

**U.S. DEPARTMENT OF
TRANSPORTATION ROADWAY
TRANSPORTATION DATA
BUSINESS PLAN (PHASE 3)**

**DATA BUSINESS PLAN
DEVELOPMENT FOR STATE AND
LOCAL DEPARTMENTS OF
TRANSPORTATION**

Final Report

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CHAPTER 1. INTRODUCTION

State Departments of Transportation (DOTs), Metropolitan Planning Organizations (MPOs) and regional transportation agencies have access to a proliferation of data sources to support planning and operations of multimodal transportation systems. There is increasing need to compile, integrate, and analyze transportation mobility data to support performance measurement, decisionmaking and Transportation System Management and Operations (TSMO). Many technical and institutional challenges must be overcome in organizing and applying the data. The Data Business Planning process is a technique designed to assist with identifying challenges, gaps, solutions and action items to ensure maximum efficiency in managing data to support relevant business needs for an agency.

As part of the U.S. DOT Roadway Transportation Data Business Plan (DBP) project, the Federal Highway Administration (FHWA) Office of Operations developed this technical assistance document for State DOT and local agency staff charged with mobility data-related responsibilities to follow in the creation, development, and implementation of a tailored DBP for roadway travel mobility data, defined as follows¹:

Roadway travel mobility data is travel data from the following roadway travel modes: vehicle, truck freight, bicycle/pedestrian, and transit. Travel data includes vehicle volume, speed, and lane occupancy data, as well as connected vehicle data such as vehicle location, presence, and speed within the system, internal vehicle status such as fuel consumption rate, or externally measured data such as recorded external temperature and weather conditions. Travel data for transit could include location, speed and status data, passenger counts, and schedule adherence data. Freight carriers may supplement the standard location and position report with gross weight data or data regarding the type and time-critical nature of goods carried.

A DBP is a plan for efficient use of people, processes, and technology. It links business objectives, programs, and processes to data systems, services, and products and guides an agency in data management practices.

This type of DBP will help State DOT and local partners understand what roadway travel mobility data is being collected within their organizations and at the regional level, how the data supports mobility planning, operations, and performance measure activities, and who is responsible for managing/updating the data. The process will also help solidify working relationships by identifying how various offices/agencies share and exchange roadway travel mobility data with both internal and external stakeholders. Another benefit of organized, well understood data is that it can then be used to support comprehensive diagnostics for the transportation system and can better inform whether specific operational practices are having an intended system-wide effect. Finally, data business planning will help identify potential

¹ U.S. DOT Roadway Transportation Data Business Plan, FHWA-JPO-13-084, January 2013.

duplicative data collection efforts, leading to more rapid, targeted data acquisitions that would reduce future data collection/management costs.

Systematic instructions are provided in this document on how to plan for, implement, and maintain a DBP, including: stakeholder outreach, data assessment and improvement plan, data governance processes and documents, and data management practices.

A draft of this document was tested and implemented within three pilot transportation agencies around the country. One of the key lessons learned in the pilots was that the process of developing a DBP while working with stakeholders was as beneficial as the resulting action plan. Following the steps in this document will result in activities such as Data Coordination groups forming to address common issues. The lessons learned by developing regional level DBPs using the initial draft document were incorporated into this final assistance document.

ORGANIZATION

The remainder of the DBP is organized as follows:

- **Chapter 2: Data Business Plan Development.** This section provides assistance for State and local DOTs to develop a DBP for roadway travel mobility data.
- **Chapter 3: Data Business Plan Implementation.** This section provides assistance for implementing the DBP.
- **Appendix A: Example Stakeholder Letter.**
- **Appendix B: Example Memorandum of Understanding.**
- **Appendix C: Example Data Sharing Agreement.**
- **Appendix D: Example Stakeholder Survey.**
- **Appendix E: Survey Practices.**
- **Appendix F: Example Charter.**
- **Appendix G: Example Data Governance Manual.**
- **Appendix H: Glossary of Data Management and Governance Terms.**

CHAPTER 2. DATA BUSINESS PLAN DEVELOPMENT

This section provides assistance for State and local Departments of Transportation (DOTs) to develop a data business plan (DBP) for roadway travel mobility data, including stakeholder outreach, data assessment, gap assessment, improvement plan, data governance processes and documents, and data management practices. The audience is intended to be State and/or local DOTs or Metropolitan Planning Organizations (MPO's). The term “lead agency” is used to represent the agency leading the effort to develop the DBP.

Figure 1 depicts the steps of the DBP.



Figure 1. Process chart. Data business plan steps.

STEP 1. ESTABLISH NEED AND OBJECTIVES

A lead agency should begin by establishing the need and objectives for the DBP. This involves examining the high-level challenges and opportunities for improving mobility data in the region. For example, an agency may wish to address stakeholder needs for specific mobility data systems (e.g., data systems, data elements, data collection methods, duplicative data collection

efforts, data storage environments, quality of data, data standards, data integration, data analysis, documentation, and system access), technology and tools for managing data (e.g., software, hardware, system interfaces, Information Technology (IT) compatibility, business intelligence tools, analytical tools, knowledge management, and network issues), or the management/governance of the data (e.g., business rules and processes, data management, data governance, coordination across business lines, resource availability, and training needs). Some pilot sites found it beneficial to obtain input from executive leadership regarding how the DBP fits into the larger agency goals/direction.

Lead agencies should also develop an outcome statement describing the results the DBP will achieve. Example outcome statements are below:

- Hillsborough MPO: The expected outcome of the DBP is a framework for partner agencies to share travel time and speed data for roadway users and freight within the tri-county region for planning purposes.
- Mid-America Regional Council: The expected outcome of this effort is to develop a process for developing, collecting, calculating, and reporting on performance measures to support mobility in the region.

The Maryland DOT State Highway Administration (SHA) used the DBP to develop a Framework representing the interaction, structure, and components for Maryland DOT SHA to integrate and report on mobility data. It has three components:

- Data—Description of data elements including data inventory and required improvements related to availability, timeliness, coverage, and quality.
- Architecture—A high-level description of the interaction between databases and tools to support use of the integrated mobility data.
- Governance—Components of an institutional structure describing roles and responsibilities related to ensuring all data is available.

Maryland DOT SHA also defined three tiers of data to assist with prioritizing action items in the plan. They are:

- **Tier 1.** Traffic volume and speed.
- **Tier 2.** Origin/Destination, accessibility, truck freight, work zone and signal timing.
- **Tier 3.** Connected and Automated Vehicle.

STEP 2. STAKEHOLDER OUTREACH

The next step is to identify and document the stakeholders for roadway travel mobility data. Stakeholders include any internal or external person or organization that collects, owns, maintains, uses, interfaces with, accesses, or benefits from roadway travel mobility data. These stakeholders play a vital role in identifying the business needs and uses for roadway travel mobility data from the perspective of their individual offices or agencies.

Internal stakeholders may include those involved in traffic operations, traffic safety, roadway design, pavement design, maintenance, air quality, modal, and connected vehicle capture activities. External stakeholders may include State and local transportation agencies, traffic management centers, transportation system managers, Corridor Coalitions, transit agencies, metropolitan planning organizations, researchers, freight operators, private data providers (e.g., Inrix, Nokia-Navteq-HERE, TomTom, TrafficCast, etc.), neighboring State DOTs, media providers, the traveling public, and FHWA.

A lead agency should develop a stakeholder registry and plan for engaging stakeholders throughout each step of the DBP development process. The registry should include contact information for each stakeholder, including name, agency/office name, email, and phone number. The plan should identify the stakeholders that are relevant for each step of developing the DBP, the feedback desired for that step, and engagement mechanisms (e.g., in-person meetings, surveys, focus groups, workshops, research studies, briefings, etc.).

An example of a Stakeholder Engagement Plan is shown in table 1.

Table 1. Sample stakeholder engagement plan.

Data Business Plan Development Process	Key Actions	Relevant Pilot Site Stakeholders	Stakeholder Input Needed	Outreach Mechanism
Step 1. Stakeholder Outreach	Identify stakeholders and document their input. Develop stakeholder registry and plan for engaging stakeholders.	Pilot Site Champions	Obtain input on regional stakeholders to include in the Data Business Plan development effort.	Phone interviews
Step 2. Data Assessment	Identify issues related to the collection, management, governance, or use of mobility data programs and stakeholder cooperation / coordination. Assess level of maturity within assessment areas using a Data Management Maturity Model.	Pilot Site Champions Regional Stakeholders	Obtain input on specific issues, symptoms, and root causes within each assessment area. Obtain input on maturity within each assessment areas.	Stakeholder survey Phone interviews Stakeholder workshop
Step 3. Gap Assessment	Identify gaps and overlaps that exist in program activities related to data systems, technology and tools, and data governance, culture, and collaboration.	Pilot Site Champions Regional Stakeholders	Obtain input on what mobility data is being collected within their organizations and at the regional level, how the data supports mobility planning, operations and performance measure activities, and who is responsible for managing/updating data. Obtain consensus on gaps and overlaps that exist in program activities related to data systems, technology and tools, and data governance, culture, and collaboration.	Stakeholder survey Phone interviews

Table 1. Sample stakeholder engagement plan (continuation).

Data Business Plan Development Process	Key Actions	Relevant Pilot Site Stakeholders	Stakeholder Input Needed	Outreach Mechanism
Step 4. Improvement Plan	Identify improvements needed to address gaps within each assessment area. Identify desired future condition. Identify strategies/actions needed to move to next level of capability. Prioritize strategies/actions. Develop Improvement Plan. Revise the Improvement Plan as needed.	Pilot Site Champions Regional Stakeholders	Obtain input on improvements needed to address gaps. Obtain input on desired maturity level and steps needed to achieve the goals and objectives of the DBP. Obtain input on priorities and schedule for implementing strategies/actions. Assign responsibilities for planned implementation (to be formalized through a charter). Obtain updates on shifting priorities or other data management/governance initiatives.	Phone interviews
Step 5. Data Governance Processes and Documents	Develop data governance model. Determine data governance roles and responsibilities. Develop supporting documentation.	Pilot Site Champions Regional Stakeholders	Obtain consensus on the data governance model and data governance roles and responsibilities. Obtain input and consensus on supporting documentation.	Phone interviews
Step 6. Data Management Practices	Identify data management practices, standards, and policies needed to support management of mobility data.	Pilot Site Champions Regional Stakeholders	Obtain input on data management practices, standards, and policies needed in each focus area.	Phone interviews

Table 1. Sample stakeholder engagement plan (continuation).

Data Business Plan Development Process	Key Actions	Relevant Pilot Site Stakeholders	Stakeholder Input Needed	Outreach Mechanism
Step 7. Develop Data Business Plan	Document the Data Business Plan.	Pilot Site Champions Regional Stakeholders	Obtain feedback on the Data Business Plan.	Phone interviews Stakeholder workshop
Step 8. Implement Data Business Plan	Execute the strategies/actions contained in the Improvement Plan. Formalize roles and responsibilities to support data governance. Implement performance measures to track success. Report on implementation progress.	Pilot Site Champions Regional Stakeholders	Obtain feedback on proposed revisions of the Data Business Plan. Obtain feedback on training needs and plan effectiveness. Provide an update on plan implementation and seek strategic direction from senior management.	N/A

Agencies may choose to send a project kick-off letter to stakeholders to inform and obtain their support for the DBP effort. An example stakeholder letter is provided in appendix A. The lead agency may also choose to execute cooperative agreements with some of the neighboring stakeholders. An example Memorandum of Understanding and Data Sharing Agreement are provided in Appendices B and C, respectively. Finally, the agency may wish to designate a smaller group of stakeholders as “partners” if they have a larger stake in the process. Stakeholder outreach mechanisms could include interviews, surveys, and workshops.

STEP 3. DATA ASSESSMENT

The next step is to identify the data sets and business uses for mobility data they are interested in addressing with the DBP. For example, there may be particular interest in integrating speed and volume data to report on mobility performance measures. Another example could be the need to collect and integrate speed, travel time and incident data for analyzing bottlenecks or impact of operations projects on arterials. Some pilot sites found it helpful to develop a data inventory to increase their knowledge of partner agencies’ current and future mobility data collection activities. The inventory included the following information: organization, mobility data collected, data source, data collection method, network type, geographic boundary, time period, real-time versus archived, and purpose.

The following tables are excerpts of data inventories from two of the pilot sites.

Table 2. Excerpt of data inventory from Hillsborough Metropolitan Planning Organization pilot.

Organization	Mobility Data Collected	Data Source	Data Collection Method	Network Type	Geographic Boundary	Time Period	Real Time versus Archived	Purpose
Tampa-Hillsborough Expressway Authority (THEA)	As a toll road, THEA primarily collects transaction data. However, they do collect some mobility data such as traffic volume counts and speeds. It is collected using microwave. They are installing Bluetooth as part of an Intelligent Transportation System project.	Obtained from another agency—Florida DOT Other—If we need travel speed, we will do traffic engineering studies.	Bluetooth (FUTURE)	Highways	Lee Roy Selmon Expressway, Meridian Avenue, and Brandon Parkway.	Samples	Real-time Archive	Operations Planning

Table 2. Excerpt of data inventory from Hillsborough Metropolitan Planning Organization pilot (continuation).

Organization	Mobility Data Collected	Data Source	Data Collection Method	Network Type	Geographic Boundary	Time Period	Real Time versus Archived	Purpose
Hillsborough County	Speed (FUTURE) Travel times (FUTURE)	Other—Google Traffic/Waze (FUTURE)	Other—Crowdsourcing (FUTURE)	Freeways (FUTURE) Highways (FUTURE) Arterials (FUTURE)	Within Hillsborough County (FUTURE)	Ongoing (FUTURE)	Real-time (FUTURE)	Operations (FUTURE)
City of Tampa	Volume Speed Travel times	Obtained from another agency—Florida DOT Other—Google Traffic/Waze Collected internally using machine counters and laser/radar devices.	GPS Bluetooth/BlueTOAD Other—Crowdsourcing Other—machine counter and laser radar devices.	Freeways Highways Arterials	Within the City of Tampa and adjacent surrounding areas.	Ongoing Samples	Real-time Archive	Operations Planning

Table 3. Excerpt of data inventory from Mid-America Regional Council (MARC) pilot.

	Organization	
	City of Overland Park, KS	Kansas City Area Transportation Authority (KCATA)
Mobility Data Collected	Bicycle Volume, Vehicular Volume, Vehicular Speed	Number of transit boardings by stop, transit on-time arrival, transit ridership, transit travel time, and other data (including General Transit Feed Specification (GTFS), operational statistics, maintenance, etc.).
Data Source	All are collected internally.	All are collected internally.
Network Type	Arterials and collectors	A variety of facilities, including local, arterials, and freeways.
Geographic Boundary	Overland Park	KCATA Region
Data Collection Standards	Yes	Yes, but transit on-time arrival is not adequate, and other datasets are uncertain regarding adequacy.
Meeting Business Needs?	Yes for bicycle and vehicular volume. No for vehicular speed.	Not for on-time arrival. Undefined/ unknown for the rest.
If No, why Not	“The speed data is random (when residents complain about speeding in their neighborhood) and sometimes quite old data is used.”	“On-time arrival information definition for data collection doesn’t match the way public would see as on-time. Some technical issues.”
Data Sharing	The volume counts are shared with MARC and the general public.	Ridership is publicly available. Other datasets are shared internally and with other organizations.
Data Sharing Obstacles		There is no good structure or interface for sharing on an ongoing basis.
Data Documentation		Bad for on-time arrival. Ok for the rest.
Data Management Structure	To manage this data, certain individuals or work groups are tasked with developing count needs and deploying equipment.	No
Collaboration	They have a quarterly meeting with the Johnson County Traffic Engineers to discuss common areas of interest	Currently working on a new regional dashboard. Collaboration with MARC and local jurisdictions, sharing data on an as-needed basis.

Next, the lead agency should conduct an assessment to identify issues related to the collection, management, governance, or use of roadway travel mobility data programs and stakeholder cooperation/coordination. The lead agency can use the following questions to help identify specific issues, symptoms, and root causes that need to be addressed in the DBP:

Data Systems:

- Are there gaps in required data elements needed to support mobility planning, operations, and performance measure activities? If so, what are they?
- Are current data collection efforts meeting business needs? If not, why not?
- Are there overlaps or redundancies occurring in current data collection or data management efforts? If so, what are they?
- Are business processes for data acquisition and updating, quality assurance, data processing, and use documented? If so, what are they?
- Is there an inventory of available roadway travel mobility data systems (in a data registry)? If so, is it adequate?
- Are data collection standards and metadata in place? If so, are they adequate?
- What are the needs for integrating roadway travel mobility data sets to support performance measurement and asset management purposes?
- Have links been created between existing data sets and connected vehicle data sets, or is there a need to do this in the future? If so, what are they? If not, should there be?
- What business needs or business decisions would be supported through data integration?
- Are data easily accessible? If not, what improvements are needed?
- Are users able to find the data they need and in the format they need it in? If not, why not?
- Are there any opportunities for sharing of data with internal/external stakeholders, thereby reducing costs associated with data collection?

Technology and Tools:

- Do users have access to the business analysis tools they need to support mobility planning, operations, and performance measure activities? If not, why not?
- Are technology/tools that support data management and analysis consistent, standardized, and updated? If not, what improvements are necessary?

Data Governance, Culture, and Collaboration:

- Are roles, responsibilities, and processes for managing/updating the data formalized and documented?
- Is there a data governance structure in place, including formally defined roles and responsibilities, communities of interest, formation of data governance council, development of data governance manual, and data catalog? If not, should there be?

- Does top management visibly support data management/governance efforts? If not, why not?
- Are adequate resources committed? If not, why not?
- Is data being promoted as a DOT-wide asset? If not, why not?
- How is the program made visible and relevant to management and DOT staff?
- Are internal/external partner agencies appropriately aligned and working together productively? If not, what changes are necessary?
- What topics do stakeholders currently collaborate on (e.g., sharing request for proposals (RFPs) for current and upcoming initiatives, procurement plans, program roadmaps, vision/objective documents, sharing of current initiatives, activities, and best practices related to specific types of mobility and connected vehicle data)?
- How does collaboration take place? Has collaboration been successful? What factors have contributed to success/failure?

The lead agency should assess their current level of maturity within each of the assessment areas above using a Data Management Maturity Model. The maturity model helps agencies assess their current capabilities with respect to data management and governance and identify next steps in achieving the goals and objectives of the DBP. There are three distinct levels of capability:

- Level 1—Initial/Under Development. Activities and relationships are largely ad hoc, informal, and champion-driven, substantially outside the mainstream of other DOT activities. Alternatively, the capability is under development, but there is limited internal accountability and uneven alignment with other DOT activities.
- Level 2—Defined/Managed. Technical and business processes are implemented and managed, partnerships are aligned, and training is taking place.
- Level 3—Optimized. Data management and governance is a full, sustainable DOT program priority, with continuous improvement, top-level management support, and formal partnerships in place.

The Maturity assessment be performed for each of the above categories. The agency can assign a level score according to current and desired conditions. The agency should also consider the timeframe and whether the desired state is constrained or unconstrained.

Figure 2 is an example of results of the maturity assessment for one of the pilots.

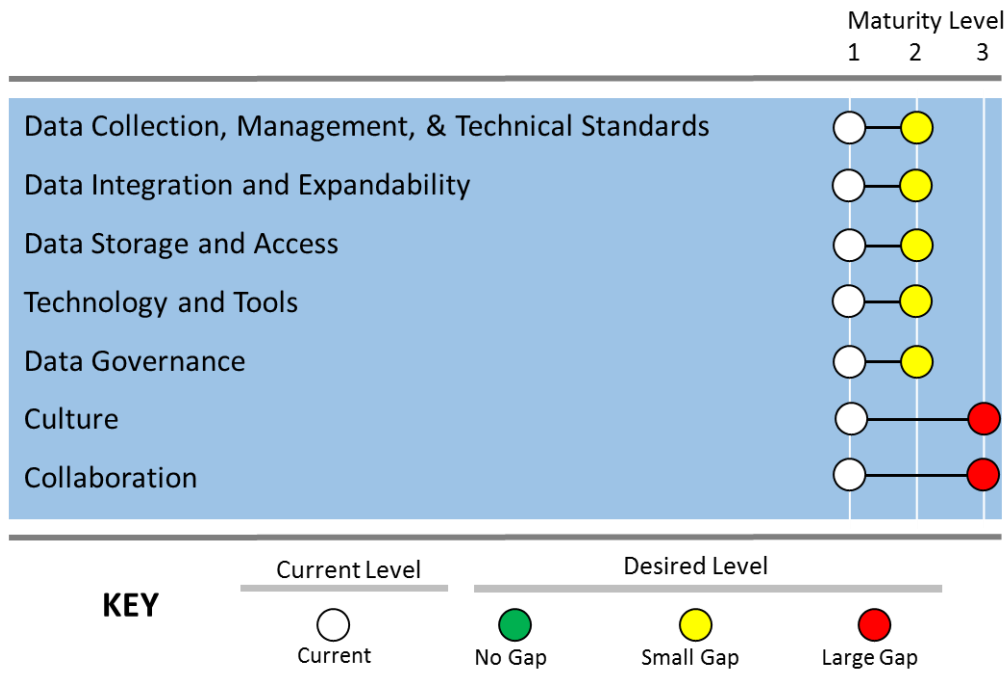


Figure 2. Chart. Example assessment of capability.

(Source: Cambridge Systematics, Inc.)

The pilot sites used stakeholder surveys and workshops for gathering information for the inventory and assessment. An example stakeholder survey is provided in appendix D. Appendix E contains best practices for designing and administering the survey.

STEP 4. GAP ASSESSMENT

The assessment results will help the lead agency and local partners understand what roadway travel mobility data is being collected within their organizations and at the regional level, how the data supports mobility planning, operations and performance measure activities, and who is responsible for managing/updating the data. A lead agency should examine the assessment results and identify any gaps and overlaps that exist in program activities in each of the following improvement areas:

- **Data Systems:** Gaps related to data systems, data elements, data collection methods, duplicative data collection efforts, data storage environments, quality of data, data standards, data integration, data analysis, documentation, and system access.
- **Technology and Tools:** Gaps related to software, hardware, system interfaces, IT compatibility, business intelligence tools, analytical tools, knowledge management, and network issues.
- **Data Governance, Culture, and Collaboration:** Gaps related to business rules and processes, data management, data governance, coordination across business lines, resource availability, and training needs.

Table 4 is an example of a gap summary from one of the pilots.

Table 4. Example summary of gaps.

Dimension	Gaps
Data Systems	1. Gaps in travel time/speed data, turning movement counts at intersections, origin/destination data, pedestrian/bicycle activity data, and data to support calculation of return on investment.
	2. Need to assess how connected vehicle data could be incorporated into the Multimodal Transportation Database and used for planning purposes.
	3. Need improved data quality/data collection standards for travel time/speed data.
	4. Need to define data standards for Bluetooth/GPS probe data.
	5. Need to make better use of expanding data sources for performance management.
	6. Need to develop/formalize business processes for the following: a. Systematics process to gather travel time/speed data from partner agencies. b. Procedures for managing and analyzing mobility data. c. Procedures for attaching travel time data to roadway segments in the Multimodal Transportation Database. d. Procedures for analysis such as determining the average travel time and standard deviation during the PM peak on a typical weekday, or determining whether there is a correlation between travel time on arterials and fatality rates.
	7. Need method for data integration.
	8. Need to improve the structure of the Multimodal Transportation Database to support data integration.
	9. Need data sharing platform to support external partner agency access to the Multimodal Transportation Database.
	10. Need to address proprietary and personally identifiable information (PII) data restrictions.
	11. Need to address data storage issues associated with data size.
Technology and Tools	12. Need more robust analysis tools to handle large datasets.
	13. Need staff training on use of analysis tools.
	14. Need to address network conflation issues associated with NPMRDS/HERE data.
	15. Need to address network-testing issue.
Data Governance, Culture, and Collaboration	16. Need improved collaboration among partner agencies to increase awareness of mobility data availability.
	17. Need a formal governance or collaboration program.
	18. Need systematic process for sharing data with partner agencies.

STEP 5. IMPROVEMENT STRATEGIES

Once a lead agency has identified the gaps in roadway travel mobility data programs and data management/governance practices, it should identify improvements needed to address the gaps within each area. One way to do this is to compare the current situation to a desired future condition and identify strategies needed to move to the next level of capability.

A lead agency should prioritize the strategies based on input from data system owners and/or directives from senior management. A priority for implementation may be assigned as follows:

- **High**—Strategies/actions that should be implemented as soon as possible as they significantly improve the assessment dimension and gaps.
- **Medium**—As time and investments permit, these strategies/actions should be implemented.
- **Low**—The benefit provided by these strategies/actions do not significantly improve the assessment dimension and gaps. These strategies/actions can be implemented as time and investments permit, but are lowest in priority.

The result of this step is a table summarizing the strategies/actions, the offices responsible for implementing each action, and an implementation schedule. In addition, a lead agency should identify opportunities for collaboration to address these issues. The lead agency should review and revise the schedule as needed to reflect any shifting priorities or other data management/governance initiatives within stakeholder offices.

Following is an excerpt from one of the pilots.

Table 5. Excerpt of improvement strategy table.

Dimension	Sub Area	Strategies	Priority
Data Systems	1. Data Collection/ Acquisition	a. Incorporate traffic count data from other local agencies into the Multimodal Transportation Database. Initial efforts should focus on short-term count data from Hillsborough and Pinellas MPOs.	High
		b. Address gaps in travel time/speed data, turning movement counts at intersections, origin/destination data, pedestrian/ bicycle activity data, and data to support calculation of return on investment.	Medium
		c. Address data gaps to meet requirements of the MAP-21/FAST Act Performance Management regulations.	High
		d. Utilize NPMRDS travel time data and combine it with regional traffic volume data.	Medium

Table 5. Excerpt of improvement strategy table (continuation).

Dimension	Sub Area	Strategies	Priority
Data Systems	1. Data Collection/ Acquisition	e. Archive travel time/volume data and make it available to support compliance with Performance Management regulations.	High
		f. Develop specifications for collecting, updating, maintaining, and archiving mobility data in the Multimodal Transportation Database and assign responsibility for these activities.	High
		g. Develop systematic process to gather/update travel time/speed data from partner agencies.	Medium
		h. Identify opportunities for collaboration between connected vehicle data capture activities and existing data programs.	Low
		i. Conduct annual review of regional mobility data programs to identify duplicate data collection and storage activities. Eliminate and replace with single source of data for specific data programs to ensure data is collected once and used many times.	High
		j. Identify applications that use expanding data sources, such as Strava.	Low
	2. Data Quality	a. Develop policy to define responsibilities for data quality assurance, including accuracy, timeliness, completeness, validity, coverage, and accessibility.	Low
		b. Adopt data quality standards for collection, processing, use, and reporting of mobility data.	Medium
		c. Require metadata for mobility data systems.	Low
		d. Document quality control procedures, including instructions on how to process data errors.	Medium
		e. Develop validation rules and allowable values for coded fields and incorporate these rules into data systems and data repositories. Use established validation rules to the greatest extent possible.	Low

Table 5. Excerpt of improvement strategy table (continuation).

Dimension	Sub Area	Strategies	Priority
Data Systems	3. Data Standards	a. Develop and enforce data quality standards for travel time/speed data. Ideally, enforcement should be a collaborative effort whereby participants agree on holding each other accountable.	High
		b. Develop standard data template format to foster joint usage and collaboration on mobility data.	Medium
		c. Develop minimum regional standards for Bluetooth/GPS probe data	Low
		d. Ensure coordination with applicable national data standards.	High
		e. Develop policy to define responsibilities for supplying metadata, data dictionaries, and descriptive information for mobility data systems to facilitate the understanding, characteristics, and usage of data.	Medium
		f. Develop metadata guidelines to indicate data name, size, data type, where data is located, data ownership, update frequency, age of data, and how data can be used or integrated with other data sources.	Low
	4. Data Integration and Expandability	a. Leverage the Regional Integrated Transportation Information System (RITIS) as a tool for data integration. RITIS is available through Florida DOT District 7, so no procurement purchase is required. The MPO should facilitate the RITIS implementation effort from planning through fruition.	Medium
		b. Use common linear network to facilitate data sharing and integration.	High
		c. Develop procedures for attaching travel time data to roadway segments in the Multimodal Transportation Database.	High
		d. Determine improvements needed to the structure of the Multimodal Transportation Database to support data integration.	High

Table 5. Excerpt of improvement strategy table (continuation).

Dimension	Sub Area	Strategies	Priority
Data Systems	5. Data Storage and Access	a. Understand stakeholders' business needs for mobility data access and sharing.	Medium
		b. Develop policy to define responsibilities for data storage, hosting, data retention/archival, and disposal.	Medium
		c. Develop policy to define data ownership and dissemination rights.	Medium
		d. Implement standard data sharing agreement with internal and external stakeholders.	High
Technology and Tools	6. Business Analysis Tools	a. Explore use of tools to integrate data from other systems and to enhance data sharing among regional stakeholders. These could include use of XML formats for sharing data, GPS technology for collecting and geocoding data location, and GIS tools for geographical display of data.	Medium
		b. Share published data in a centralized location such as the Multimodal Transportation Database, SharePoint, or open data portal that is accessible to internal and external stakeholders.	High
		c. Involve network/database administrators from partner agencies in development of shared data portal.	High
		d. Develop procedures for conducting analyses such as determining the average travel time and standard deviation during the PM peak on a typical weekday, or determining whether there is a correlation between travel time on arterials and fatality rates.	Medium
		e. Develop and implement training program on use of analysis tools.	Medium

Table 5. Excerpt of improvement strategy table (continuation).

Dimension	Sub Area	Strategies	Priority
Data Governance, Culture, and Collaboration	7. Data Governance	a. Implement a formal governance or collaboration framework.	High
		b. Identify and assign governance roles and responsibilities.	Medium
		c. Develop, maintain, and enforce a Data Governance Manual.	Medium
		d. Develop and publish a Data Catalog to increase awareness of mobility data availability.	High
		e. Develop and publish a Business Terms Glossary to define standard terminology for how mobility data is defined and used across the agency.	Medium
		f. Hold a Data Summit or conference to engage regional stakeholders and share ideas.	Low
		g. Identify resource needs.	Medium
	8. Collaboration	a. Identify datasets that can be openly shared.	High
		b. Determine which stakeholders are willing to engage in a data sharing agreement.	High
		c. Develop contract language for vendors to ensure data can be shared with other agencies.	Medium
	9. Data Privacy and Security	a. Establish and maintain security standards to secure data and protect privacy of individuals and contributing agencies.	High
		b. Clearly document policies, standards, and procedures and distribute to all staff responsible for collecting, maintaining, or distributing mobility data.	Medium
		c. With respect to accessing and using data with personal identifiable information (PII), stakeholders should be aware of the protections they have under 23 USC § 409 and are encouraged to seek further legal guidance with their attorneys.	Medium
		d. Further explore <i>Privacy by Design</i> as a way to address privacy concerns.	Low

Table 5. Excerpt of improvement strategy table (continuation).

Dimension	Sub Area	Strategies	Priority
Data Governance, Culture, and Collaboration	10. Performance Measures	a. Define performance indicators and implement a monitoring program to measure the success of the governance program. Performance indicators should measure program activities (i.e., outputs) and confirm the governance program is delivering results (i.e., outcomes). Output indicators quantify the activities of the Mobility Data Task Force and reflect the level of effort expended or scale/scope of activities. Outcome indicators quantify the effectiveness of the Coordination Group in terms of meeting its mission and stated goals. Example output and outcome indicators are provided in the Example Data Governance Manual in appendix G. Document the adopted measures in the Data Governance Manual. Note this reference to performance measures is not related to performance management requirements that are being implemented as pursuant to several rules codified in 23CFR part 490. In no way does this substitute for compliance under that rule. See FHWA TPM website for details related to 23CFR part 490.	Low
		b. Establish a communication protocol and plan for communicating performance measure results to executive level staff, Mobility Data Task Force, and data users/stakeholders.	Medium
	11. Risk Assessment	a. Conduct risk assessment to identify regional mobility data programs and current and potential risks associated with these programs (e.g., what would happen if there was a loss of data or data quality issues). A risk assessment matrix can be used to determine: 1) how much data is needed; 2) how accurate data should be; 3) what the refresh rate of the data should be; 4) who should have access to the data; and 5) potential risks of data loss.	Low
		b. Develop Risk Management Plan to address risks if they occur. Risk management practices should include disaster recovery procedures.	Low

	12. Knowledge Management	a. Develop and implement a Knowledge Management system for organizing, storing, and archiving knowledge regarding mobility data sets and workflow processes. This ensures lessons learned and experiences pertaining to mobility data are retained and archived as staff retire or leave the organization.	High
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STEP 6. DATA GOVERNANCE PROCESSES AND DOCUMENTS

Data governance is defined as the “execution and enforcement of authority over the management of data assets and the performance of data management functions. [...] Data governance promotes the understanding of data as a valuable asset to the organization and encourages the management of data from both a technical and business perspective.” A lead agency should establish data governance processes and documents for its roadway travel mobility data programs, including developing a data governance model and defining roles and responsibilities to support data governance efforts at the agency.

One of the pilots adopted core data principles to guide mobility-related decisionmaking.

The following set of core data principles are recommended by the AASHTO Subcommittee on Data.² These data principles are also applicable for enterprise level governance efforts:

- **Principle 1—VALUABLE: Data is an asset.** Data is a core business asset that has value and is managed accordingly.
- **Principle 2—AVAILABLE: Data is open, accessible, transparent, and shared.** Access to data is critical to performing duties and functions. Data must be open and usable for diverse applications and open to all.
- **Principle 3—RELIABLE: Data quality and extent is fit for a variety of applications.** Data quality is acceptable and meets the needs for which it is intended.
- **Principle 4—AUTHORIZED: Data is secure and compliant with regulations.** Data is trustworthy and is safeguarded from unauthorized access, whether malicious, fraudulent, or erroneous.
- **Principle 5—CLEAR: There is a common vocabulary and data definitions.** Data dictionaries are developed and metadata established to maximize consistency and transparency of data across systems.
- **Principle 6—EFFICIENT: Data is not duplicated.** Data is collected once and used many times for many purposes.

² AASHTO Subcommittee on Data, Data Subcommittee Efforts on Core Data Principles Web site, <http://planning.transportation.org/Pages/Data.aspx>.

- **Principle 7—ACCOUNTABLE: Decisions maximize the benefit of data.** Timely, relevant, high quality data are essential to maximize the utility of data for decisionmaking.

Data Governance Model. A data governance model depicts the relationship between an organization’s strategic vision, mission, and goals for data, the agency’s data programs, the various individuals/offices responsible for implementing data governance, and the users/stakeholders for the data programs, as shown in figure 3. In some cases, the Data Governance Board may work directly with the Data Stewards and Custodians.

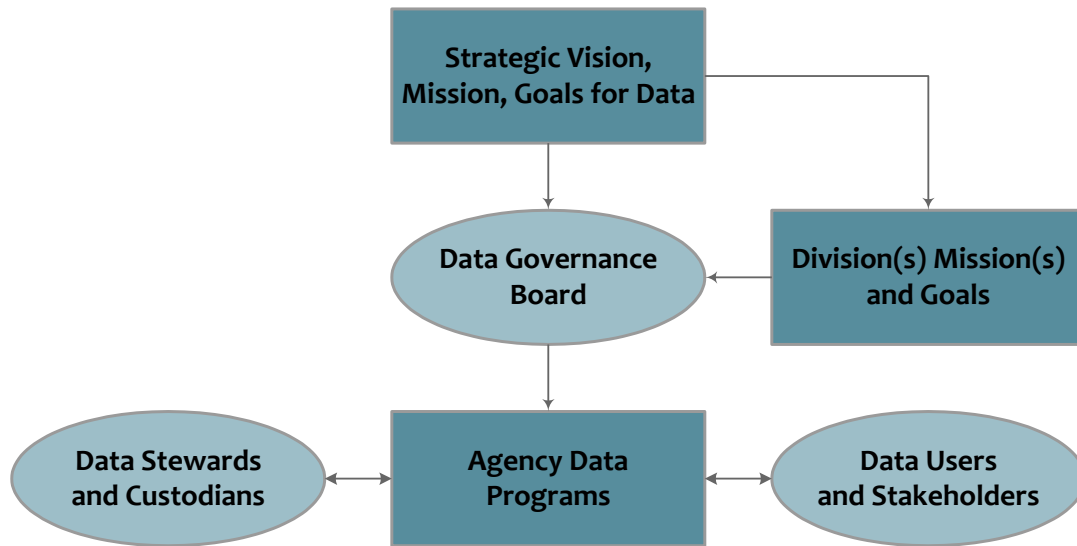


Figure 3. Flow chart. General data governance framework.

(Source: Cambridge Systematics, Inc.)

Roles and Responsibilities for Data Governance. Table 6 defines the roles and responsibilities recommended to support a data governance model.

Table 6. Data governance roles and responsibilities.^{3,4}

Role	Description	Responsibilities
Data Governance Council	Senior level managers across business areas of agency and typically includes Director of the IT Office or Division.	Establish the policies and procedures that shall be used in the collection and use of data and information, across the organization, and in support of the agency mission and goals.

³ NCHRP 666: Target-Setting Methods and Data Management to Support Performance-Based Resource Allocation by Transportation Agencies, Volume II: Guide for Target-Setting and Data Management, 2010.

⁴ Data Governance, Standards, and Knowledge Management, Alaska Department of Transportation and Public Facilities (ADOT&PF), 2009, Appendix B—Kansas Department of Education Roles and Responsibilities and Appendix C—Data Governance Manual.

Data Stewards	Individuals responsible for ensuring that the data which is collected, maintained, and used in the agency is managed according to policies established by the data governance board or council.	• Identify and manage metadata. • Identify and resolve data quality issues. • Determine business and security needs of data. • Communicate data quality issues to individuals that can influence change, as needed. • Provide input to data analysis.
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Table 6. Data governance roles and responsibilities (continuation).

Role	Description	Responsibilities
Data Business Owners	Individuals from the business side of the agency that are responsible for establishing the business requirements for the use of the data in their business area of the agency. They also may approve access to data applications supported by their business area. They may be internal or external to the agency.	• Establish business rules for use of data in their business area. • May approve access to applications supported by their business area.
Data Custodians	IT staff including IT security, network administrators, Database Administrators, server administrators, and Business area staff who are responsible for the “technical application” support for data systems. This may include application programmers and systems analysts who work in business areas other than the IT Office or Division.	• Ensure safety and integrity of data in custody of IT. • Implement application and data access controls appropriate for security classification. • Provide reasonable safeguards for information resources.
Working Groups	Association of people who collect and provide data and establish business rules and processes for a specific data system. Working Groups may also include some of the internal and external stakeholders.	• Provide assistance to the governing board in recommending the development of data products to meet business needs. • Recommend procedures to the governing board for standards and procedures regarding collection, maintenance, and use of data programs and products within the agency.

		• Recommend the technology tools for potential use to support data management at the agency.
Community of Interest	Association of people comprised of internal and external stakeholders who share a common interest as users of a data system.	• Provide a focus for communicating business needs supported by data programs.

Figure 4 shows an example of a Data Governance framework from one of the pilots.

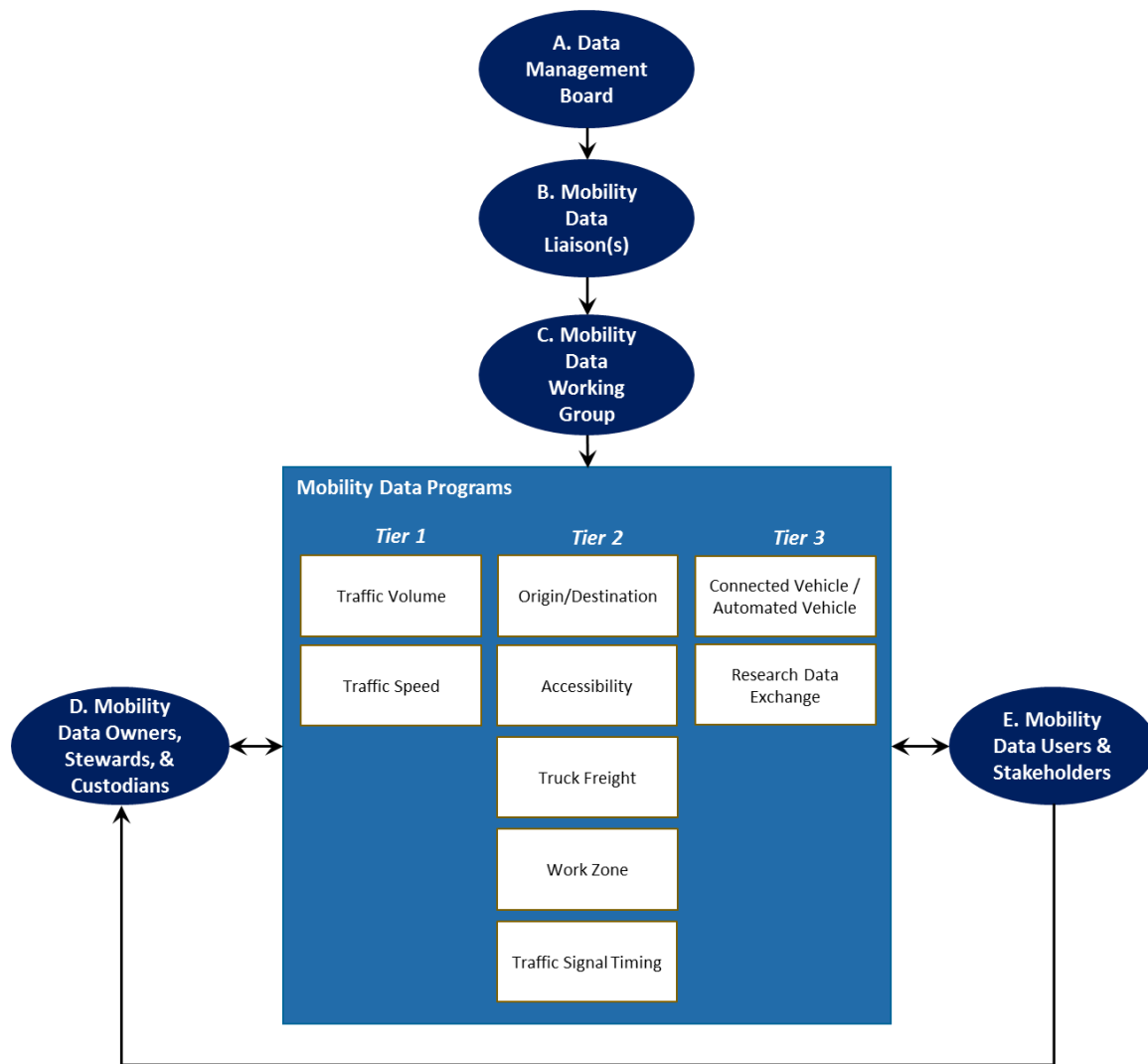


Figure 4. Flow chart. Example data governance framework.

(Source: Cambridge Systematics, Inc.)

The lead agency should develop the following supporting documentation to define policies, standards, and procedures for data governance:

- **Data Governance Manual.** The manual serves as a centralized resource that formalizes data governance roles and responsibilities, data standards, policies, and procedures related to roadway travel mobility data. The manual also includes a data catalog with references to data definitions, data standards, metadata standards, data models, and contact information for IT and business subject matter experts. An example data governance manual is provided in appendix G.
- **Data Catalog.** The data catalog documents the roadway travel mobility data systems and the offices responsible for maintaining those systems. The catalog identifies the system of

record for specific roadway travel mobility data sources, metadata about the data systems, and contact information for the data stewards and data custodians responsible for updating and maintaining the data.

- **Business Terms Glossary.** The business terms glossary defines how standard terminology for roadway travel mobility data (such as location) is defined and used across the agency. The glossary assists IT professionals in defining/using the data correctly when developing or enhancing data systems. An example glossary is provided in appendix H.

STEP 7. DATA MANAGEMENT PRACTICES

A lead agency should implement effective data management policies and procedures for the collection, processing, analysis, and integration of roadway travel mobility data as part of its DBP. Data management is defined as the development, execution, and oversight of architectures, policies, practices, and procedures to manage an agency's information lifecycle needs pertaining to data collection, storage, security, data inventory, analysis, quality control, reporting, and visualization. Data management practices are necessary to acquire, update, describe, standardize, analyze, store and protect data to ensure it can be used.

Agencies should identify the data management practices, standards, and policies that will apply to the management of roadway travel mobility data in the DBP. The following aspects of data management should be considered:

- **Data Acquisition.** Define responsibilities for the collection, update and maintenance of data; for example identifying opportunities for collaboration between connected vehicle data capture activities and existing data programs; identify where duplicate data collection and storage should be eliminated. Data ownership/User rights need to be included here. This may also include investigating new data acquisition methods.
- **Data Quality.** Define data quality per governance standards; adopt data quality standards and metadata for the collection, processing, use, and reporting of roadway travel mobility data; document data quality procedures for each data system, with instructions on how to process data errors; and develop validation rules and allowable values for coded fields in data systems and repositories.
- **Data Standards.** Define metadata standards per governance standards for each type of data set (e.g., weather data, travel data, etc.), data dictionaries and descriptive information for data products; develop metadata guidelines to indicate update frequency, age of data, and specify how data can be used or integrated with other data sources; and coordinate with applicable data standards. Note that metadata standards are different from data format standards.
- **Business Analysis Tools.** Implement new/improved technology to integrate data from other systems and enhance sharing of data from these programs with other systems and stakeholders. The types of tools recommended could include the use of XML formats for sharing of data, GPS technology for collection of data and identifying the location of data collected, and GIS tools for geographical display of data.

- **Data Privacy and Security.** Ensure data privacy and security related to the data. For example, this could include coordinating with FHWA Connected Vehicle Senior Policy Working Group's recommendations related to security, ownership, and liability of connected vehicle data. Access to data that includes personally identifiable information (PII) was raised as a major issue during the pilot studies. Although the U.S. DOT is not in a position to provide legal counsel, lead agencies and stakeholders should be aware of the protections afford them under 23 USC § 409. It is recommended they seek further legal advice from their attorneys.
- **Data Storage and Access.** Define business requirements for data access, analysis and reporting; define responsibilities for data storage, hosting, data retention (archive), and disposal; define data ownership and dissemination rights; and explore methods to enhance access to information and data for the roadway travel mobility data. This includes developing Web-portals that are easily accessible by internal and external stakeholders for each of these programs to obtain data and information as needed.
- **Traceability.** Establish internal Data Working Groups for the roadway travel mobility data programs to examine data and information needs in the common business areas for each program, on a regular basis.
- **Performance Measures.** Identify measures of effectiveness (both qualitative and quantitative) and implement a monitoring program to measure the success of data coordination/data management activities and provide confirmation that the program is necessary and is effectively delivering results.
- **Risk Assessment.** Perform a risk assessment using a risk assessment matrix which identifies each data set used to support the roadway travel mobility data programs and current and potential risks (e.g., loss of data) associated with these programs.
- **Knowledge Management.** Develop and implement a knowledge management system to ensure that lessons learned and experiences pertaining to business operations within the organization are retained and archived as staff retire or leave the organization.

STEP 8. DEVELOP IMPLEMENTATION ROADMAP

In this step, the lead agency should examine the improvement strategies identified in previous steps and assign logical steps and priority for implementation. Figure 5 shows an example implementation roadmap based on the pilot studies.

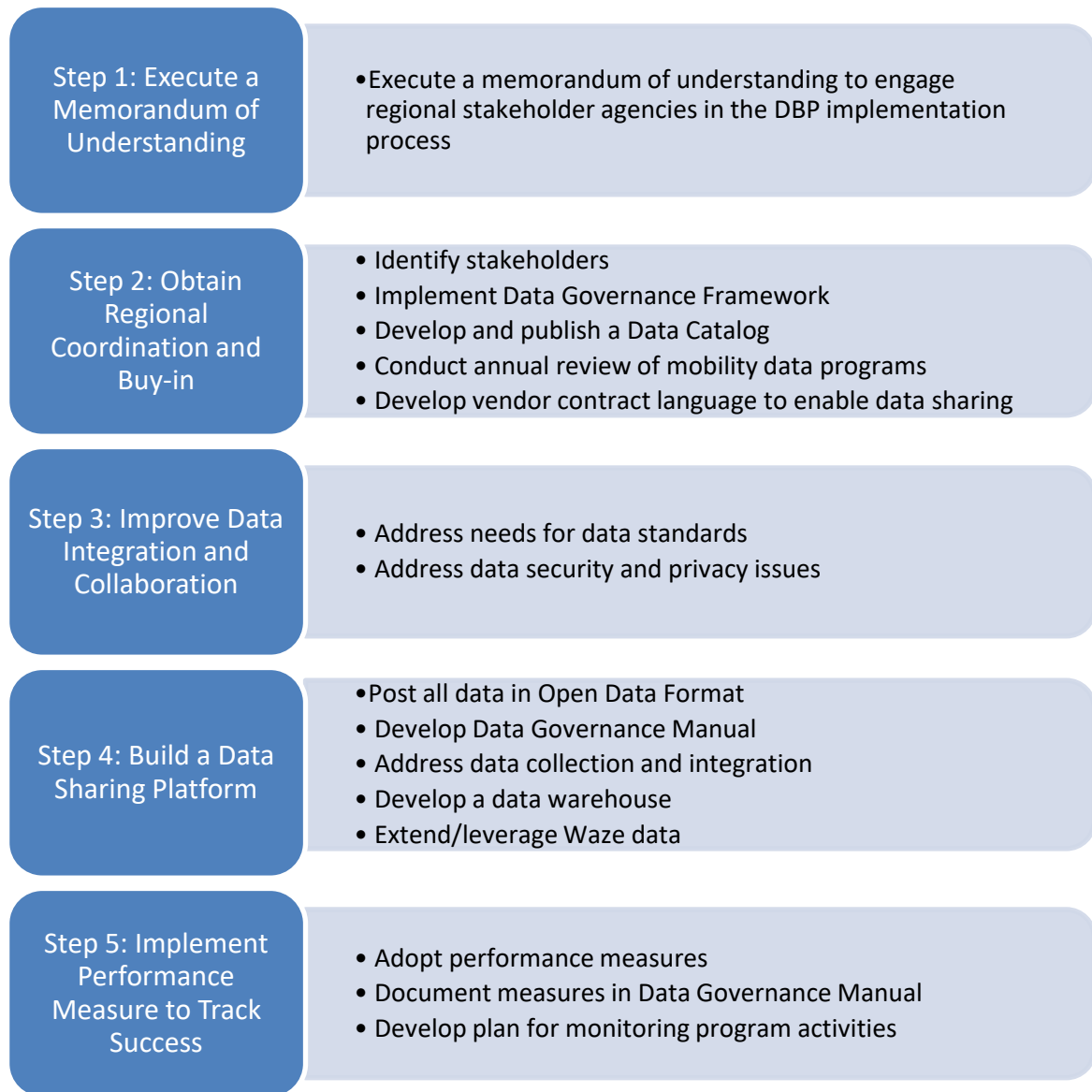


Figure 5. Process chart. Example implementation roadmap.

(Source: Cambridge Systematics, Inc.)

STEP 9. DEVELOP DATA BUSINESS PLAN

A lead agency should compile the results and documentation from previous steps into a single document. The DBP should include the following components:

- Chapter 1. Introduction—Describe the need, scope, objectives, and expected outcome of the DBP.
- Chapter 2. Stakeholder Outreach—Identify internal/external stakeholders and their involvement in development of the DBP.

- Chapter 3. Data and Gap Assessment—Provide a data inventory if available. Summarize assessment results and identified gaps. Summarize strategies/actions to improve data systems, data collection methods, data storage environments, data quality standards, data integration, data analysis, and analytical tools. The results of the assessment help prioritize data systems for enhancements or replacements to support mobility planning, operations, and performance measure activities.
- Chapter 4. Data Governance Framework—Explain how the lead agency will use data governance to support roadway travel mobility data. This section should include data principles, a customized data governance model to match the organizational structure of the DOT, and roles and responsibilities for management and governance of roadway travel mobility data. This section should also reference supporting documents including the Data Governance Manual, Data Catalog, and Business Terms Glossary.
- Chapter 5. Implementation Plan—Explain the steps the lead agency will take to implement the DBP.

CHAPTER 3. DATA BUSINESS PLAN IMPLEMENTATION

The lead agency should implement the Data Business Plan (DBP) by working on the strategies/actions (next steps) contained in the Improvement Plan, as well as formalizing the roles and responsibilities to support data governance at the Department of Transportation (DOT) as identified in the Data Governance Manual. Implementation is not a one-time event, but rather the policies, standards, and procedures identified in the DBP should become part of the day-to-day business practices of the DOT. For example, the lead agency may want to recommend workshops and meetings to implement the Plan.

Implementation of the DBP should be monitored by the Data Governance Council and include performance measures for monitoring implementation progress. Discussions at meetings should include reports on progress of current implementation tasks (e.g., tasks completed, tasks remaining) and any adjustments needed to the implementation schedule due to changes in DOT priorities, policies, standards, or legislative priorities. In addition, a lead agency should provide an annual report or briefing to senior management that provides an executive level summary of the lead agency of the roadway travel mobility data systems, successes achieved or new enhancements needed for existing systems, and recommendations for how to address those issues.

APPENDIX A. EXAMPLE STAKEHOLDER LETTER



Hillsborough MPO Metropolitan Planning for Transportation

Commissioner Lesley "Les" Miller, Jr.
Hillsborough County
MPO Chairman

Councilman Harry Cohen
City of Tampa
MPO Vice Chairman

Paul Anderson
Tampa Port Authority

Commissioner Kevin Beckner
Hillsborough County

Wallace Bowers
HART

Mayor Frank Chillum
Temple Terrace

Trent Green
The Planning Commission

Commissioner Ken Hagan
Hillsborough County

Joe Lopano
Hillsborough Co. Aviation Authority

Mayor Rick A. Lott
City of Plant City

Councilman Guido Maniscalco
City of Tampa

Councilwoman Lisa Montellone
City of Tampa

Commissioner Sandra Murman
Hillsborough County

Cindy Stuart
Hillsborough County School Board

Joseph Waggoner
Expressway Authority

Commissioner Stacy R. White
Hillsborough County

Beth Alden, AICP
Executive Director



Plan Hillsborough
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18th floor
Tampa, FL, 33602

Dear Colleagues,

The Hillsborough MPO is excited to announce its selection to participate as one of three pilot sites for a Federal Highway Administration (FHWA) mobility data business planning initiative.

A revolution in traffic information is upon us, as our vehicles and public rights-of-way become part of the internet of things. Local and state agencies as well as private entities are collecting and sharing transportation information minute by minute, and connected-vehicle applications will be a growing participant.

Can we use big data to make smarter, better targeted decisions about transportation investments? Yes— if we have the analysis tools.

We're fortunate that the FHWA Office of Operations and its consultant team, Cambridge Systematics, Inc., will assist the MPO in developing a tailored data business plan to improve the management and governance of mobility data, which is defined as volume, speed, lane occupancy, and connected vehicle data for vehicle, freight, walk, bike, and transit modes.

The data business plan will be a living document that addresses the data needs of the MPO and its local partners, tackling both technical and institutional needs.

In order to have a positive impact in our data processes, commitments are needed not only from the Hillsborough MPO but also from our stakeholders, who collect, manage, or use mobility data in the region.

We hope your office can participate in a survey, and in two local meetings which will coincide with the MPO's regularly-scheduled ITS Committee meetings. Prior to the initial meeting, the consultant team will reach out to your office to gather your input regarding data practices, goals, and issues. Follow-up phone interviews are also planned.

Should you have any questions on this initiative, please do not hesitate to contact me or Sarah McKinley at the Plan Hillsborough office, or Mr. Walter During from the FHWA Office of Operations at 202-366-8959.

We look forward to working with you on this exciting initiative!

Beth Alden, AICP

Enclosures

APPENDIX B. EXAMPLE MEMORANDUM OF UNDERSTANDING

REGIONAL MOBILITY DATA BUSINESS PLANNING

To support regional transportation planning and performance monitoring needs, the Hillsborough Metropolitan Planning Organization (MPO) developed a Mobility Data Business Plan (DBP) to improve the sharing, integration, and management of regional travel mobility data (hereafter called “mobility data”). Mobility data is defined as traffic volume, speed, lane occupancy, or connected vehicle data for vehicle, freight, bicycle/pedestrian, and transit modes that is procured, collected, or managed by transportation agencies within the three core urban areas in the tri-county Tampa Bay region, which include Hillsborough, Pasco, and Pinellas counties.

In furtherance of this effort, this Agreement acknowledges the involvement and participation of regional stakeholder agencies in the data business planning process. The Mobility DBP recommended the following improvement strategies that regional stakeholder agencies should pursue:

1. Execute a Memorandum of Understanding to engage regional stakeholder agencies in the DBP implementation process.
2. Obtain regional coordination and buy-in:
 - a. Engage regional stakeholder agencies in a data sharing agreement.
 - b. Implement a data governance framework.
 - c. Develop and publish a data catalog
 - d. Conduct an annual review of regional mobility data programs.
 - e. Develop contract language for vendors to ensure regional data sharing.
3. Improve data integration and collaboration:
 - a. Address needs for data sharing.
 - b. Address data security and privacy issues.
4. Build a data sharing platform:
 - a. Publish the data catalog on a wiki or Web site.
 - b. Adopt open data format for data sharing.
 - c. Address governance needs.
 - d. Address data collection and integration needs.

- e. Develop a data warehouse with classification system and querying capabilities.
5. Implement performance measures to track success.

The ultimate objective of the DBP is to develop an open data-sharing platform for regional stakeholder agency staff and other users to request and/or access data for operations, planning, project prioritization, asset management, GIS/spatial analysis, and performance management activities.

It is anticipated that the DBP will help local partners understand what mobility data is being collected within their organizations and at the regional level, how the data could be used to support transportation planning activities, and who is responsible for managing/updating the data. Having organized, well understood data will help reduce the amount of time staff spend obtaining data from other agencies, as well as help identify duplicative data collection/procurement effort, leading to more rapid, targeted data acquisitions in the future. Another benefit is that it can then be used to support transportation decisionmaking and better inform whether specific operational practices are having an intended system-wide effect.

APPROVAL

By signing this Agreement, each member agency agrees to participate in the Mobility Data Business Plan implementation process.

Agreed to by:

_____	_____
Tampa-Hillsborough Expressway Authority	Hillsborough County

_____	_____
Date	Date

_____	_____
Signature	Signature

_____	_____
Name (PRINT)	Name (PRINT)

_____	_____
Title	Title

_____	_____
City of Tampa	Florida DOT District 7

_____	_____
Date	Date

_____	_____
Signature	Signature

_____	_____
Name (PRINT)	Name (PRINT)

_____	_____
Title	Title

Hillsborough Area Regional Transit Authority

Center for Urban Transportation Research

Date

Date

Signature

Signature

Name (PRINT)

Name (PRINT)

Title

Title

Hillsborough MPO

Pinellas MPO

Date

Date

Signature

Signature

Name (PRINT)

Name (PRINT)

Title

Title

Pinellas County

Pasco MPO

Date

Date

Signature

Signature

Name (PRINT)

Name (PRINT)

Title

Title

Pasco County

Florida Department of Health

Date

Date

Signature

Signature

Name (PRINT)

Name (PRINT)

Title

Title

Florida's Turnpike

City of Temple Terrace

Date

Date

Signature

Signature

Name (PRINT)

Name (PRINT)

Title

Title

City of Plant City

Environmental Protection Commission

Date

Date

Signature

Signature

Name (PRINT)

Name (PRINT)

Title

Title

Pinellas Suncoast Transit Authority

Port Tampa Bay

Date

Date

Signature

Signature

Name (PRINT)

Name (PRINT)

Title

Title

APPENDIX C. EXAMPLE DATA SHARING AGREEMENT

VOLUNTARY DATA CONTRIBUTION AGREEMENT BETWEEN THE U.S. DEPARTMENT OF TRANSPORTATION AND {CONTRIBUTING ENTITY}

In an effort to support the needs of Intelligent Transportation System researchers and developers while reducing costs and encouraging innovation, the Office of the Assistant Secretary for Research and Technology (OST-R) and the Federal Highway Administration (FHWA) of the U.S. Department of Transportation (US DOT) have developed the Research Data Exchange (RDE), a web-based transportation data sharing system to promote the sharing of multi-source and multi-modal data. In furtherance of this effort, this Agreement acknowledges the voluntary contribution of such data to the RDE.

WHEREAS, I, _____, am authorized to execute this agreement for and on behalf of _____ (hereinafter "Contributor");

WHEREAS, Contributor desires to voluntarily add its Data, as defined and described below, to the US DOT RDE;

WHEREAS, Contributor desires to grant to US DOT the rights to use and disseminate the Data as needed in support of the goals and objectives of its research projects; and

WHEREAS, US DOT desires Contributor to voluntarily add its Data, as defined and described in detail below;

Contributor definition and description of submitted data: _____

Now Therefore:

I, the undersigned, hereby grant irrevocable, non-exclusive rights to the US DOT to copy, use, disseminate, publicly display, store, and to grant others these rights in advancing their own research goals and objectives.

Signature of Data Contributor Representative

Date

Title of Representative and Organization Name

APPENDIX D. EXAMPLE STAKEHOLDER SURVEY

SURVEY INTRODUCTION

Imagine a world where mobility data is easily accessible and ready to be analyzed in a user-friendly manner, and where there is ongoing collaboration with no waste of resources or duplicative efforts. Though it might sound like Utopia, we can get closer to that goal by implementing a data business plan to improve the way we manage and govern mobility data in our region.

With this effort, <Agency Name> seeks to develop an actionable plan for improving our data management practices. The plan will focus on mobility data sets and data systems that support performance measurement for our region. An initial step is to gather information on current data management practices for these datasets, including the way data is collected, stored, accessed, used, and governed. This is a shared effort and we hope you can participate in the process by responding to the survey below by <DATE>.

We appreciate your input!

ORGANIZATIONAL QUESTIONS:

- 1) Please identify the organization under which you are employed, and what your title is.
 - a. Name: <text box>
 - b. Division: <text box>
 - c. Title: <text box>
 - d. Email: <text box>
- 2) What mobility datasets does your division directly collect, develop, maintain, or use? For the purposes of this study, mobility data is defined as volume, speed, VMT, and operational performance data for vehicle, freight, bicycle/pedestrian, and transit modes.
 - a. Bicycle volume
 - b. Pedestrian volume
 - c. Bike/Pedestrian other—please specify
 - d. Transit On-time arrival
 - e. Transit Ridership
 - f. Transit Speed or travel time
 - g. Transit Other—please specify
 - h. Vehicular Speed or travel time

- i. Vehicular volume
- j. VMT
- k. Incident/crash data
- l. Vehicular other—please specify
- m. Freight Speed or travel time
- n. Freight volume
- o. Freight other—please specify

<IF none are selected, respondent will be sent to DATA COLLABORATION (q. 19)>

Questions 3—16 will appear for each of the data types

3) What is your role with respect to [data type]? (select all that apply)

	I am responsible for collecting or updating the data	I use and/or analyze the data	I generate metadata and/or resolve data quality issues	I am an IT professional responsible for technical application	I am an administrator and/or designer for databases and systems	Other (please specify)
Bicycle volume	☐	☐	☐	☐	☐	☐
Pedestrian volume	☐	☐	☐	☐	☐	☐
Bike/Ped other	☐	☐	☐	☐	☐	☐
Transit On-time arrival	☐	☐	☐	☐	☐	☐
Transit Ridership	☐	☐	☐	☐	☐	☐
Transit Speed or travel time	☐	☐	☐	☐	☐	☐
Transit Other	☐	☐	☐	☐	☐	☐
Vehicular Speed or travel time	☐	☐	☐	☐	☐	☐
Vehicular volume	☐	☐	☐	☐	☐	☐
VMT	☐	☐	☐	☐	☐	☐
Incident/crash data	☐	☐	☐	☐	☐	☐
Vehicular other	☐	☐	☐	☐	☐	☐
Freight Speed or travel time	☐	☐	☐	☐	☐	☐
Freight volume	☐	☐	☐	☐	☐	☐
Freight other	☐	☐	☐	☐	☐	☐

Data Collection

4) Who collects the data? (Check all that apply)

	We collect it internally (please specify)	We obtain it from another agency (please specify)	We purchase it from vendors (please specify)	Other (please specify)
Bicycle volume	☐	☐	☐	☐
Pedestrian volume	☐	☐	☐	☐
Bike/Ped other	☐	☐	☐	☐
Transit On-time arrival	☐	☐	☐	☐
Transit Ridership	☐	☐	☐	☐
Transit Speed or travel time	☐	☐	☐	☐
Transit Other	☐	☐	☐	☐
Vehicular Speed or travel time	☐	☐	☐	☐
Vehicular volume	☐	☐	☐	☐
VMT	☐	☐	☐	☐
Incident/crash data	☐	☐	☐	☐
Vehicular other	☐	☐	☐	☐
Freight Speed or travel time	☐	☐	☐	☐
Freight volume	☐	☐	☐	☐
Freight other	☐	☐	☐	☐

5) On what network?

	Freeways	Highways	Arterials	Other (please specify)	[for bike/ped only] trails (please specify)
Bicycle volume	☐	☐	☐	☐	☐
Pedestrian volume	☐	☐	☐	☐	☐
Bike/Ped other	☐	☐	☐	☐	☐
Transit On-time arrival	☐	☐	☐	☐	☐
Transit Ridership	☐	☐	☐	☐	☐
Transit Speed or travel time	☐	☐	☐	☐	☐
Transit Other	☐	☐	☐	☐	☐
Vehicular Speed or travel time	☐	☐	☐	☐	☐
Vehicular volume	☐	☐	☐	☐	☐
VMT	☐	☐	☐	☐	☐
Incident/crash data	☐	☐	☐	☐	☐
Vehicular other	☐	☐	☐	☐	☐
Freight Speed or travel time	☐	☐	☐	☐	☐
Freight volume	☐	☐	☐	☐	☐
Freight other	☐	☐	☐	☐	☐

6) On what geographic boundary? (e.g., Johnson County)

Bicycle volume	
Pedestrian volume	
Bike/Ped other	
Transit On-time arrival	
Transit Ridership	
Transit Speed or travel time	
Transit Other	
Vehicular Speed or travel time	
Vehicular volume	
VMT	
Incident/crash data	
Vehicular other	
Freight Speed or travel time	
Freight volume	
Freight other	

7) Are data collection standards in place for the data?

	Yes	If yes, are they adequate?	No	I don't know
Bicycle volume	☐	Yes/No	☐	☐
Pedestrian volume	☐	Yes/No	☐	☐
Bike/Ped other	☐	Yes/No	☐	☐
Transit On-time arrival	☐	Yes/No	☐	☐
Transit Ridership	☐	Yes/No	☐	☐
Transit Speed or travel time	☐	Yes/No	☐	☐
Transit Other	☐	Yes/No	☐	☐
Vehicular Speed or travel time	☐	Yes/No	☐	☐
Vehicular volume	☐	Yes/No	☐	☐
VMT	☐	Yes/No	☐	☐
Incident/crash data	☐	Yes/No	☐	☐
Vehicular other	☐	Yes/No	☐	☐
Freight Speed or travel time	☐	Yes/No	☐	☐
Freight volume	☐	Yes/No	☐	☐
Freight other	☐	Yes/No	☐	☐

8) What steps can be taken to improve the quality of the data?

Bicycle volume		
Pedestrian volume		
Bike/Ped other		
Transit On-time arrival		
Transit Ridership		
Transit Speed or travel time		
Transit Other		
Vehicular Speed or travel time		
Vehicular volume		
VMT		
Incident/crash data		
Vehicular other		
Freight Speed or travel time		
Freight volume		
Freight other		

9) Are these data redundant with any other data system, or are there any issues with multiple sources for the same data?

- a. Yes (please specify)
- b. No
- c. I don't know

Data Storage and Access

10) Where are the data stored? (PC, server, data warehouse, legacy system)

	On individual personal computers	On a server within our organization/division	In a data warehouse or database management system such as Oracle or Microsoft SQL server	In a specialized software application or legacy mainframe data system	Other (please specify)
Bicycle volume	☐	☐	☐	☐	☐
Pedestrian volume	☐	☐	☐	☐	☐
Bike/Ped other	☐	☐	☐	☐	☐
Transit On-time arrival	☐	☐	☐	☐	☐
Transit Ridership	☐	☐	☐	☐	☐
Transit Speed or travel time	☐	☐	☐	☐	☐
Transit Other	☐	☐	☐	☐	☐
Vehicular Speed or travel time	☐	☐	☐	☐	☐
Vehicular volume	☐	☐	☐	☐	☐
VMT	☐	☐	☐	☐	☐
Incident/crash data	☐	☐	☐	☐	☐
Vehicular other	☐	☐	☐	☐	☐
Freight Speed or travel time	☐	☐	☐	☐	☐
Freight volume	☐	☐	☐	☐	☐
Freight other	☐	☐	☐	☐	☐

11) Is the database linked to data in any other data system?

Bicycle volume	Yes/No/I don't know
Pedestrian volume	Yes/No/I don't know
Bike/Ped other	Yes/No/I don't know
Transit On-time arrival	Yes/No/I don't know
Transit Ridership	Yes/No/I don't know
Transit Speed or travel time	Yes/No/I don't know
Transit Other	Yes/No/I don't know
Vehicular Speed or travel time	Yes/No/I don't know
Vehicular volume	Yes/No/I don't know
VMT	Yes/No/I don't know
Incident/crash data	Yes/No/I don't know
Vehicular other	Yes/No/I don't know
Freight Speed or travel time	Yes/No/I don't know
Freight volume	Yes/No/I don't know
Freight other	Yes/No/I don't know

Data Access and Use

12) Please indicate with whom is this data shared or made available to:

	Other divisions/ business units within my organization (please specify)	Other external organizations (please specify)	General public	We currently do not share this with anyone
Bicycle volume	☐	☐	☐	☐
Pedestrian volume	☐	☐	☐	☐
Bike/Ped other	☐	☐	☐	☐
Transit On-time arrival	☐	☐	☐	☐
Transit Ridership	☐	☐	☐	☐
Transit Speed or travel time	☐	☐	☐	☐
Transit Other	☐	☐	☐	☐
Vehicular Speed or travel time	☐	☐	☐	☐
Vehicular volume	☐	☐	☐	☐
VMT	☐	☐	☐	☐
Incident/crash data	☐	☐	☐	☐
Vehicular other	☐	☐	☐	☐
Freight Speed or travel time	☐	☐	☐	☐
Freight volume	☐	☐	☐	☐
Freight other	☐	☐	☐	☐

13) In what format are the databases shared with other entities?

	Copies of the raw database	Summary tabulations	Periodic reports	Other (please specify)	Not applicable
Bicycle volume	☐	☐	☐	☐	☐
Pedestrian volume	☐	☐	☐	☐	☐
Bike/Ped other	☐	☐	☐	☐	☐
Transit On-time arrival	☐	☐	☐	☐	☐
Transit Ridership	☐	☐	☐	☐	☐
Transit Speed or travel time	☐	☐	☐	☐	☐
Transit Other	☐	☐	☐	☐	☐
Vehicular Speed or travel time	☐	☐	☐	☐	☐
Vehicular volume	☐	☐	☐	☐	☐
VMT	☐	☐	☐	☐	☐
Incident/crash data	☐	☐	☐	☐	☐
Vehicular other	☐	☐	☐	☐	☐
Freight Speed or travel time	☐	☐	☐	☐	☐
Freight volume	☐	☐	☐	☐	☐
Freight other	☐	☐	☐	☐	☐

14) What are obstacles to sharing this data with other entities?

	Proprietary restrictions (please specify)	Data sharing platform (please specify)	Other (please specify)	Not applicable
Bicycle volume	☐	☐	☐	☐
Pedestrian volume	☐	☐	☐	☐
Bike/Ped other	☐	☐	☐	☐
Transit On-time arrival	☐	☐	☐	☐
Transit Ridership	☐	☐	☐	☐
Transit Speed or travel time	☐	☐	☐	☐
Transit Other	☐	☐	☐	☐
Vehicular Speed or travel time	☐	☐	☐	☐
Vehicular volume	☐	☐	☐	☐
VMT	☐	☐	☐	☐
Incident/crash data	☐	☐	☐	☐
Vehicular other	☐	☐	☐	☐
Freight Speed or travel time	☐	☐	☐	☐
Freight volume	☐	☐	☐	☐
Freight other	☐	☐	☐	☐

Data Documentation

15) What documentation of the database or data system currently exists?

a. <text box for each data type>

16) What additional documentation would be helpful, both for yourself and for users of the data?

a. <text box for each data type>

Questions 17—22 appear only once

17) Which of the following types of improvements would you like to see for mobility data? Please rank them in priority order, with 1 being the most important and 5 being the least important.

- A “one stop shop” for all mobility data instead of data storage on multiple network connections.
- A Web-based system where users can search, view, and query up-to-date data.
- Data dictionaries or “how to use this data” directions associated with all data.
- Better data quality (please specify)
- Other (please specify)

18) What significant changes are planned for the data systems you work with? Include changes in data collection, dissemination, data uses, or storage of the data.

a. <text box>

Data Governance & Collaboration

19) Are data management responsibilities formalized and documented as part of job descriptions or standard operating procedures within your organization/division?

a. Yes (please specify)

b. No

c. I don't know

d. Not applicable

20) Is there a formal structure for managing and governing the data? This could include formally defined roles and responsibilities, formation of a data governance council, or development of a data governance manual and data catalog.

a. Yes (please specify)

b. No

c. I don't know

d. Not applicable

i) If no, would setting one be helpful?

21) Do you collaborate with other organizations in the region on other topics? (e.g., sharing Requests for Proposals (RFPs) for current and upcoming initiatives, procurement plans, program roadmaps, vision/objective documents, sharing of current initiatives, activities, and best practices related to specific types of mobility data)

a. Yes (please specify)

b. No

i) If yes, how does collaboration take place?

22) Please indicate any additional comments that would help us understand your current data management practices or needs. For instance, are there aspects of agency culture that need to be changed? Are there untapped opportunities for collaboration with other divisions or organizations that you are aware of? Are there opportunities for automation that could make data management easier?

a. <text box>

Thank you Page

Thank you for taking this survey. Your input will be crucial in developing an effective and relevant Data Business Plan!

APPENDIX E. SURVEY PRACTICES

Pilot sites used a stakeholder survey to obtain information needed to conduct the assessment. Surveys can be a very effective tool for a successful development of a data business plan, helping with:

1. Setting the right mindset for stakeholders and get conversation started regarding current situation and needs.
2. Gathering information regarding what types of data are collected or used by the agency and by whom.

The first bullet can be addressed by having an inviting introduction that speaks to the importance of a DBP and encourages the survey taker to envision a future where data integration and collaboration is streamlined. Lead agencies may find it helpful to encourage stakeholders to get together to submit one survey for a particular office or division. For the MARC pilot, several divisions decided to do this voluntarily in order to submit comprehensive responses that are representative of the entire division.

There are two crucial aspects the survey designer can tackle to address the second bullet:

OPEN TEXT VERSUS LIMITED-CHOICE QUESTIONS

In developing the survey, it is important to make a distinction between limited-choice questions and open-text ones. Open-text questions offer respondents the flexibility and freedom to use their own words in answering questions. By the same token, however, they will generate a set of virtually unique answers for each question, making the task of a systematic analysis much harder to conduct.

By design, limited-choice questions offer a much cleaner set of data for survey analysis. They are concrete, avoid misinterpretation from either end, and prevent unusual or unexpected answers, thus enabling quantitative analyses on the dataset.

For the purposes of a DBP survey, it is best to restrict the amount of open-text questions to a minimum, and reserve them for qualitative, exploratory questions (which are certainly very important). Limited-choice questions should be used whenever there are a finite set of anticipated answers. If there is a mostly finite set of anticipated answers but there may be the possibility of a response outside that set, the question can simply have “other” as the last option, accompanied with a textbox to specify.

DISTINGUISHING BETWEEN DATA TYPES

Another lesson learned is that surveys should avoid asking questions that may refer to different data types. For instance, a question asking to “rate the dataset(s) you work with” to a stakeholder that *collects* data for a bike/pedestrian dataset but *uses* vehicular volume data will be unclear to the respondent, and the answer unclear to interpret. Instead, it may be helpful to provide answer

grids, such as the one shown below. This will allow respondents to give different answers to each data type, and will enable the survey analyst to evaluate answers based on multiple criteria, such as data type, or interaction with data (e.g., collectors indicating data quality is good but users indicating otherwise). An equally valid alternative is to ask the same questions for each data type that the respondent works with.

	I am responsible for collecting or updating the data	I use and/or analyze the data	I generate metadata and/or resolve data quality issues	I am an IT professional responsible for technical application	I am an administrator and/or designer for databases and systems	Other (please specify)
Bicycle volume	☐	☐	☐	☐	☐	☐
Pedestrian volume	☐	☐	☐	☐	☐	☐
Bike/Ped other	☐	☐	☐	☐	☐	☐
Transit On-time arrival	☐	☐	☐	☐	☐	☐
Transit Ridership	☐	☐	☐	☐	☐	☐
Transit Speed or travel time	☐	☐	☐	☐	☐	☐
Transit Other	☐	☐	☐	☐	☐	☐
Vehicular Speed or travel time	☐	☐	☐	☐	☐	☐
Vehicular volume	☐	☐	☐	☐	☐	☐
VMT	☐	☐	☐	☐	☐	☐
Incident/crash data	☐	☐	☐	☐	☐	☐
Vehicular other	☐	☐	☐	☐	☐	☐
Freight Speed or travel time	☐	☐	☐	☐	☐	☐
Freight volume	☐	☐	☐	☐	☐	☐
Freight other	☐	☐	☐	☐	☐	☐

Additional lessons learned on the stakeholder survey include the following:

- The survey language and terminology should fit the local construct.
- They survey design should account for the wide array of potential stakeholder roles. For example, survey questions will differ depending on whether the stakeholder is an owner or user of mobility data. Could add something about tailoring the language to fit with the client. And also doing some thinking at the outset on the wide array of users that you should include—doing that thinking up front allows us to be more specific with our questions.
- Lead agencies should test the survey questions to make sure they make sense from the perspective of different stakeholder roles.
- Should strive to strike a balance between not demanding too much time/effort from respondent and at the same time collect valuable info.
- It is best to keep open-text responses at a minimum.
- They survey should include questions to assess staff expertise and available resources.
- They survey should include a question that asks if data is publicly shared.
- Pilot sites found the survey helpful to take stock of current.
 - Data.
 - Issues.
 - Stakeholder willingness to participate.

APPENDIX F. EXAMPLE CHARTER

SCOPE AND PURPOSE

This Charter establishes a Mobility Data Task Force (hereafter called the Task Force), which is charged with facilitating cross-agency collaboration, data sharing, and integration of mobility data (hereafter called mobility data) to address data gaps and redundancies and avoid investing resources in the same or similar types of data related programs.

Mobility data is defined as traffic volume, speed, lane occupancy, or connected vehicle data for vehicle, freight, bicycle/pedestrian, and transit modes. The geographic scope of the Task Force is limited to mobility data programs within the three core urban areas in the tri-county Tampa Bay region, which include Hillsborough, Pasco, and Pinellas counties.

The Task Force encourages collaboration among multiple public agencies throughout the region to share and integrate mobility data to support regional performance-based planning. The Mobility Data Task Force should be supported by an Executive Group, which consists of senior level managers from member agencies. The Executive Group would not meet formally, but would provide executive level support for mobility data governance activities. Figure 6 shows an organizational model of this structure.

This Charter establishes the objectives, membership, roles/responsibilities, and operating suggestions for the Task Force. By signing this Charter, each office agrees to participate in the Task Force's activities and to share mobility data and information with other members.

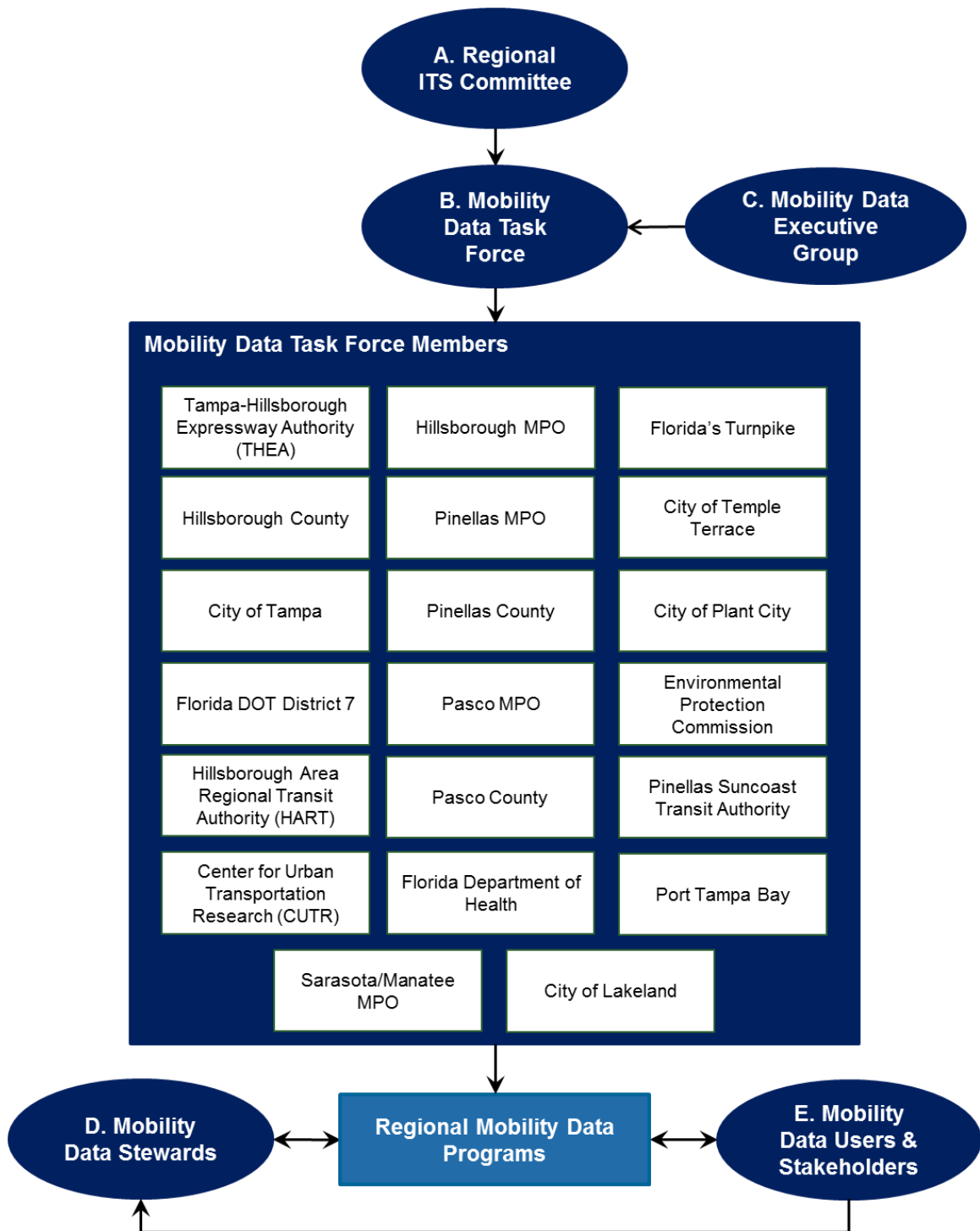


Figure 6. Flow chart. Governance model.

(Source: Cambridge Systematics, Inc.)

TASK FORCE OBJECTIVES

The Task Force is intended to be a forum for regional stakeholders responsible for mobility data to:

- Share Requests for Proposals (RFPs) for current and upcoming data collection activities, data acquisitions, initiatives, activities, and projects related to mobility data.
- Share current initiatives, activities, and best practices related to mobility data, including data strategies, policies, standards, metadata, system architecture, procedures, performance metrics, etc.
- Identify needs and opportunities to integrate mobility data sets to support performance-based planning and asset management activities in the region.
- Identify needs and opportunities to create links between mobility data sets and connected vehicle data sets in the future to support performance-based planning in the region.
- Identify opportunities to coordinate resource, reduce data redundancies, and implement cost-sharing strategies for the collection, management, and maintenance of mobility data.
- Identify needs and opportunities to reduce redundancy in the development and maintenance of duplicative data systems and promote efficiency in system maintenance.
- Identify needs and opportunities to enhance data sharing and access among regional stakeholders, including the need for Web portals for stakeholders to share data and information as needed.
- Understand and promote the value of mobility data as an asset within individual stakeholder agencies and regionwide.

MEMBERSHIP

The members of the Task Force are listed below. Each agency shall appoint a designated representative and alternate to attend Task Force meetings held as a part of Regional Intelligent Transportation System (ITS) Committee meeting:

- Tampa-Hillsborough Expressway Authority (THEA)
- Hillsborough County
- City of Tampa
- Florida DOT District 7
- Hillsborough Area Regional Transit Authority (HART)
- Center for Urban Transportation Research (CUTR)
- Hillsborough MPO
- Pinellas MPO
- Pinellas County

- Pasco MPO
- Pasco County
- Sarasota/Manatee MPO
- City of Lakeland
- Florida Department of Health
- Florida's Turnpike
- City of Temple Terrace
- City of Plant City
- Environmental Protection Commission
- Pinellas Suncoast Transit Authority
- Port Tampa Bay

MEMBER RESPONSIBILITIES

Members of the Task Force shall:

- Regularly attend and participate in Task Force meetings and present their agency perspective.
- Share RFPs for current and upcoming initiatives related to mobility data.
- Share best practices related to mobility data, including data strategies, policies, standards, metadata, architecture, procedures, and metrics.
- Ensure that Task Force best practices are communicated to data stewards from their respective agencies.

CHAIRMANSHIP

The Task Force is tri-chaired by individuals from the Hillsborough, Pasco, and Pinellas MPOs.

MEETINGS

The Task Force would not meet separately, but conducts business during the Regional ITS Committee meetings. A regular agenda item to discuss the Data Business Plan should be added to the Regional ITS Committee meeting.

ACTIVITIES

The Task Force shall perform the following activities:

- Develop “rules of engagement” regarding collaboration and coordination.

- Identify and address gaps and redundancies in regional mobility data collection activities.
- Identify data stewards for mobility data programs within their respective agencies.
- Establish policies and procedures for the collection and use of mobility data and information within their respective agencies.
- Share current activities and best practices in mobility data collection and management.
- Coordinate resources and cost sharing strategies to reduce redundancy in regional data collection, integration, and data systems.
- Facilitate sharing of data with internal/external stakeholders.
- Share procurement plans and RFPs for mobility data.
- Review RFPs and provide recommendations based on best practices.
- Provide recommendations to the Regional ITS Committee regarding the development of mobility data products to meet business needs.
- Provide recommendations to the Regional ITS Committee regarding standards and procedures for collection, maintenance, and use of data programs and products.
- Recommend technology tools to support mobility data management and sharing.

Task Force members seeking input on RFPs and other procurement actions related to mobility data will share the RFP with the Chair/Co-Chair, who will decide whether it should be distributed to Task Force members for input/review. The Chair/Co-Chair shall decide the review mechanism (e.g., form a Working Group, distribute the RFP for review by all Task Force members, etc.), duration of review period, and whether to initiate a meeting to resolve issues.

CHARTER AMENDMENTS

This Charter shall remain in effect until amended or replaced. The Charter will be reviewed annually based on comments received from member agencies throughout the year, and any amendments or revisions will be distributed to Task Force members.

After 3 years, an assessment of the effectiveness of the group shall be made, and the Task Force will decide whether to continue its activities or disband the group.

APPROVAL

By signing this Charter, each member agency agrees to participate in the Task Force's activities and to share data and information with other members.

Agreed to by:

_____	_____
Tampa-Hillsborough Expressway Authority	Hillsborough County

_____	_____
Date	Date

_____	_____
Signature	Signature

_____	_____
Name (PRINT)	Name (PRINT)

_____	_____
City of Tampa	Florida DOT District 7

_____	_____
Date	Date

_____	_____
Signature	Signature

_____	_____
Name (PRINT)	Name (PRINT)

APPENDIX G. EXAMPLE DATA GOVERNANCE MANUAL

INTRODUCTION

This Data Coordination Manual provides comprehensive direction to members of the U.S. DOT Roadway Mobility Data Coordination Group (hereafter called the Coordination Group) on the background and purpose of the Coordination Group, its overall structure, the kinds of topics that the Coordination Group addresses, how the Coordination Group works, expectations of Coordination Group members, and a plan for measuring the outcomes and overall success of the Coordination Group.

The following provides a basic understanding and overview of the Coordination Group:

- The Coordination Group is a forum for facilitating cross-organizational collaboration, data sharing, and integration of roadway travel mobility data within the U.S. DOT to address gaps and redundancies documented in the U.S. DOT Roadway Transportation Data Business Plan (Phase 1)⁵ and to collaborate on data management functions related to roadway travel mobility data.
- Since the Federal Highway Administration (FHWA) is the largest provider of roadway mobility data, the Coordination Group is managed under the Operations Regime of FHWA's Data Governance Advisory Council (DGAC).
- The Coordination Group includes members from other DGAC regimes such as Planning, Policy and Research, as well as from other operating administrations and programs of the Department.
- Coordination Group activities and priorities are guided by the Data Business Plan, which documents stakeholder needs and gaps related to roadway travel mobility data programs and data business planning within U.S. DOT; establishes a framework for data coordination; and provides recommendations regarding data management functions related to roadway travel mobility data.
- The culture of the Coordination Group is one of collaboration and mutual trust, with shared ownership of decisionmaking as a key characteristic.

WHAT IS THE ROADWAY MOBILITY DATA COORDINATION GROUP?

The Coordination Group is charged with facilitating cross-organizational collaboration, data sharing, and integration of roadway travel mobility data within U.S. DOT to address gaps and redundancies (documented in the U.S. DOT Roadway Transportation Data Business Plan (Phase 1) report⁶) and to collaborate on data management functions related to roadway travel mobility data.

⁵ <http://ntl.bts.gov/lib/48000/48500/48531/6E33210B.pdf>

⁶ <http://ntl.bts.gov/lib/48000/48500/48531/6E33210B.pdf>

Roadway travel mobility data includes travel data from roadway travel modes, including vehicle, truck freight, bicycle/pedestrian, and transit.

Travel data includes vehicle volume, speed, and lane occupancy data, as well as connected vehicle data such as vehicle location, presence and speed within the system, internal vehicle status such as fuel consumption rate, or externally measured data such as recorded external temperature. Travel data for transit vehicles could include location, speed and status data, as well as passenger counts and schedule adherence data. Freight carriers may supplement a standard location and position report with gross weight data or data regarding the type and time-critical nature of goods carried. Public sector fleet vehicles may be able to contribute other key data related to their primary functions, such as snowplows reporting blade position or estimates of roadway snow depth. Additional travel data could include a multimodal trace of individual travelers through the transportation system.

The need for the Coordination Group evolved from the white paper, *Needs and Gaps in the Operation and Coordination of U.S. DOT Data Capture and Management Programs*, which was commissioned by the FHWA and the Office of Operations, Office of Transportation Management (HOTM) to examine current data capture and management activities across various U.S. DOT program areas and identify gaps and potential opportunities to effectively and efficiently coordinate and manage the programs' activities. The white paper identified the need for a communication and coordination mechanism at the Federal level through formation of a data coordination team to address the gaps and share issues related to the capture and management of roadway travel mobility data.

The U.S. DOT Roadway Transportation Data Business Plan (Phase 1) report formalized the recommendation and proposed an initial structure, framework, and rules of engagement for the Coordination Group. The Data Business Plan also established that the scope of the Coordination Group be limited to formally recognized data programs within U.S. DOT that involve the collection, analysis, or reporting of roadway travel mobility data.

The member offices of the Coordination Group are listed in table 7.

Table 7. Coordination group member offices.

Membership
OST-R/Intelligent Transportation Systems Joint Program Office (HOIT)
Bureau of Transportation Statistics (BTS)
FHWA Office of Highway Policy Information (HPPI)
FHWA Office of Program Performance Management (TPM)
FHWA Office of Transportation Management (HOTM)
FHWA Office of Transportation Operations Road Weather Management (HOTO)
FHWA Office of Transportation Operations Research & Development (HRDO)
FHWA Office of Human Environment (HEPH)
FHWA Office of Planning (HEPP)
FHWA Office of Freight Management & Operations (HOFM)
Federal Motor Carrier Safety Association (FMCSA)

HOW IS THE COORDINATION GROUP STRUCTURED?

The Coordination Group is managed under the Operations Regime of the FHWA DGAC, which is formally chartered and empowered to provide strategic review and oversight of all FHWA data collection efforts. The DGAC has authority and responsibility to corporately advise on the utilization of FHWA's data resources and recommend major changes in FHWA data collection efforts that will result in increased consistency and coordination between existing and new data programs; the elimination of redundant data collection; the consolidation of data sources and resources; and compliance with external mandates.

As documented in *FHWA Data Governance Plan Volume 1: Data Governance Primer* (draft February 2014), data governance at FHWA is comprised of the following three-tiered hierarchy:

- **Data Governance Advisory Council.** The DGAC is responsible for developing the FHWA Data Governance Plan and Framework and serves as the point of contact for coordinating data collection efforts with other modes within the Department and with other branches of government. The DGAC is assisted by Technical Advisors that assist in developing formal documentation on data governance principles and provide input into the decisionmaking process.
- **Data Governance Regimes and Coordinators.** Regimes are responsible for coordinating with individual data programs and ensuring that the Data Governance Plan and Framework are adhered to, while Regime Coordinators liaison with the DGAC and provide oversight of stewardship and management processes of data programs within their regime. There are twelve Data Governance Regimes:
 - Headquarters (HQ) Administrative
 - Financial
 - Planning
 - Operations
 - Policy
 - Research
 - Infrastructure
 - Chief Council
 - Safety
 - Federal Lands
 - Division Office
 - Technical Services
- **Data Stewards.** Data Stewards are subject matter experts and points of contact for the data programs they oversee. They are responsible for managing their data programs in accordance with the processes and procedures established by the DGAC and the Regime Coordinator.

The Coordination Group is managed under the Operations Regime of the DGAC, with members from other DGAC regimes such as Planning, Policy and Research, as well as from other operating administrations and programs of the Department. Figure 7 shows how the Coordination Group fits within the DGAC framework. The Coordination Group also influences other activities/areas outside of FHWA (such as safety).

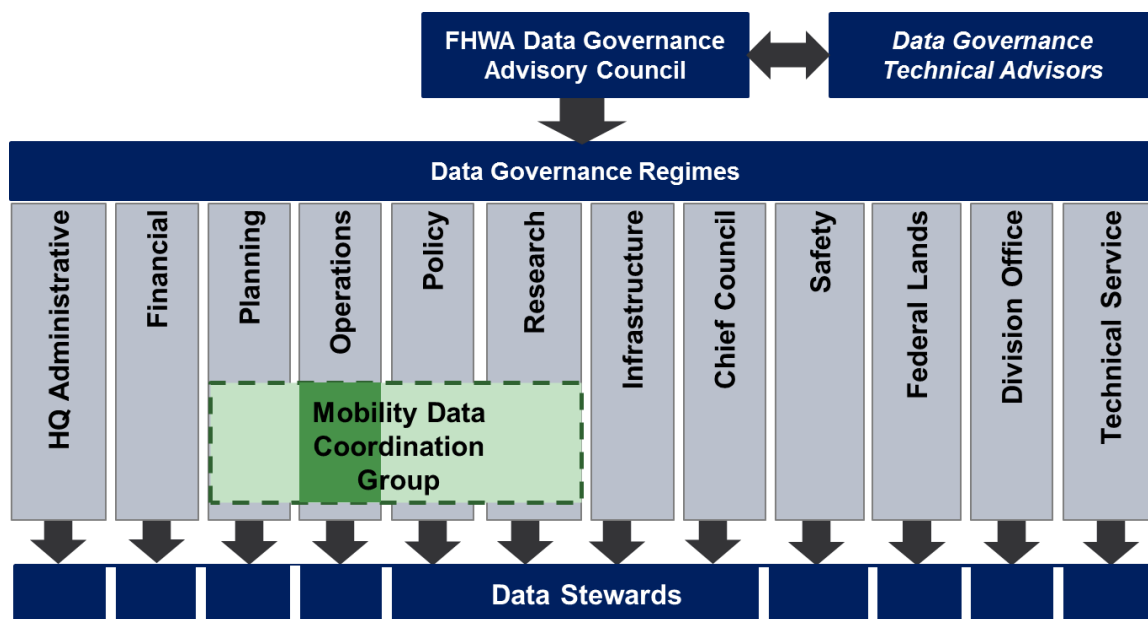


Figure 7. Flow chart. Framework for the Coordination Group with the Data Governance Advisory Council.

(Source: FHWA Data Coordination Manual (internal document).)

The structure for the Coordination Group is comprised of the Coordination Group Chair/Co-Chair, the Coordination Group itself, Working Groups, and Supporting Staff, as shown in Figure 8:

- **Roadway Mobility Data Coordination Group Chair/Co-Chair.** The Chair/Co-Chair are designated individuals from within the FHWA Office of Operations and one member agency representative who would co-chair the Roadway Mobility Data Coordination Group and liaison with the FHWA Data Governance Advisory Council and other offices outside of FHWA (such as Safety). The FHWA Office of Operations Data Business Plan champion (Walter During) would serve as the permanent chair, while the rotating Co-Chair would be selected from one member agency representative.
- **Roadway Mobility Data Coordination Group.** The Coordination Group consists of designated individuals within U.S. DOT who are responsible for the oversight of roadway travel mobility data programs to support the business functions of their offices.
- **Working Groups.** Working Groups may be temporarily formed to address issues that are pertinent to a specific type of mobility data (e.g., travel data, connected vehicle data, climate data, etc.) or that cross-cut multiple types of mobility data (e.g., data quality, data standards, data privacy and security, analysis tools, etc.). Working Groups can also be formed to conduct work on specific activities deemed necessary by the Coordination Group (e.g., provide comments on upcoming Requests for Proposals (RFPs), develop a Strategy Document for the Coordination Group, oversee coordination project activities, etc.).

- **Supporting Staff.** Supporting staff provide administrative and technical support to the Chair/Co-Chair, Roadway Mobility Data Coordination Group and Working Groups, as needed. Supporting staff members include consultants and other administrative staff support as needed.

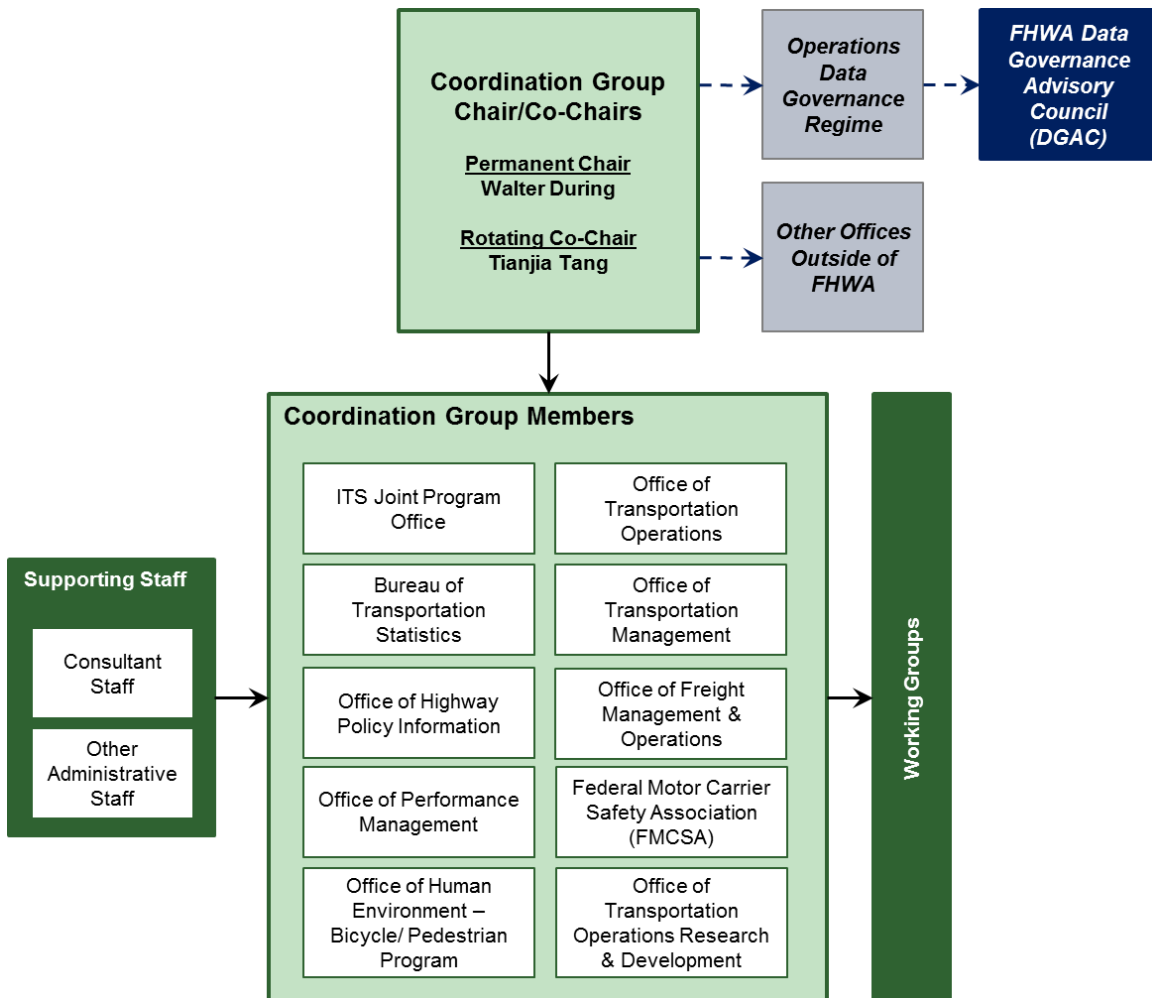


Figure 8. Organizational chart. Structure for Roadway Mobility Data Coordination Group.

(Source: FHWA Data Coordination Manual (internal document).)

WHAT KIND OF TOPICS DOES THE COORDINATION GROUP ADDRESS?

The Coordination Group is intended to be a forum for U.S. DOT and FHWA stakeholders involved with roadway travel mobility data to coordinate on the following types of activities:

- Share RFPs for current and upcoming initiatives related to roadway travel mobility data.
- Review and provide input on possible FHWA procurement actions related to roadway travel mobility data.

- Share current initiatives, activities, and/or best practices related to roadway travel mobility data, including data strategies, policies, standards, metadata, architecture, procedures, metrics, etc.
- Participate in indepth vetting of data standards/procedures and standards for linear referencing attributes/terminology to facilitate sharing/integration of U.S. DOT roadway travel mobility data.
- To the extent possible, identify and address gaps and redundancies (documented in the Data Business Plan) in mobility data programs within their respective offices.
- Identify needs and opportunities to coordinate resources, reduce data redundancies, and implement cost-sharing strategies for the collection, management, and maintenance of roadway travel mobility data.
- Identify needs and opportunities to reduce redundancy in the development and maintenance of duplicate data systems, promote efficiency in system maintenance, and promote open source initiatives.
- Identify needs and opportunities to integrate national data sets to support performance measurement and asset management purposes.
- Identify needs and opportunities to create links between existing data sets and connected vehicle data sets in the future.
- Identify needs and opportunities to enhance access to information and data for roadway travel mobility data programs, including the need for Web portals accessible by internal and external stakeholders to share data and information as needed.
- Identify and oversee potential data coordination projects or additional research needed to demonstrate reduced cost or improved Federal capability.
- Identify potential funding to conduct agreed upon research projects and data coordination activities.
- Understand and promote the value of data as a U.S. DOT-wide asset.

DATA COORDINATION PROJECTS

Data coordination projects will be conducted to demonstrate the benefit and value of the Data Business Plan in terms of reduced cost or improved efficiency in business operations and work processes. The Coordination Group will be responsible for identifying and overseeing potential data coordination projects or research topics of interest to them, as well as potential funding sources to conduct agreed upon projects.

The following types of projects have been identified by the Coordination Group:

- Development of a searchable, sustainable, current data catalog and SharePoint site for Coordination Group members to share internal information on projects and inform offices of upcoming initiatives related to roadway travel mobility data.

- Develop technical and other assistance on developing data business plans for States and local jurisdictions.
- Investigate “big data” sources such as crowdsourcing, social media, and private-sector data sources that have not been traditionally utilized as sources for roadway travel mobility data.
- Investigate how current standards such as the National Information Exchange Model (NIEM) and open source could be applied within the Data Business Plan or within an individual stakeholder office.
- Develop a tool for visualizing and analyzing large roadway travel mobility data sets within a cloud environment.

A complete list of candidate data coordination project concepts will be maintained on the Roadway Mobility Data Coordination Group Document Share site (FHWA internal site) (<https://collaboration.fhwa.dot.gov/dot/fhwa/xhcx/dbp/default.aspx>). Work on the first project concept will be conducted by Cambridge Systematics as part of the Data Business Plan (Phase III) project, Implementation and Maintenance of the Overall Mobility Data Coordination Group.

HOW DOES THE COORDINATION GROUP WORK?

Meetings

The Coordination Group meets quarterly on the first Tuesday of the months of March, June, September, and December to discuss data management/coordination issues. An annual one-day symposium/working meeting will be convened at the time of the March meeting for members to share information on current initiatives, activities, and best practices and to establish and review the strategic direction and priorities for the Coordination Group for the coming year.

Meetings and teleconferences will be announced at least a week in advance and conducted in accordance with a published agenda. Coordination Group members will be asked to update the group on their office’s current initiatives and activities related to roadway travel mobility data. A draft agenda and any requests for presentations/updates will be sent to Coordination Group members in advance of the meeting. Members may request that additional discussion topics be added to the agenda by notifying the Chair/Co-Chair.

Meetings are normally open to all interested parties but may be restricted to Federal participants when necessary (e.g., when RFPs or other upcoming initiatives are shared). Draft minutes documenting action items and responsibilities will be circulated to all members following the meeting. The meeting announcement and final minutes will be posted within two weeks on the Roadway Mobility Data Coordination Group Document Share site (FHWA internal site) (<https://collaboration.fhwa.dot.gov/dot/fhwa/xhcx/dbp/default.aspx>).

Coordination Group members seeking input on RFPs and other procurement actions related to roadway travel mobility data should share the RFP with the Chair/Co-Chair, who will decide whether it should be distributed to Coordination Group members for input/review. The Chair/Co-Chair will also decide the review mechanism (e.g., form a Working Group, distribute the

RFP for review by all Coordination Group members, etc.), duration of review period, and whether to initiate a meeting to resolve issues.

Working Groups

The Coordination Group will be supported by Working Groups that are temporarily formed to address needs/gaps that are pertinent to a specific type of roadway travel mobility data (e.g., travel data, connected vehicle data, climate data, etc.) or that cross-cut multiple types of roadway travel mobility data (e.g., data quality, data standards, data privacy and security, analysis tools, etc.). Working Groups may also be formed to conduct work on specific activities deemed necessary by the Coordination Group (e.g., provide comments on upcoming RFPs, develop a Strategy Document for the Coordination Group, oversee data coordination project activities, etc.).

A request to form a Working Group may be made by the Chair/Co-Chair, any Coordination Group member, or through consensus by the Coordination Group. Working Groups will consist of two to four interested members, with one member serving as the lead and the remaining members serving as key content reviewers.

Working Groups will meet via conference call or in person as agreed upon by members of the group. The Working Group leader will report on their results at the next regularly scheduled Coordination Group meeting. The Working Group may be disbanded after their work is complete.

Data Coordination Mechanisms

Document Share Site

The Roadway Mobility Data Coordination Group Document Share site (FHWA internal site) (<https://collaboration.fhwa.dot.gov/dot/fhwa/xhcx/dbp/default.aspx>) will be used as a clearinghouse for Coordination Group members to share best practice documents and Coordination Group documents, meeting announcements, and meeting summaries. Hyperlinking to Share Site documents will be used for sending out requests for document review/comments to members.

Awards

The Coordination Group will give annual awards to recognize significant contributions that advance the Data Business Plan's goal to improve coordination and communication mechanisms across U.S. DOT and FHWA offices involved with roadway travel mobility data. In addition to a custom-designed award, recipients receive recognition for their efforts at the annual symposium/working meeting convened at the time of the March meeting.

Each year, nominations for the award will be accepted by members of the Coordination Group. To submit a nomination, the nominator must submit the following information:

- Nominator's name, office, title, address, phone number, and email.

- Nominee's name (or contact person for a nominated organization or program), office, title, address, phone number, and email.
- A narrative, not to exceed 500 words, in support of the nomination, addressing the following areas:
 - Provide a clear, direct, and specific statement of why the nominee deserves recognition.
 - Elaborate on why the nominee's accomplishments are worthy of the award, including what the nominee did (e.g., projects, activities), any challenges or issues encountered and overcome, how they did it (initiative/leadership, teamwork/collaboration, and/or creativity/innovation), and the results/outcomes (or major milestones) that the nominee's efforts accomplished.

Nominations should be submitted to the Coordination Group Chair by January 31st of each year. A Working Group will be formed to review nominations and select a winner, which will be announced during the annual symposium/working meeting.

WHAT IS EXPECTED OF MEMBERS?

Members of the Coordination Group shall:

- Maintain a culture of collaboration and mutual trust by regularly attending and participating in quarterly Coordination Group meetings and Working Groups and presenting their office perspective.
- To the extent possible, identify and address gaps and redundancies in roadway travel mobility data programs within their respective offices.
- Identify data standards and stewardship recommendations for consideration by the FHWA Data Governance Advisory Council.
- Engage Coordination Group members in procurement decisions by sharing RFPs for current and upcoming initiatives related to roadway travel mobility data.
- Develop recommended language for insertion into Statements of Work.
- Share best practices related to roadway travel mobility data, including data strategies, policies, standards, metadata, architecture, procedures, and metrics.
- Ensure that Coordination Group best practices are communicated to data stewards within their respective office.
- Identify potential data coordination projects or additional research needed to demonstrate reduced cost or improved Federal capability.
- Identify potential funding to conduct agreed upon research projects and data coordination activities.
- Provide feedback on research project ideas.

Coordination Group products include:

- Documentation of best practices related to roadway travel mobility data, including data strategies, policies, standards, metadata, architecture, procedures, and metrics.
- Recommendations for enhancements to Statements of Work or RFPs for current and upcoming procurements related to roadway travel mobility data.
- Completion of data coordination projects and research activities that reduce costs or improve the quality and effectiveness of roadway mobility data.

HOW WILL SUCCESS OF THE COORDINATION GROUP BE MEASURED?

The Data Business Plan outlined the expected outcomes of improved coordination of roadway travel mobility data programs through the Coordination Group, which include:

- Improved availability of data to support planning, operations, and performance measure activities.
- Elimination of redundant data collection efforts, resulting in a decrease in possible expenditure for duplicate data.
- More rapid, targeted data acquisitions.
- Broader sharing of data resources.
- Systematic coordination and clarification of data-related Federal policy.
- Reduced data collection and management costs.
- Better serve the needs of customers of FHWA.
- Improved efficiency in business operations and work processes through use of data sharing technology.
- Consensus in the use of streamlined data sources across organizational business units.

Success of the Coordination Group will be assessed using performance indicators to measure program activities (i.e., outputs) and confirm the program is effectively delivering results (i.e., outcomes). The linkages between program activities (i.e., outputs) and expected outcomes (both immediate and long term) are shown in figure 9.

Performance indicators for Coordination Group activities (i.e., outputs) and outcomes are shown in Figures 10 and 11, respectively. Output indicators quantify the activities of the Coordination Group and reflect the level of effort expended or scale/scope of activities. These indicators are both qualitative and quantitative in nature and will be assessed on an annual basis as part of the Data Business Plan Annual Update. Outcome indicators quantify the effectiveness of the Coordination Group in terms of meeting its mission and stated goals. These indicators will depend on the availability of internal U.S. DOT data to support calculation of the measure, and they may be refined as implementation of the Data Business Plan continues. After three years, an assessment of the effectiveness of the group will be made using the outcome indicators, and the Coordination Group will decide whether to continue its activities or disband the group.

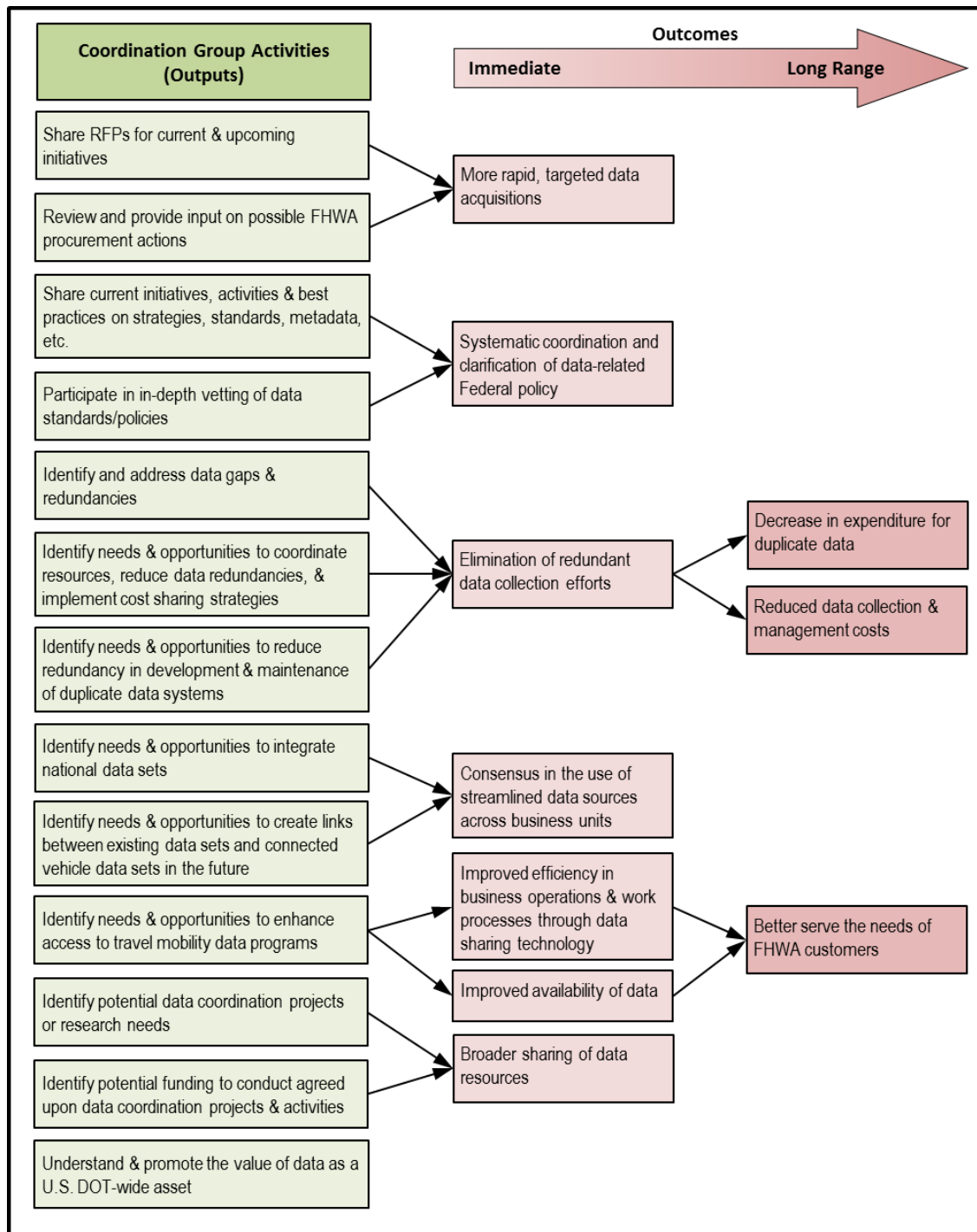


Figure 9. Flow chart. Relationship between group activities (outputs) and outcomes.

(Source: FHWA Data Coordination Manual (internal document).)

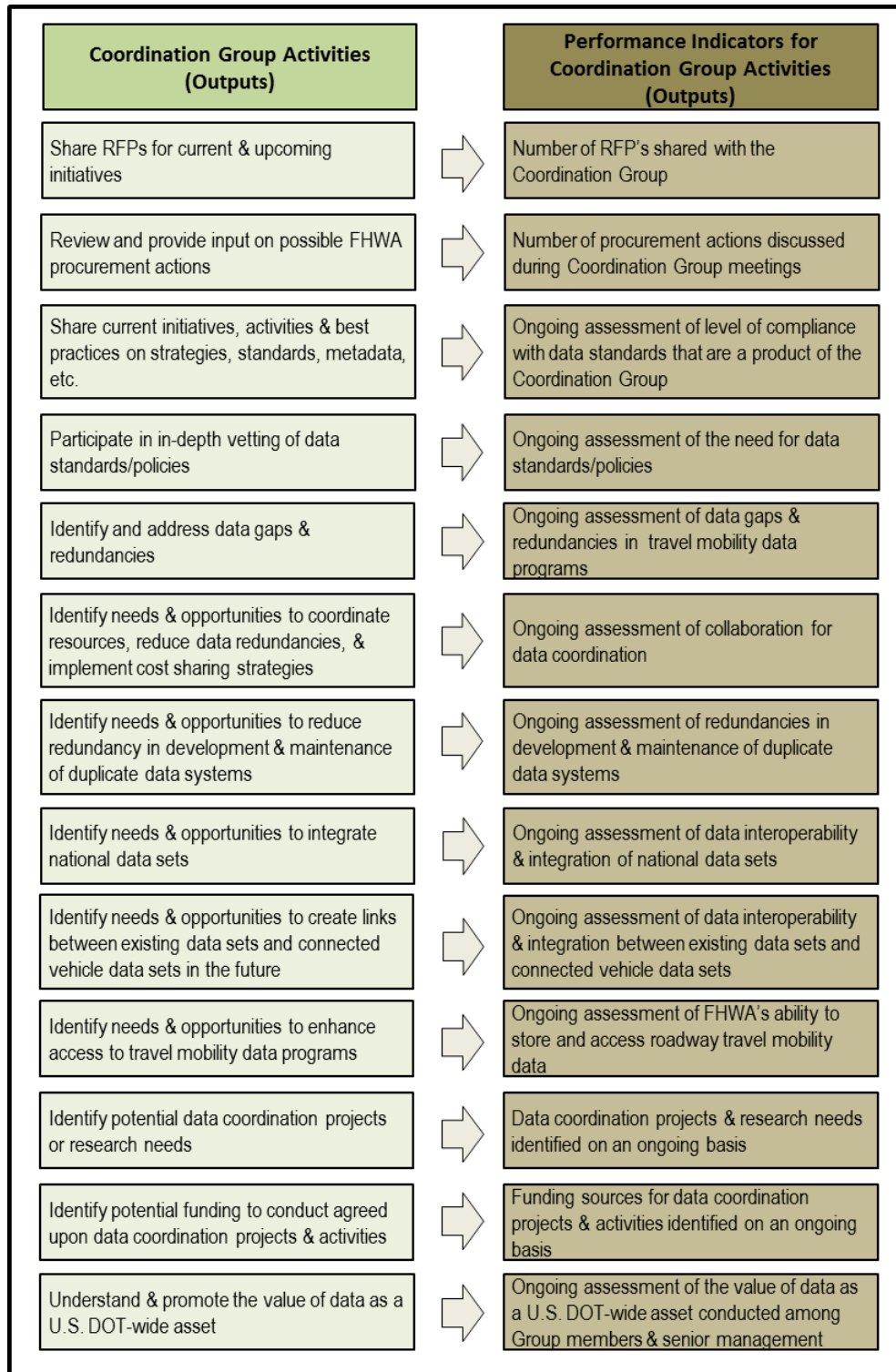


Figure 10. Process chart. Performance indicators for group activities (outputs).

(Source: FHWA Data Coordination Manual (Internal Document).)

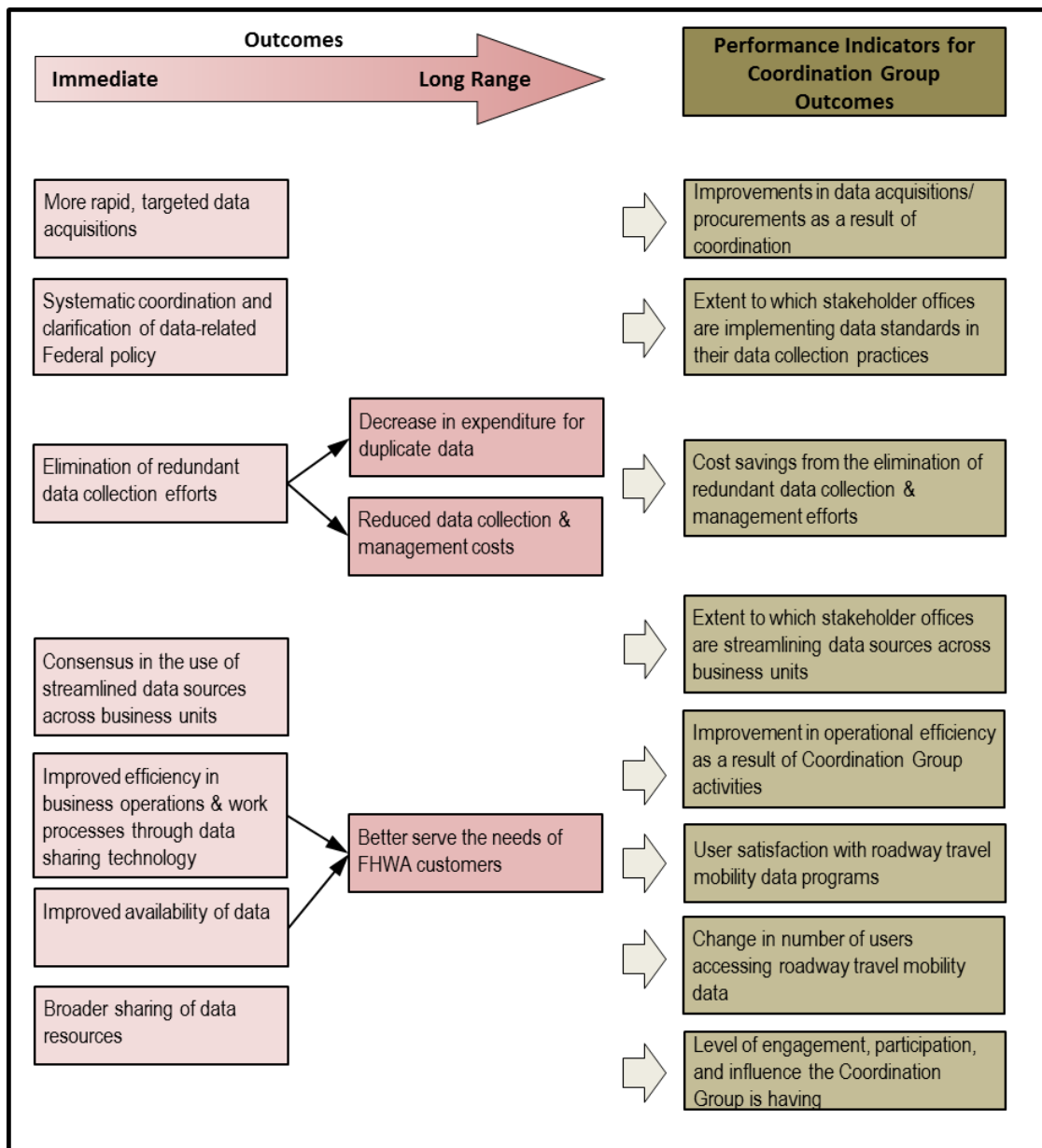


Figure 11. Flow chart. Performance indicators for outcomes.

(Source: FHWA Data Coordination Manual (internal document).)

WHAT ADDITIONAL DOCUMENTATION IS AVAILABLE?

The following supporting documents provide additional information on the history of the Coordination Group and U.S. DOT Roadway Transportation Data Business Plan:

- *Data Capture and Management: Needs and Gaps in the Operation and Coordination of U.S. DOT Data Capture and Management Programs.* This white paper examines current data capture and management activities across various U.S. DOT program areas and

identified gaps and potential opportunities for filling the gaps to effectively and efficiently coordinate and manage the programs' activities. The primary recommendation from the white paper was that the HOTM develop a Data Business Plan to address the gaps identified in the paper.

- *U.S. DOT Roadway Transportation Data Business Plan (Phase I): Data Business Plan* (January 2013). This report documents the results of Phase 1 of the Data Business Plan, which serves to improve coordination among real-time data capture programs within U.S. DOT by clearly defining U.S. DOT needs for real-time data, address gaps and overlaps in program needs with respect to stakeholders, and ultimately result in cost savings for U.S. DOT. (Available at: <http://ntl.bts.gov/lib/48000/48500/48531/6E33210B.pdf>).
- *U.S. DOT Roadway Transportation Data Business Plan (Phase II): Data Business Plan* (June 2013). This report documents the results of Phase 2 of the Data Business Plan, which includes execution of the Data Business Plan coordination, as well as conducting two data integration test pilots to demonstrate the benefits and value of the Data Business Plan. (Available at: <http://ntl.bts.gov/lib/48000/48500/48536/EBBC1DA.pdf>).

WHO IS THE KEY CONTACT FOR INFORMATION?

The key FHWA contact for additional information on the Coordination Group and *U.S. DOT Roadway Transportation Data Business Plan* is:

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APPENDIX H. GLOSSARY OF DATA MANAGEMENT AND GOVERNANCE TERMS

This appendix provides a glossary of terms related to data coordination, management, and governance.

Connected Vehicle Data—Data collected via a vehicle that has an independent onboard wireless capability to establish a two-way data linkage between a system onboard and another system not onboard, for the purpose of transferring information.

Data Business Plan—Describes a systematic process for Hillsborough MPO to follow while conducting activities related to the collection, management, and maintenance of mobility data.

Data Catalog—A catalog of information about the data used by stakeholders involved with mobility data programs in the Hillsborough region. The data catalog includes a list of relevant data programs, data business owners, data stewards, and instructions for accessing data standards and definitions with that program.

Data Governance—The execution and enforcement of authority over the management of data assets and the performance of data functions. The management of data assets is accomplished through the Mobility Data Task Force. This role is critical in successfully managing data programs that meet business needs and in supporting a comprehensive data business plan for the organization.

Data Governance Charter—Sets forth the purpose, mission, vision, goals and objectives, and data management policies for implementation of the Mobility Data Task Force.

Data Governance Manual—Provides comprehensive direction to the Mobility Data Task Force in implementing the Data Governance Model and Charter.

Data Governance Model—A diagram depicting the relationship between mobility data programs, the various individuals/agencies responsible for implementing data governance, and the users/stakeholders for the data programs.

Data Management—The development, execution, and oversight of architectures, policies, practices, and procedures to manage the information lifecycle needs of an enterprise in an effective manner as it pertains to data collection, storage, security, data inventory, analysis, quality control, reporting, and visualization.

Data Management Practices—Activities necessary to acquire, update, describe, standardize, analyze, store, and protect data to ensure it can be used.

Data Stewards—Individuals within Mobility Data Task Force member agencies who are subject matter experts and points of contact for the data programs they oversee. They are responsible for managing their data programs in accordance with the processes and procedures established by the Mobility Data Task Force.

Data Stewardship—The formalization of accountability for the management of data resources. Data stewardship is a role performed by individuals within an organization known as data stewards. The functions of data governance and data stewardship typically are part of an overall data management program within an organization.

Mobility Data—Travel time and speed data for roadway users and freight.

Mobility Data Task Force—The designated individuals from MPO partner agencies responsible for the oversight of mobility data programs to support the business functions of their agencies. This group dictates the policies, procedures, and business practices associated with mobility data programs. Also called the Task Force in supporting documents.

Mobility Data Executive Group—Senior level managers from Mobility Data Task Force member agencies. The Executive Group provides executive level support for mobility data governance activities, including dedicating resources as needed and establishing memorandums of understanding for data sharing with other partner agencies.

Mobility Data Task Force Charter—Charter document that formally establishes the Mobility Data Task Force and sets forth the objectives, membership, structure, and operating framework for implementing the Task Force.

Mobility Data Task Force Co-Chairs—Designated individuals from within Hillsborough, Pasco, and Pinellas MPOs who would chair the Mobility Data Task Force and liaison with the Regional ITS Committee.

Mobility Data Program—A formal or informal program for the collection, analysis, or reporting of mobility data.

Mobility Data Users and Stakeholders—Any persons or agencies that use or interface with, access, benefit from, or are otherwise affected by mobility data.

Rules of Engagement—Practices followed or behavior displayed by the participants in situations of opposing interests such as negotiations. Unwritten rules of engagement determine what information is given, at what time, to whom, and in what manner; and what concession is granted and what is demanded in return. For work in a team, rules of engagement typically define the protocols of communication, conflict, decisionmaking, and meetings.

APPENDIX I. ACRONYMS

AASHTO	American Association of State Highway Transportation Officials
BTS	Bureau of Transportation Statistics
CUTR	Center for Urban Transportation Research
DBP	Data Business Plan
DGAC	Data Governance Advisory Council
DOT	Department of Transportation
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Association
GIS	Geographic Information System
GPS	Global Positioning System
HART	Hillsborough Area Regional Transit Authority
HEPH	FHWA Office of Human Environment
HEPP	FHWA Office of Planning
HOFM	FHWA Office of Freight Management & Operations
HOIT	OST-R/Intelligent Transportation Systems Joint Program Office
HOTM	FHWA Office of Transportation Management
HOTO	FHWA Office of Transportation Operations Road Weather Management
HPPI	FHWA Office of Highway Policy Information
HRDO	FHWA Office of Transportation Operations Research & Development
IT	Information Technology
MARC	Mid-America Regional Council
MDOT	Maryland Department of Transportation

MoDOT	Missouri Department of Transportation
MPO	Metropolitan Planning Organization
NPMRDS	National Performance Management Research Data Set
PII	Personally identifiable information
RFP	Request for Proposals
RPC	Regional Planning Council
SHA	State Highway Administration
THEA	Tampa-Hillsborough Expressway Authority
TPM	FHWA Office of Program Performance Management
TSMO	Transportation Systems Management and Operations
XML	Extensible Markup Language

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