\$180,000

<sup>1</sup>Year of DMO establishment reflects the best available information and, in some cases, is inferred from contextual details or external sources rather than direct interview responses.

<sup>2</sup>These values are rough estimates provided by the specific DOTs interviewed. They reflect the costs specific to each state's expenditures and the time period in which they incurred.

As DMOs grow more established, operational costs tend to increase. Mature offices often support between eight to ten full-time employees, often supplemented by contractor support. In addition to salaries and benefits, agencies also often budget for software licensing, GIS tools, and enterprise platforms that support data integration, metadata tracking, and governance management. One DOT, for example, reported investing \$9 million in a centralized data platform, with ongoing maintenance costs of approximately \$500,000 per year (Shang et al. 2025). However, many agencies emphasized that these investments are not entirely new; rather, they often replace or consolidate pre-existing spending on disparate information technology (IT) modernization projects and data systems. From this perspective, the DMO is viewed as a mechanism for coordinating and optimizing data investments, rather than introducing additional financial burden. Table 3 summarizes operational cost estimates gathered from the interviewed DOTs.

**Table 3. Operational Costs Associated with DMOs.**

State DOT	Operation Cost Category	Estimated Cost
Ohio (ODOT)	Staffing	10 FTE and 10 staff contractors
California (Caltrans)	Staffing; technology infrastructure; contracting and licensing	9 FTE; \$9 million (development) and \$500,000/year; \$150,000
Connecticut (CTDOT)	Staffing; technology infrastructure and licensing	4 FTE; \$500,000

It is worth noting that some of these costs, such as enterprise software licenses or broader data governance platforms, may have been incurred regardless of DMO establishment as part of broader agency-wide IT or data-modernization efforts. In these cases, the DMO may contribute to the planning or use of such investments, even if it is not the sole reason for the cost. In summary, operational costs reflect the ongoing resource commitments necessary to scale and sustain a DMO's impact as its mission evolves.

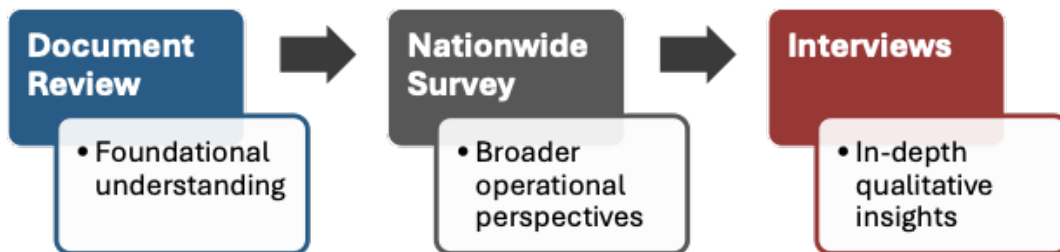
## *Return on Investment*

Although none of the agencies interviewed reported conducting a formal ROI analysis, nearly all interviewees identified qualitative benefits that reflect substantial value (Shang et al. 2025). Improvements in data quality, such as completeness, accuracy, and timeliness, were cited frequently, along with enhanced documentation practices and stronger institutional memory. Agencies noted that centralized oversight enabled better tracking of decision-making processes and more consistent implementation of standards across departments. In addition, the presence of a DMO has supported improved interdepartmental coordination and increased compliance with data privacy, sharing, and reporting requirements.

A few DOTs expressed interest in developing internal tools, such as data health indices, to better measure the quality and usefulness of their data over time (Shang et al. 2025). At the time of writing, these tools are still under development but represent an important step toward quantifying performance. Across all responses, agencies stressed that short-term or opportunistic funding is insufficient to support long-term success. Instead, effective DMOs rely on consistent financial support, dedicated staffing, and integration into broader agency planning and operations. When sustained properly, DMOs offer significant potential to reduce redundancy, improve data accessibility, and increase the overall strategic value of transportation data assets.

# Methods

This study used a multifaceted approach to assess the feasibility and design considerations for establishing a DMO. The methodology included three primary components: a document review, a review of a DMO survey conducted by ADOT, and follow-up interviews with selected state DOT agencies. Each component provided a complementary perspective to support a comprehensive understanding of current practices and potential opportunities related to data governance in the transportation sector. Figure 6 presents an overview of the study approach and the specific contribution of each component of the methodology to the overall research goals.



**Figure 6. Overview of Multi-Component Research Methodology.**

## Document Review

The first phase of the project involved a structured review of publicly available resources to better understand how data governance and DMO functions are currently organized across transportation agencies. Materials reviewed included state DOT websites, agency strategic plans, published reports, internal policy documents, and federal guidance. Emphasis was placed on identifying references to data governance policies, the presence of formal data offices, and the roles and responsibilities associated with data leadership, such as CDOs and GIOs.

Findings from this review provided important context for understanding the diversity of approaches and terminology used by other agencies. These insights also informed follow-up research activities by identifying common themes and information gaps.

## DOT Survey Provided by ADOT

To gain a broad understanding of how state transportation agencies are organizing their data governance functions, ADOT conducted a DMO survey in early 2024. The survey aimed to gather information on the establishment and institutional positioning of DMOs as well as on the key staffing roles, such as a CDO and GIO, across state DOTs. A total of 21 states responded, offering a diverse snapshot of governance maturity levels and organizational structures.

Among the responding agencies, nine states reported having a formal DMO in place, eight states had a designated CDO, and 12 reported the presence of a GIO. The survey captured a wide range of perspectives, including both well-established DMOs and newer or emerging offices. It also provided insights from agencies that have not yet implemented a DMO, highlighting common barriers such as unclear ROI, limited funding, and institutional complexity.

While the survey offered useful information about the prevalence and roles of key data leadership positions, it did not address some of the detailed implementation factors necessary for a feasibility analysis, such as startup costs, staffing requirements, or organizational workflows. The ADOT DMO Survey was instrumental not only in framing the DOT landscape for DMO adoption but also in guiding the follow-up interviews, selection of interviewees, and the refinement of questions to fill in knowledge gaps.

## **Stakeholder Interviews**

To supplement the document review and survey summary, the research team conducted semi-structured interviews with representatives from state DOTs to gain firsthand insights into the operations, structures, and challenges of their DMO. These interviews provided an in-depth perspective on how different agencies manage data governance, staff and fund their DMO, and align data initiatives with broader organizational goals.

The interviews were guided by a standardized protocol, and the questions explored a range of themes including governance frameworks, staffing models, funding strategies, and interdepartmental coordination processes. The semi-structured format allowed for follow-up questions to further explore agency-specific practices or emerging insights.

Two key resources informed the design and targeting of the interview process. First, the ADOT DMO Survey (ADOT 2024) provided a baseline understanding of national practices, which helped identify agencies with well-established or emerging DMOs for follow-up engagement. Second, Policy 4400 (P4400), issued by the ADOA in 2022, outlined recommended operational guidelines for DMOs based on agency size and budget. This policy served as a benchmark for evaluating the relevance and applicability of practices observed in other states.

### ***Interview Selection Criteria***

Interview candidates were selected through a purposive sampling strategy based on three main criteria:

1. **Survey Findings** – Agencies that indicated either a currently operational DMO or active planning toward DMO development were prioritized.
2. **Public Documentation** – Agencies with publicly available materials suggesting mature or emerging data governance structures were favored.
3. **Structural Comparability** – Agencies with organizational similarities to ADOT, such as oversight of a motor vehicle department, were included to ensure contextual relevance.

A total of six interviews were conducted with representatives from the WSDOT, ODOT, Caltrans, Maryland DOT, CTDOT, and DelDOT. These agencies offered a range of perspectives, from long-standing DMOs to newly formed ones, providing insights into both the early and mature stages of DMO development. Their willingness to participate and share practical experiences offered a valuable foundation for identifying governance strategies and best practices that could inform ADOT's own planning and alignment with P4400 guidelines.

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