Hillsborough MPO Pilot of the Data Business Plan Guidance for State and Local DOTs

Data Business Plan

U.S. Department of Transportation

Produced by (Name of Contract)
U.S. Department of Transportation
(List all USDOT agencies sponsoring this report; only list one agency on the report cover)

Notice

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.
The U.S. government is not endorsing any manufacturers, products, or services cited herein and any trade name that may appear in the work has been included only because it is essential to the contents of the work.

Quality Assurance Statement

The Federal Highway Administration (FHWA) provides high-quality information to serve Government, industry, and the public in a manner that promotes public understanding. Standards and policies are used to ensure and maximize the quality, objectivity, utility, and integrity of its information. FHWA periodically reviews quality issues and adjusts its programs and processes for continuous quality improvement.

Technical Report Documentation Page

1. Report No. FHWA-JPO-	2. Government Accession No. (Remove; Insert Information Here or leave blank)	3. Recipient's Catalog No. (Remove; Insert Information Here or leave blank)
4. Title and Subtitle (Remove; Insert Information Here or leave blank)	5. Report Date (Remove; Insert Information Here or leave blank)	
	6. Performing Organization Code (Remove; Insert Information Here or leave blank)	
7. Author(s) (Remove; Insert Information Here or leave blank)	8. Performing Organization Report No. (Remove; Insert Information Here or leave blank)	
9. Performing Organization Name And Address (Remove; Insert Information Here or leave blank)	10. Work Unit No. (TRAIS) (Remove; Insert Information Here or leave blank)	
	11. Contract or Grant No. (Remove; Insert Information Here or leave blank)	
12. Sponsoring Agency Name and Address (Remove; Insert Information Here or leave blank)	13. Type of Report and Period Covered (Remove; Insert Information Here or leave blank)	
	14. Sponsoring Agency Code (Remove; Insert Information Here or leave blank)	
15. Supplementary Notes (Remove; Insert Information Here or leave blank)		
16. Abstract (Remove; Insert Information Here or leave blank)		
17. Key Words (Remove; Insert Information Here or leave blank)	18. Distribution Statement (Remove; Insert Information Here or leave blank)	
19. Security Classif. (of this report) (Remove; Insert Information Here or leave blank)	20. Security Classif. (of this page) (Remove; Insert Information Here or leave blank)	21. No. of Pages (Remove; Insert Information Here or leave blank)	22. Price (Remove; Insert Information Here or leave blank)

Form DOT F 1700.7 (8-72)   **Reproduction of completed page authorized**

Table of Contents

List of Tables

List of Figures

U.S. Department of Transportation
Intelligent Transportation System Joint Program Office
Hillsborough MPO Pilot of the Data Business Plan Guidance for State and Local DOTs – Draft

vi

1.0 Introduction

The Hillsborough County Metropolitan Planning Organization (MPO) is responsible for establishing a comprehensive transportation planning process to guide transportation funding in Hillsborough County.   This includes establishing priorities to meet short-term (next 5 years) and long-term (20+ years) multi-modal transportation needs for Tampa, Temple Terrace, Plant City and unincorporated Hillsborough County. The Fixing America's Surface Transportation (FAST) Act emphasizes a performance-based approach to transportation planning, in which funding decisions are driven by data on transportation system performance.

To support this process, the Hillsborough MPO maintains a Multimodal Transportation Database to store information on the highway, bicycle, pedestrian, and transit networks within Hillsborough County. The database includes roadway travel mobility data (hereafter called "mobility data") collected by Florida DOT and regional planning partner agencies. **Mobility data is defined as traffic volume, speed, lane occupancy, or connected vehicle data for vehicle, freight, bicycle/pedestrian, and transit modes.** The MPO uses the database to calculate multimodal Level of Service (LOS), develop traffic volume reports, and to create, store, and track scenarios for the development of the Long-Range Transportation Plan (LRTP) update.

Currently, there are opportunities for increased regional collaboration on mobility data collection and management. Data is not integrated across the region, which limits the MPO's ability to conduct analyses for planning and to add value for its customers. The MPO wants to collaborate with regional partner agencies to identify additional sources of mobility data for the database. For example, they need data to support calculation of Florida DOT performance measures, such as travel time reliability and return on investment for projects. They also want to incorporate national datasets such as the National Performance Management Research Data Set (NPMRDS) / HERE (formerly NAVTEQ) data, as well as connected vehicle data to enhance transportation analysis for the region. However, adding other mobility datasets to the database introduces a number of challenges related to data systems, technology, and governance:

- **Data Systems:** Data from private vendors such as NPMRDS/HERE are difficult to manipulate due to the large file size and network conflation challenges. Data integration is a challenge and will require improvements to the Multimodal Transportation Database structure.

- **Technology:** Manipulating mobility data using traditional database software (e.g., Microsoft Access) is difficult due to file size limitations. Agency staff have limited knowledge of specialized software tools such as Statistical Analysis Software (SAS).

- **Governance:** There is a need for regional data collaboration, as the MPO does not know what types of mobility data are available from partner agencies. In addition, there is no systematic process or platform in place for sharing data with partner agencies.

To address these concerns, the MPO developed this Data Business Plan (DBP) to better understand what mobility data are collected by their regional planning partners, how the data could support

mobility planning, operations, and performance measure activities, and who is responsible for managing and updating the data. This DBP was developed through participation in the U.S. DOT Roadway Transportation Data Business Plan (DBP) project, in which the MPO pilot tested a guidance document to help state DOT and local agency staff charged with mobility data-related responsibilities to develop, implement, and maintain a tailored data business plan for mobility data.

The MPO's goal is to integrate travel time and speed data into the Multimodal Transportation Database to support performance based planning and make it available to their planning partners in the region. As the lead agency for the data business planning effort, the MPO sees their role as one of coordination and pulling mobility data sources available to support regional planning efforts. The objectives for the DBP are to:

- Increase knowledge of partner agencies' current and future data sources available to support performance based planning

- Develop a data management plan that promotes collaboration and sharing of data sources needed to calculate Florida DOT performance measures, including but not limited to:
  o Speed
  o Travel-time reliability
  o Return on investment for projects
  o Connected vehicle outputs

- Develop a plan for integrating partner agency data into existing databases to achieve the desired outputs for performance based planning

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.

Scope

For the purposes of this pilot, mobility data is defined as traffic volume, speed, lane occupancy, or connected vehicle data for vehicle, freight, bicycle/pedestrian, and transit modes, although the MPO may add other modes and data collection technologies/sources to the DBP later. The geographic scope of the DBP is limited to the three core urban areas in the tri-county Tampa Bay region, which include Hillsborough, Pasco, and Pinellas counties.

Organization

The remainder of the DBP is organized as follows:

- **Section 2: Stakeholder Outreach.** This section identifies the stakeholders for mobility data and summarizes outreach activities used to engage stakeholders throughout each step of the DBP development process.

- **Section 3: Data and Gap Assessment.** This section summarizes issues related to the collection, management, governance, and use of mobility data in the Hillsborough area. It also identifies gaps and overlaps that exist in program activities.

- **Section 4: Data Governance Framework.** This section recommends a framework for using data governance principles to support mobility data. It provides a governance framework and defines roles and responsibilities for data governance.

- **Section 5: Improvement Strategies.** This section recommends strategies and actions to improve mobility data programs in the Hillsborough area, including data systems, collection methods, storage environments, quality standards, integration, analysis, and analytical tools.

- **Section 6: Implementation Plan.** This section provides a roadmap for implementing the DBP.

- **Appendix A: Stakeholder Registry**

- **Appendix B: Stakeholder Letter**

- **Appendix C: Stakeholder Survey**

- **Appendix D: Florida DOT Multimodal Mobility Performance Measures Matrix**

- **Appendix E: Example Data Sharing Agreement**

- **Appendix F: Example Charter**

- **Appendix G: Example Data Governance Manual**

- **Appendix H: Glossary of Data Management and Governance Terms**

- **Appendix I: Data Sharing Case Studies**

- **Appendix J: Sample Data Directory Website**

2.0 Stakeholder Outreach

Stakeholders for Hillsborough's DBP include internal and external persons and organizations that collect, own, maintain, use, interface with, access, or benefit from mobility data. This section identifies internal and external stakeholders for mobility data in the Hillsborough area and describes their involvement throughout development of the DBP.

Stakeholder Registry

Table 2-1 identifies the pilot site champion and supporting staff who served as the main points of contact for the Hillsborough MPO pilot.

Table 2-1. Pilot Site Champions

Agency	Name	Role	Email	Phone Number
Hillsborough MPO	Johnny Wong	Pilot Site Champion	wongj@plancom.org	813.273.3774 x370
Hillsborough MPO	Sarah McKinley	Support	mckinleys@plancom.org	813-273-3774 x382
Hillsborough MPO	Gena Torres	Support	torresg@plancom.org	813-273-3774 x357
Hillsborough MPO	Joseph Price	Support	pricej@plancom.org	813.273.3774 x362

Regional mobility data stakeholders are identified in a stakeholder registry in Appendix A. These stakeholders played a vital role in identifying the business needs and uses for mobility data from the perspective of their individual offices and agencies.

Stakeholder Outreach

Stakeholder outreach was conducted throughout each step of the DBP development process. The stakeholder engagement plan in Table 2-2 identifies the stakeholders engaged in each step of the DBP development, the feedback desired, and engagement mechanisms to gather input from stakeholders.

Stakeholder outreach took place through the following activities:

- **Stakeholder letter.** The Hillsborough MPO Executive Director distributed a stakeholder letter introducing the pilot project. The letter is provided in Appendix B.

- **Stakeholder survey.** An online stakeholder survey was conducted to gather information on partner agencies' mobility data collection activities, as well as identify issues related to data sharing, access, and collaboration. The survey period was from March 30 – April 12, 2016. The survey was distributed to 29 stakeholders representing 16 agencies, and 15 responses were received. The stakeholder survey instrument and results are provided in Appendix C.

- **Phone interviews.** Phone interviews were conducted with pilot site champions and partner agency stakeholders to further discuss stakeholder needs and gather information for the DBP.

- **Stakeholder workshops.** Two on-site stakeholder workshops were conducted to: 1) Gather information needed to develop the DBP, and 2) Review results, finalize the DBPs, and gather feedback for enhancement of the Guidance. The workshops were held in conjunction with regularly scheduled Intelligent Transportation System (ITS) Committee meetings and took place on April 14, 2016 and October 13, 2016.

Table 2-2. 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
Step 4. Improvement Plan	• Identify improvements needed to address gaps	• Pilot Site Champions • Regional Stakeholders	• Obtain input on improvements needed to address gaps	• Phone interviews

Data Business Plan Development Process	Key Actions	Relevant Pilot Site Stakeholders	Stakeholder Input Needed	Outreach Mechanism
	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		• 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	
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
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

Data Business Plan Development Process	Key Actions	Relevant Pilot Site Stakeholders	Stakeholder Input Needed	Outreach Mechanism
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

3.0 Data and Gap Assessment

This section presents an inventory of current mobility data collection efforts by regional stakeholders and the results of a data and gap assessment to identify issues related to the collection, management, governance, and use of mobility data within the Hillsborough area.

Data Inventory

One of the MPO's goals is to increase their knowledge of partner agencies' current and future data sources available to support performance based planning. This section details several mobility data initiatives in the region, and it provides a comprehensive mobility data inventory for regional stakeholders. The information in this section was compiled based on the results of the stakeholder survey and follow-up phone interviews.

Bluetooth Probe Data – Florida DOT District 7, City of Tampa, Pinellas County, Pasco County

Bluetooth probe data collection is becoming widely utilized in the region. FDOT District 7 piloted TrafficCast's BlueTOAD system in partnership with the City of Tampa. The project is overseen by a one-vendor system (TrafficCast's BlueTOAD system) in order to maintain uniformity. The Bluetooth units are located on arterials since data collection is usually more difficult on those roadways as compared to freeways (where radar and toll-tag readers are used to capture speed data).

District 7 has installed numerous Bluetooth devices along arterial roads in Pinellas and Hillsborough Counties, as shown in Figure 3-1. The units in blue are operated by District 7 and encompass Hillsborough, the City of Tampa, and Pasco counties. The original corridors were deployed in 2011. There is minimal coverage (only a few units) in Pasco County because District 7 decided to focus initially on the most congested corridors. However, District 7 is expanding the system and installing an additional 100 Bluetooth units throughout the district, including at least 15 units along SR 54 and SR 56 in Pasco County. This will provide coverage for the entire 3-county region. District 7 and the City of Tampa also installed readers around MacDill Air Force Base as part of a year long study to monitor traffic patterns between Gandy Blvd and the four entrance gates to the base. District 7 monitors travel times on a daily basis and generates quarterly reports. The City of Tampa receives an email-based report on corridor conditions. The data from the District 7/City of Tampa Pilot Project is being archived, and District 7 Traffic is responsible for archiving the data.

The units in red are operated by Pinellas County. Travel time data from these units support travel time message signs, traffic signal timing, and adaptive signal control. The original corridors were deployed in 2012. Pinellas County is expanding their system, with a 3 to 5 year additional commitment. Pinellas County hosts the BlueTOAD System and data on their own stand-alone server, and the data is co-hosted in their TrafficCast account as well.

Data is available to other agencies at the permission of District 7 and Pinellas County leadership, as there are no contractual commitments that refrain them from sharing the Bluetooth data. These two agencies are already engaged in a mutual agreement to share their Bluetooth data with one another.

Figure 3-1. Bluetooth Deployment in the Tri-County Tampa Bay Region
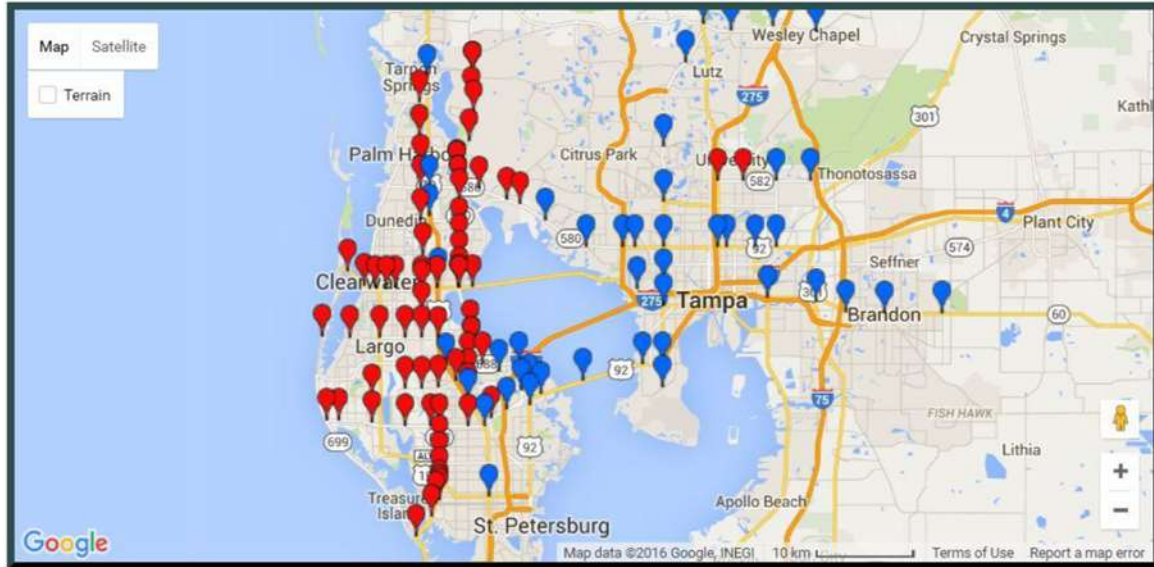
LEGEND

🔵 Operated by FDOT District 7
🔴 Operated by Pinellas County

Waze – City of Tampa, Hillsborough County

The City of Tampa has been participating in the Waze Connected Citizens Program since January 2016. The program is designed to improve traffic conditions by facilitating a two-way data exchange between Google and U.S. government agencies that collect traffic data. The City of Tampa sends Google real-time and advance information on road closures, special events, and emergency evacuations for roadways within the city limits. Google uses the data to redirect drivers around roadway closures via the Waze navigation application. In the future, the City plans to send Google flood sensor information including flood warnings and related road closures. Waze plans to beta test a carpool application in Tampa next year.

In return, Google provides the City with real-time incident, slow-down, and travel time information as reported by drivers via the Waze application. The information is provided to the City as a real-time data stream and is not saved or archived. The City uses the data to monitor traffic conditions during peak periods. Google also provides traffic condition reports by corridor. Use of Waze data is subject to the terms and conditions in a standard licensing agreement[1]. The agreement prohibits distributing or

---

[1] Overview of Google's Connnected Citizens Program and Traffic Data Cross License Terms and Conditions,
https://docs.google.com/file/d/1ZRasGSOWxioCFMuy6hDYMaZoex1HG5QzUp1x6TQyOSg/view

publishing aggregated or historic Waze data, except with Google's prior written consent. The agreement term is in effect until either party decides to end it.

Hillsborough County is also entering into an agreement with Waze.

Mobility Data Inventory

Table 3-1 provides a comprehensive mobility data inventory for regional stakeholders. It includes the following information:

- **Organization** – The name of the organization responsible for collecting or managing mobility data.
- **Mobility Data Collected** – The type of mobility data being collected within the organization.
- **Data Source** – Whether the data is collected internally, obtained from another agency, purchased from vendors, or other data source.
- **Data Collection Method** – Whether the data is collected via probe vehicles, GPS, Bluetooth, or other data collection method.
- **Network Type** – Whether the data is collected on freeways, highways, or arterials.
- **Geographic Boundary** – The geographic boundary for data collection.
- **Time Period** – Whether the data is collected on an ongoing, sample, or one-time basis.
- **Real time vs Archived** – Whether the data is aggregated in real-time or archived.
- **Purpose** – Whether the data is used to support mobility planning or operations activities.

Table 3-1. Mobility Data Inventory

Organization	Mobility Data Collected	Data Source	Data Collection Method	Network Type	Geographic Boundary	Time Period	Real time vs 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 ITS project.	Obtained from another agency – FDOT 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
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 – FDOT 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
Florida DOT District 7	Annual traffic count program	Collected internally –	Bluetooth/BlueTOAD	Freeways Highways	Throughout District 7 and Statewide	Ongoing Samples	Real-time Archive	Operations Planning

Organization	Mobility Data Collected	Data Source	Data Collection Method	Network Type	Geographic Boundary	Time Period	Real time vs Archived	Purpose
	Special counts for PD&Es, corridor studies, etc. Travel time, speed studies. Transit routes/ridership for model base years OD Bluetooth data for special studies	consultant contracts/tasks Collected internally – traffic counts/speed data Purchased from vendors – Central Office INRIX purchase	Other – counters collect speed data	Arterials		One-time		Other – Design Other – PD&Es
Hillsborough Area Regional Transit Authority (HART)	Speed Distance Fuel usage Route and stop ridership Wheelchair usage Transit signal priority requests Transit fare collection Modes: fixed route, paratransit, and streetcar	Collected internally	GPS	Freeways Highways Arterials	HART routes within Hillsborough County	Ongoing	Real-time	Operations Planning
Center for Urban Transportation Research (CUTR)	O-D and travel time data for bike, ped, transit, and vehicular.	Collected internally, through their apps.	Cellphone applications	Freeways Highways Arterials	City of Tampa, focused around the USF campus	Ongoing	Real-time Archive	Other – app development
Hillsborough MPO	Data to support multimodal level of service (LOS) reporting for highway/bike/ped/transit. Includes volumes,	Multimodal LOS data collected internally. Travel time and speed data	FDOT will be collecting data to support system performance	Freeways Highways	Hillsborough County	Ongoing Other: FDOT will provide a snapshot	Archive	Planning

Organization	Mobility Data Collected	Data Source	Data Collection Method	Network Type	Geographic Boundary	Time Period	Real time vs Archived	Purpose
	pavement conditions (lane configuration, widths, etc.), types of bike/ped facilities. The MPO wants to incorporate travel time and speed data into its Multimodal Transportation Database. (FUTURE)	obtained from other agencies/ vendors (FUTURE)	measures (FUTURE)			annually (FUTURE)		
Pinellas MPO	Some sample data on all defined types of mobility data except connected vehicles	Obtained from another agency – Albeck Gerken, Inc.	Bluetooth	Arterials	US19 Highway, which is the north/south spine of our county	Ongoing	Real-time Archive	Operations Planning
Pinellas County	Bluetooth Travel Time Data (vehicle) Computerized Signal System Sensor data (vehicle)	Collected internally – Bluetooth and loop sensors	Bluetooth/BlueTOAD	Arterials	County wide within Pinellas County	Ongoing	Archive	Operations Planning
Pasco MPO	Traffic volume	Collected internally – Pasco Traffic Operations	Other – tube counts	Freeways Highways Arterials	Within Pasco County	Ongoing	Archive	Operations Planning
Pasco County	FDOT District 7 has plans to expand and install 15 additional Bluetooth units in Pasco County as part of the BlueTOAD project (FUTURE)	Collected internally – Bluetooth (FUTURE)	Bluetooth/BlueTOAD (FUTURE)	Arterials (FUTURE)	Within Pasco County (FUTURE)	Ongoing (FUTURE)	TBD	TBD
Florida DOT Central Office	Florida DOT has data on all defined types of mobility data to support development of the Florida	Varies	Varies	Varies	Varies	Varies	Varies	Operations Planning

Organization	Mobility Data Collected	Data Source	Data Collection Method	Network Type	Geographic Boundary	Time Period	Real time vs Archived	Purpose
	DOT Multimodal Mobility Performance Measures Sourcebook. A matrix of measures is provided in Appendix D.							
Department of Health – Hillsborough	Socioeconomic, health, and walkability data that support transportation planning analyses	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Florida's Turnpike	Volume Speed System reliability Freight	Collected internally – traffic count, toll data, origin and destination studies, preference surveys Obtained from another agency – FDOT District Offices, comparisons with other states (e.g., Georgia) Purchased from vendors – additional freight information is purchased through FDOT Central Office	Bluetooth	Highways	Statewide	Ongoing Samples One-time	Real-time Archive	Operations Planning

Organization	Mobility Data Collected	Data Source	Data Collection Method	Network Type	Geographic Boundary	Time Period	Real time vs Archived	Purpose
City of Temple Terrace	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Plant City	System counts for ATMS Traffic System Local speed, volume counts for safety and development	Collected internally using road counters and system loops	Other – Loops and road tubes	N/A	Within the City of Plant City limits	Ongoing Samples One-time	Real-time Archive	Operations Planning Other - Safety
Environmental Protection Commission	Pollutant level data	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Pinellas Suncoast Transit Authority (PSTA)	Automatic passenger count data tracks ridership and related data Bicycle rack usage Real-time data tracks transit speed and on-time performance	Collected internally – Clever Devices Real Time Systems	GPS	N/A	Within Pinellas County, anywhere the PSTA buses run Limited parts of Hillsborough County, where PSTA bus routes run	Ongoing Samples	Archive	Operations Planning
Port Tampa Bay	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

Data Assessment

The stakeholder outreach process was used to identify stakeholder needs related to the collection, management, governance, and use of regional mobility data programs, stakeholder coordination, and current capability/maturity. Table 3-2 summarizes stakeholder needs within each of these assessment areas. The results of the assessment will help prioritize data systems for enhancements or replacements to support mobility planning, operations, and performance measure activities.

Table 3-2. Stakeholder Needs and Challenges

Area of Improvement	Sub Area	Stakeholder Need	Source
Data Systems	Data Gaps	1. The MPO needs data to support calculation of Florida DOT performance measures, such as travel time reliability and return on investment for projects.	Phone calls
		2. The MPO wants to incorporate national datasets into its Multimodal Transportation Database, such as the National Performance Management Research Data Set (NPMRDS) / HERE (formerly NAVTEQ) data, as well as connected vehicle data to enhance transportation analysis for the region.	Phone calls
		3. Need additional travel data, mainly turning movement counts at intersections on a continuous basis	Survey
		4. Need to obtain travel time data on more facilities. Specifically SR 60, which was discontinued. It is a main beach access arterial.	Survey
		5. More origin and destination data would be useful for planning purposes	Survey
		6. Pedestrian and bicycle activity data is the most needed	Survey
	Data Collection	1. Need to make better use of expanding data sources for performance management	Survey
	Data Standards	1. There is a need to assess how data could come from connected vehicles through a DBP environment to support planning in general.	Survey
		2. Intensive work to set out machine counters, not to mention exposure to traffic, which can be unsafe	Workshop
		3. There is always room for improvement in data quality/data collection standards for travel time/ speed	Workshop
	Business Processes	1. If Bluetooth or GPS probe data isn't based on a good sample size, results can be skewed	Survey
		2. Knowing whether data collected is continuous or a one-time collection is very important	Survey

Area of Improvement	Sub Area	Stakeholder Need	Source
		3. Travel time and speed data is obtained based on site-specific needs through our GEC. There are no systematic ways for data gathering.	Survey
		4. Managing and analyzing this data is time intensive. We are currently doing it with the same staffing level as before.	Phone calls
	Business Processes / Data Integration	1. Ideally, the MPO would like to attach travel time data to roadway segments in Multimodal Transportation Database. They would like the ability to conduct 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.	Phone calls
	Data Integration	1. Currently, data is not integrated across the region, which limits the MPO's ability to conduct analysis to support performance based planning.	Phone calls
	Data Integration / Data Sharing	1. The MPO is interested in integrating other datasets (planning for operations, connected vehicle data) into its Multimodal Transportation Database. However, data integration is a challenge and will require improving the structure of the database.	Phone calls
		2. It is an interagency mission to incorporate travel time and speed data into the MPO databases and make it available to planning partners.	Phone calls
	Data Sharing	1. Private vendors are willing to install a device in signal cabinets to gather roadway performance measures. These measures are available to the municipality, but the company may also sell that information to Original Equipment Manufacturers.	Survey
		2. Data availability is not publicly advertised, so access is limited.	Survey
		3. Data sharing obstacles include proprietary restrictions and data sharing platform	Survey
	Data Storage and Access	1. Access to data is a major issue. If GPS data contains personally identifiable information (PII), agency access is limited unless they obtain a special type of research certification.	Workshop
		2. Limited access to test data was cited as an obstacle	Workshop
		3. Data size is an obstacle	Workshop
Technology & Tools	Software / Tools	1. Technical challenges exist with specialized software needed to access GPS probe data.	Workshop
		2. Although the NPMRDS/HERE data seems to be a good source of travel time data, manipulating the data using traditional database software (e.g., Microsoft Access) is difficult due to file size limitations (e.g., 2 GB).	Phone calls

Area of Improvement	Sub Area	Stakeholder Need	Source
		3. Data from private vendors such as NPMRDS/HERE are difficult to manipulate due to the large file size and network conflation challenges.	Phone calls
		4. The MPO would like to make more use of NPMRDS datasets, but it requires specialized software tools such as Statistical Analysis Software (SAS). The MPO has not evaluated this capability.	Phone calls
		5. Travel time data in the NPMRDS is associated with the National Highway System, which represents only a portion of the MPO roadway network. The MPO is able to download other files to generate reports in MS Access based on location. The MPO can do light reporting using the travel time data and static table with Traffic Message Channel (TMC) location codes. However, it is challenging to do spatial joins in GIS due to file size.	Phone calls
		6. The MPO has a need for more robust tools to handle large datasets.	Phone calls
	Network Testing	1. Network testing was cited as an obstacle	Workshop
Data Governance	Data Ownership	1. Not knowing the owners of data was cited as an obstacle	Workshop
	Collaboration	1. 45% of survey respondents indicated they do not currently share travel time/speed data with other organizations, but they are willing to do so.	Survey
		2. The MPO wants to collaborate with regional partner agencies to identify additional sources of mobility data for the database, but they do not know what types of data are available.	Phone calls
		3. There is no systematic process or platform in place for sharing data with partner agencies	Phone calls
		4. Collaboration takes place between individual partner agencies and FDOT, but should be expanded to other regional partners	Survey

Assessment of Capability

An assessment of the Hillsborough region's capabilities for collecting, managing, governing, and using mobility data was conducted using a capability 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. The maturity model defines levels of maturity for each of the following assessment areas:

- **Data Collection, Management, and Technical Standards:** What mobility data are collected? Are the data sufficient to support mobility planning, operations, and performance measure activities? Are there overlaps or redundancies in data collection or management efforts? Are business processes for data collection, updating, quality assurance, data processing, and use documented? Is there an inventory of available mobility data systems (in a data registry)? Are adequate data collection standards and metadata in place?
- **Data Integration and Expandability:** To what extent are mobility data sets linked to support performance measurement and asset management purposes? Are existing mobility data systems expandable as new technologies and tools are developed?
- **Data Storage and Access:** Are data easily accessible? Are users able to find the data they need and in the format they need it in?
- **Technology and Tools:** Do users have access to the business analysis tools they need to support mobility planning, operations, and performance measure activities? Are technology and tools to support data management and analysis consistent, standardized, and updated?
- **Data governance:** Is there a governance structure for mobility data programs in place? For example, are roles, responsibilities, and processes for managing data formalized and documented? Is there a designated data governance board, data stewards, and data owners?
- **Culture:** Does top management visibly support data management/governance efforts? (i.e. provides resources, supports initiatives by signing charters, etc.) Are adequate resources committed? Is mobility data promoted as an agency-wide asset? How is the program made visible and relevant to management and staff?
- **Collaboration:** Are internal and external partner agencies appropriately aligned and working together productively? Do stakeholders collaborate on topics relevant to mobility data (e.g., sharing RFP's for current and upcoming initiatives, procurement plans, and best practices related to specific types of mobility data)? Has collaboration been successful?

There are three distinct levels of capability for each assessment area:

- **Level 1 – Initial/Under Development.** Activities and relationships are largely ad hoc, informal, and champion-driven, substantially outside the mainstream of other activities. Alternatively, the capability is under development, but there is limited internal accountability and uneven alignment with other organizational 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 program priority, with continuous improvement, top-level management support, and formal partnerships in place.

Figure 3-2 presents the draft results of the capability assessment. The hollow circle (○) indicates current level of capability within the assessment area, which was determined based on the list of stakeholder needs. The solid circles indicate the target level of capability, and they are color coded to reflect the degree of gap. For example, the green circle (●) indicates no gap, in which the desired level of capability is the same as the current level. The yellow circle (●) indicates a small gap (e.g., one level difference) between current and desired levels of capability. The red circle (●) indicates a large gap (e.g., two levels) between current and desired levels of capability.

Figure 3-2. Assessment of Capability
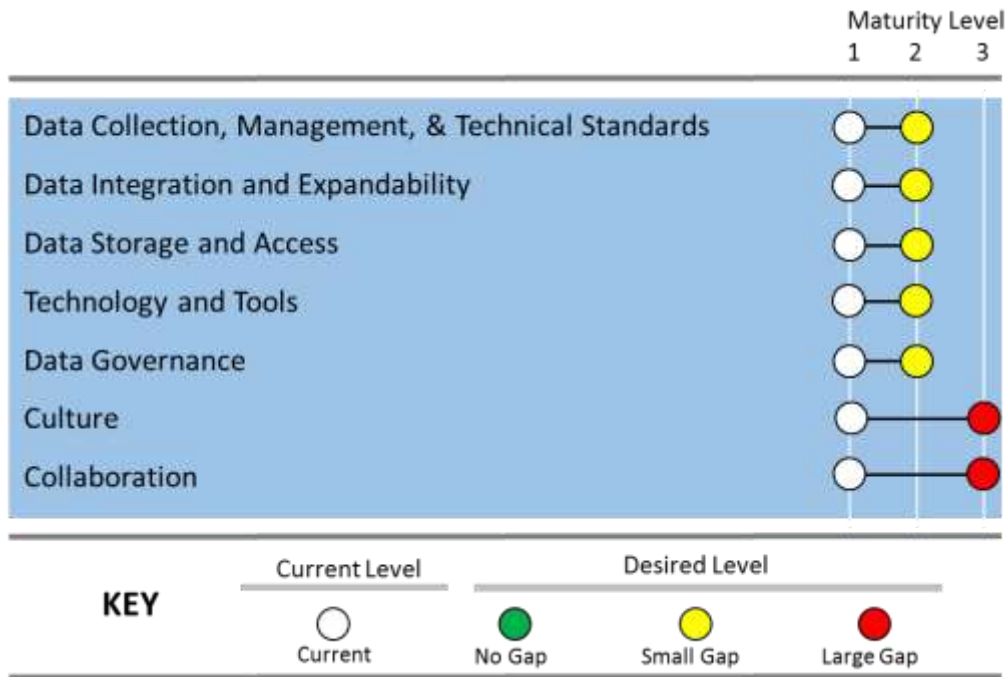
Summary of Gaps

Table 3-3 summarizes the gaps and overlaps that exist in program activities related to data systems, technology and tools, and data governance, culture, and collaboration. These gaps need to be addressed to advance the region from current to desired levels of capability within the assessment areas.

Table 3-3. 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

Dimension	Gaps
	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 conflations 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

Improvement Strategies

This section summarizes strategies for the Hillsborough MPO and its partner agencies to improve mobility data systems, data collection methods, data storage environments, data quality standards, data integration, data analysis, and analytical tools. Table 5-1 recommends improvement strategies to address each assessment dimension and gap identified in Section 3 and assigns a priority for implementation 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.

Table 3-4. Improvement Strategies

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 Notice of Proposed Rule-making on Mobility Performance Measures.	High
		d.	Utilize NPMRDS travel time data and combine it with regional traffic volume data.	Medium
		e.	Archive travel time/volume data and make it available to support MAP-21 requirements.	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
	3. Data Standards	a.	Develop and enforce data quality standards for travel time/speed data. Ideally, enforcement should be a	High

Dimension	Sub Area	Strategies	Priority
		collaborative effort whereby participants agree on holding each other accountable.	
		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 FDOT 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
	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

Dimension	Sub Area		Strategies		Priority
		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
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		Medium

Dimension	Sub Area	Strategies	Priority
		encouraged to seek further legal guidance with their attorneys.	
		d. Further explore *Privacy by Design* as a way to address privacy concerns	Low
	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 Subcommittee 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.	Low
		b. Establish a communication protocol and plan for communicating performance measure results to executive level staff, Mobility Data Subcommittee, 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

4.0 Data Governance Framework

It is recommended that the region establish a data governance framework for mobility data in the region. This includes adopting core data principles, implementing a data governance model, defining roles and responsibilities for managing mobility data, and developing supporting documents such as a Data Governance Manual, Data Catalog, Business Terms Glossary, and Data Sharing Agreements.

Data Principles

All mobility data related decision-making should be guided by the following set of core data principles[2]:

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

Data Governance Model

A data governance model depicts the relationship between mobility data programs, the various individuals/agencies responsible for implementing data governance, and the users/stakeholders for the data programs.

The model diagram in Figure 4-3 proposes a formal structure for mobility data governance in the Hillsborough region. The following components are depicted in the model diagram:

---

[2] AASHTO Subcommittee on Data, Data Subcommittee Efforts on Core Data Principles website, http://planning.transportation.org/Pages/Data.aspx

    A.   Regional ITS Committee
    B.   Mobility Data Subcommittee
    C.   Mobility Data Executive Group
    D.   Mobility Data Stewards and Custodians
    E.   Mobility Data Users and Stakeholders

It is recommended that Hillsborough, Pasco, and Pinellas MPOs formally designate a Regional ITS Committee (A) to coordinate the planning, programming, engineering, and implementation of intelligent transportation systems projects in the tri-county region. This regional ad hoc working group would meet annually or bi-annually as needed.

The Regional ITS Committee would designate a regional Mobility Data Subcommittee (B) to coordinate on mobility data collection, data acquisitions, and crosscutting data management issues (e.g., data quality, standards, metadata, data privacy, and security). The Subcommittee would meet on a quarterly basis and report to the Regional ITS Committee (A). The Subcommittee would consist of designated individuals from Regional ITS Committee member agencies and other MPO partner agencies who are responsible for the oversight of mobility data programs to support the business functions of their agencies. Potential Subcommittee members are shown in the figure.

The Mobility Data Subcommittee should be supported by an Executive Group (C), 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, including dedicating resources as needed and establishing memorandums of understanding for data sharing with other partner agencies. An example data sharing agreement is provided in Appendix E.

Mobility data governance champions from within the Hillsborough MPO, Pinellas MPO, and Pasco MPO should tri-chair the Mobility Data Subcommittee. These individuals would also liaison with the Regional ITS Committee (A).

Mobility data stewards and custodians (D) within partner agencies would ensure mobility data that is collected, maintained, and used by their agency is managed according to policies established by the Mobility Data Subcommittee.

Mobility data users and stakeholders (E) would not be involved in data governance activities but would benefit from improved coordination and data management practices resulting from the governance framework.

Figure 4-3. Data Governance Model

Figure 4-3. Data Governance Model
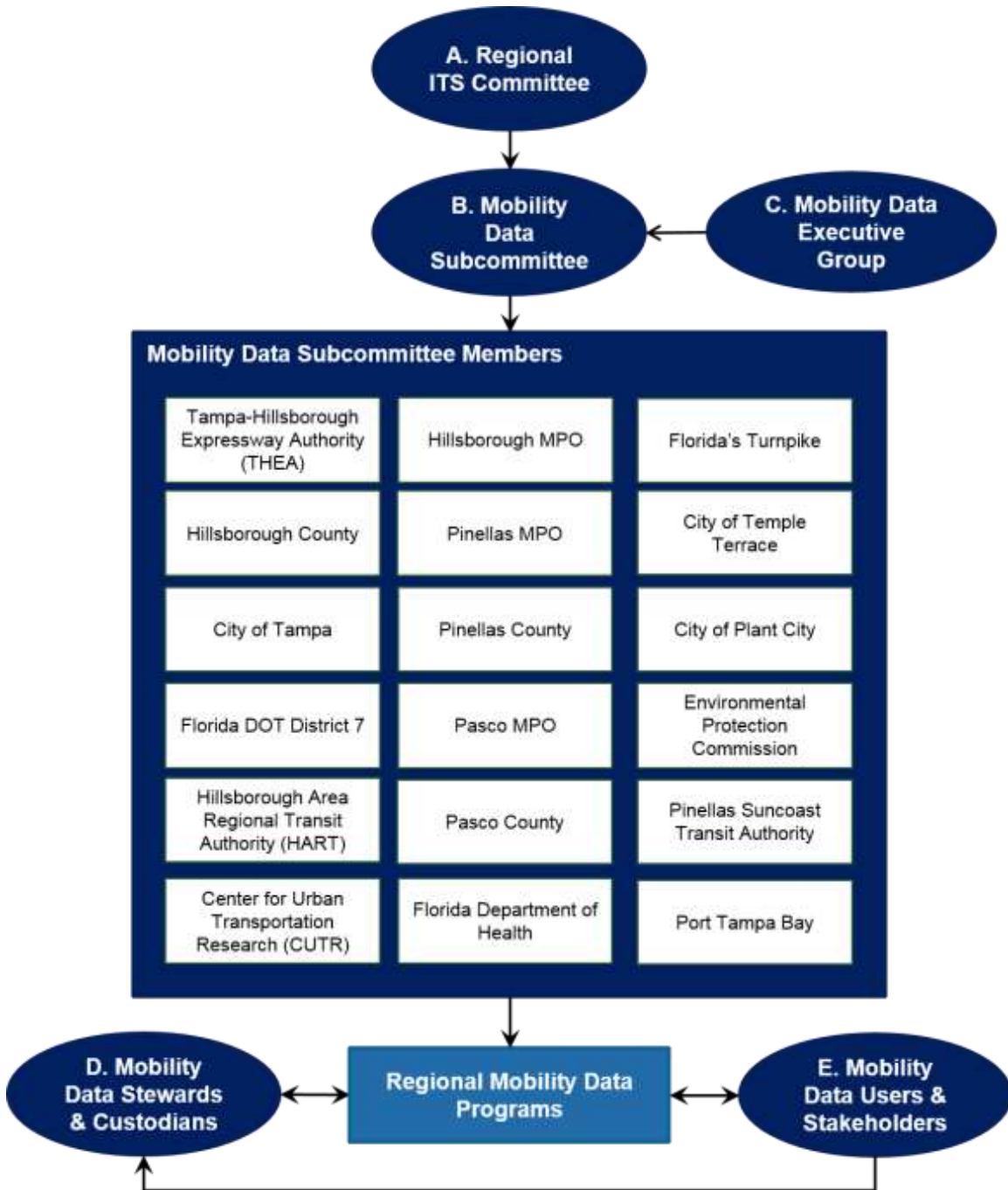
Roles and Responsibilities

The following data governance roles are defined for the region:

- **Mobility Data Subcommittee** – 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.
- **Mobility Data Subcommittee Co-Chairs** – Designated individuals from within Hillsborough, Pinellas, and Pasco MPOs who would co-chair the Mobility Data Subcommittee and liaison with the Regional ITS Committee.
- **Mobility Data Executive Group** – Senior level managers from Subcommittee member agencies. The Executive Group would provide executive level support for mobility data governance, including dedicating resources as needed and establishing memorandums of understanding for data sharing with other partner agencies.
- **Mobility Data Stewards** – Individuals within Subcommittee member agencies who ensure mobility data that is collected, maintained, and used by their agency is managed according to policies established by the Mobility Data Subcommittee.
- **Mobility Data Custodians** – IT staff within Subcommittee member agencies who provide "technical application" support for mobility data systems.
- **Mobility Data Users and Stakeholders** – Any persons or agencies that use or interface with, access, benefit from, or are otherwise affected by mobility data.

Table 4-1 defines the roles and responsibilities for supporting the governance framework. These roles/responsibilities should be vetted with members of the Mobility Data Subcommittee. It is recognized that the organization structure of individual partner agencies are all different. The roles and responsibilities listed are job functions and not necessarily job titles. In some cases, the duties of a data steward and data custodian may be performed the same individual.

Table 4-1. Data Governance Roles and Responsibilities[3] [4]

	Role	Description		Responsibilities
1.	Regional ITS Committee	Association of technically qualified representatives of agencies involved in the planning, programming, engineering and/or implementation of intelligent transportation systems projects in Hillsborough, Pasco, and Pinellas Counties.	a.	Develop "rules of engagement" regarding collaboration and coordination for the Mobility Data Subcommittee
			b.	Establish policies and procedures for the collection and use of mobility data and information within their respective agencies
			c.	Coordinate resources and cost sharing strategies to reduce redundancy in regional data collection, integration, and data systems
2.	Mobility Data Subcommittee	Association of individuals from partner agencies who collect and provide mobility data and establish business rules and processes for the mobility data that is collected, maintained, and used by their agency. These individuals may serve as data stewards or subject matter experts for mobility data within their agency.	a.	Identify and address gaps and redundancies in regional mobility data collection activities
			b.	Identify data stewards for mobility data programs within their respective agencies
			c.	Share current activities and best practices in mobility data collection and management
			d.	Facilitate sharing of data with internal/external stakeholders
			e.	Share procurement plans and RFPs for mobility data
			f.	Review RFPs and provide recommendations based on best practices
			g.	Provide recommendations to the Regional ITS Committee regarding development of mobility data products to meet business needs
			h.	Provide recommendations to the Regional ITS Committee regarding standards and procedures for collection, maintenance, and use of data programs and products
			i.	Recommend technology tools to support mobility data management and sharing

---

[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.

Role	Description	Responsibilities
3. Mobility Data Executive Group	Senior level managers across business areas of member agencies and may include Director of IT Office or Division.	a. Provide executive level support for mobility data governance b. Dedicate resources to support data management and governance within their agency as needed c. Establish data sharing agreements and memorandums of understanding with other partner agencies j. Develop and approve charter for their agency's participation in the Mobility Data Subcommittee
4. Mobility Data Stewards	Individuals within partner agencies who are responsible for ensuring mobility data that is collected, maintained, and used by their agency is managed according to policies established by the Mobility Data Subcommittee.	a. Identify and manage metadata b. Identify and resolve data quality issues c. Determine business and security needs of data d. Communicate data quality issues to individuals that can influence change, as needed e. Provide input to data analysis
5. Mobility Data Custodians	IT staff within partner agencies who are responsible for the "technical application" support for data systems. This may include IT security staff, network administrators, database administrators, and server administrators within the IT Office or Division, as well as application programmers and systems analysts who work in business areas other than the IT Office or Division.	a. Ensure safety and integrity of data in custody of IT b. Implement application and data access controls appropriate for security classification c. Provide reasonable safeguards for information resources
6. Mobility Data Users and Stakeholders	Association of people comprised of internal and external stakeholders who share a common interest as users of mobility data.	a. Communicate their agency's business needs supported by mobility data programs b. Provide feedback on data quality and use of mobility data programs

Rules of Engagement

Once the Mobility Data Subcommittee has been formally established, the group should develop and approve a Charter to set forth the purpose, goals, membership, roles and responsibilities, meeting schedule, and "rules of engagement" regarding collaboration and coordination for the group. Potential rules of engagement could include the following:

- Share 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.

An example charter is provided in Appendix F.

Governance Documentation

Once the Mobility Data Subcommittee has formally approved a Charter, the group should also develop and approve the following supporting documents to define policies, standards, and procedures for data governance in the region:

- **Data Governance Manual.** The manual serves as a centralized resource that formalizes data governance roles and responsibilities, data standards, policies, and procedures related to mobility data. An example Data Governance Manual is provided in Appendix G.
- **Data Catalog.** The data catalog documents regional mobility data systems and the offices responsible for maintaining those systems. The catalog identifies the system of record for specific 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. The data inventory in Section 3 can be used as a starting point for developing the data catalog.
- **Business Terms Glossary.** The business terms glossary defines how standard terminology for 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.

6.0 Implementation Plan

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 Mobility Data Subcommittee member agencies. The Subcommittee may conduct regular workshops and meetings to implement the Plan, and all stakeholders are responsible for addressing the improvement items (identified in Section 5). Discussions at meetings should include reports on implementation progress (e.g., tasks competed, tasks remaining) and any adjustments needed due to changing priorities, policies, standards, or legislative priorities. In addition, Hillsborough MPO should provide an annual report or briefing to senior management that provides an executive level summary of regional mobility data systems, status of integrating the data systems into the MPO's Multimodal Transportation Database, successes achieved, new enhancements needed for existing data systems, and recommendations for addressing those issues.

This section provides a proposed roadmap to implement this DBP, with one set of actions centered on regional collaboration and another focused on internal use within Hillsborough MPO.

Regional Implementation Plan

Step 1: Execute a Memorandum of Understanding

Execute a Memorandum of Understanding (MOU) to engage regional stakeholder agencies in the DBP implementation process. The purpose of the MOU is to obtain agreement from leadership for their agencies' involvement in the DBP process so that the effort can move forward. This top-down agreement can make DBP implementation significantly more successful.

Step 2: Obtain Regional Coordination and Buy In

1. Determine which stakeholders are willing to engage in a data sharing agreement. Ideally, these stakeholders will be committed to the ultimate vision of an open-data platform. Stakeholders should strive to understand each other's business needs for mobility data access and sharing. One venue in which this can take place is a Data Summit or conference to engage regional stakeholders and share ideas (Stragegies 5a and 7f). Additional information on the purpose and benefits of data sharing in an open data platform is provided in Appendix I (strategy 8b).

2. Implement the Data Governance Framework. This would include formally designating a regional Mobility Data Subcommittee and Executive Group to coordinate on mobility data collection, data acquisitions, and cross-cutting data management issues (e.g., data quality, standards, metadata, data privacy and security); formalize the roles and responsibilities to support data governance in the region; develop and approve a Charter to set forth the purpose, goals, membership, roles and responsibilities, meeting schedule, and "rules of engagement" regarding collaboration and coordination for the group; and develop supporting documents such as a Data Governance

Manual, Data Catalog, Business Terms Glossary, and Data Sharing Agreements (Section 4) (strategy 7a).

3. Develop and publish a Data Catalog to increase awareness of mobility data availability, identifying datasets that can be openly shared. The data catalog should document the system of record for specific 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 (strategy 7d).

4. 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 (strategy 1i).

5. Develop contract language for vendors to ensure data can be shared with other agencies (strategy 8c).

Step 3: Improve Data Integration and Collaboration

1. Address needs for data standards:
   a. Adopt data quality standards for collection, processing, use, and reporting of mobility data (strategy 2b).
   b. Implement standard data sharing agreement among stakeholders (strategy 5d).
   c. Agree on using a common linear network to facilitate data sharing and integration.
   d. Ensure coordination with applicable national data standards (strategy 3d).
   e. 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 (strategy 3a).
   f. Develop minimum regional standards for Bluetooth/GPS probe data (strategy 3c).

2. Address data security and privacy issues:
   a. Establish and maintain security standards to secure data and protect privacy of individuals and contributing agencies (strategy 9a).
   b. Further explore Privacy by Design as a way to address privacy concerns (strategy 9d).
   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 (strategy 9c).

Step 4: Build a Data Sharing Platform

Starting with speed and volume data, develop a roadmap to implement a common data platform:
1. Publish the data catalog from step 2 on a wiki or website. Example website content is provided in Appendix J.

2. Have agencies post all data in Open Data Format.

3. Address governance:
   a. Develop, maintain, and enforce a Data Governance Manual (strategy 7c).

   b. 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 (strategy 3e).

   c. Develop policy to define responsibilities for data storage, hosting, data retention/archival, and disposal (strategy 5b).

   d. Develop policy to define data ownership and dissemination rights (strategy 5c).

   e. Identify and assign governance roles and responsibilities (strategy 7b).

   f. Develop policy to define responsibilities for data quality assurance, including accuracy, timeliness, completeness, validity, coverage, and accessibility (strategy 2a).

   g. Establish a communication protocol and plan for communicating performance measure results to executive level staff, Mobility Data Subcommittee, and data users/stakeholders (strategy 10b).

   h. Clearly document policies, standards, and procedures and distribute to all staff responsible for collecting, maintaining, or distributing mobility data (strategy 9b).

4. Address data collection and integration:

   a. Identify applications that use expanding data sources (strategy 1j)

   b. Involve network/database administrators from partner agencies in development of shared data portal (strategy 6c).

   c. Develop systematic process to gather/update travel time/speed data from partner agencies (strategy 1g).

   d. Document quality control procedures, including instructions on how to process data errors (strategy 2d).

   e. 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 (strategy 6a).

   f. Develop standard data template format to foster joint usage and collaboration on mobility data (strategy 3b).

   g. Require metadata for mobility data systems (strategy 2c).

   h. 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 (strategy 3f).

   i. 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 (strategy 2e).

   j. Conduct risk assessment to identify data rists (strategies 11a and 11b)

5. Develop a data warehouse with classification system and querying capabilities.

Step 5: Implement Performance Measures to Track Success

1. Adopt a set of performance indicators to measure program activities (i.e., outputs) and confirm the region's governance program is delivering results (i.e., outcomes). Output indicators quantify the activities of the Subcommittee and reflect the level of effort expended or scale/scope of activities. Outcome indicators quantify the effectiveness of the Subcommittee 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.

2. Document the adopted measures in the Data Governance Manual.
3. Develop a plan for monitoring performance of program activities.

Internal Hillsborough MPO Implementation Plan

Step 1: Improve Multimodal Transportation Database

1. Identify resource needs (strategy 7g).
2. Develop and publish a Business Terms Glossary to define standard terminology for how mobility data is defined and used across the agency. (strategy 7e).
3. Develop specifications for collecting, updating, maintaining, and archiving mobility data in the Multimodal Transportation Database and assign responsibility for these activities (strategy 1f).
4. Archive travel time/volume data and make it available to support MAP-21 requirements.
5. Address data gaps to meet requirements of the MAP-21/FAST Act Notice of Proposed Rule-making on Mobility Performance Measures (strategy 1c).
6. Determine improvements needed to the structure of the Multimodal Transportation Database to support data integration (strategy 4d).
7. Develop procedures for attaching travel time data to roadway segments in the Multimodal Transportation Database (strategy 4c).
8. 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 (strategy 6b).
9. 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 (strategy 1a).
10. 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 (strategy 1b).

Step 2: Address Internal Governance

1. Identify and assign governance roles and responsibilities (strategy 7b).
2. Develop, maintain, and enforce a Data Governance Manual (strategy 7c).
3. Develop and implement a Knowledge Management system for organizing, storing, and archiving knowledge regarding mobility data sets and workflow processes. This ensures ensures lessons learned and experiences pertaining to mobility data are retained and archived as staff retire or leave the organization (strategy 12a).
4. Develop policy to define responsibilities for data storage, hosting, data retention/archival, and disposal.

Step 3: Maximize Externally-available Resources

1. Utilize NPMRDS travel time data and combine it with regional traffic volume data (strategy 1d).
2. Leverage the Regional Integrated Transportation Information System (RITIS) as a tool for data integration. RITIS is available through FDOT District 7, so no procurement purchase is required. The MPO should facilitate the RITIS implementation effort from planning through fruition (strategy 4a).

Step 4: Improve Technical Know-how

1. 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 (strategy 6d).
2. Develop and implement training program on use of analysis tools (strategy 6e).

Appendix A. Stakeholder Registry

	Stakeholder Agency	Stakeholder Name	Email
1.	Tampa-Hillsborough Expressway Authority	Bob Frey Rafael Hernandez Joe Ferreira*	BobF@tampa-xway.com rafael@tampa-xway.com joef@tampa-xway.com
2.	Hillsborough County	John Patrick Bob Campbell Michael Flick* Fred Hartless Greg McLean	PatrickJ@HillsboroughCounty.org CampbellR@HillsboroughCounty.org flickm@hillsboroughcounty.org HartlessF@hillsboroughcounty.org McLeanG@hillsboroughcounty.org
3.	City of Tampa	Vik Bhide* William Porth	Vik.Bhide@tampagov.net William.Porth@tampagov.net
4.	Florida DOT District 7	Peter Hsu Waddah Farah Menna Yassin Brian Hunter Elaine Martino Ron Chin Chester Chandler Tea Muslic	Ping.Hsu@dot.state.fl.us Waddah.Farah@dot.state.fl.us menna.yassin@dot.state.fl.us Brian.Hunter@dot.state.fl.us Elaine.martino@dot.state.fl.us ronald.chin@dot.state.fl.us Chester.Chandler@dot.state.fl.us tea.muslic@dot.state.fl.us
5.	Hillsborough Area Regional Transit Authority (HART)	Shannon Haney Justin Begley*	HaneyS@gohart.org BegleyJ@gohart.org
6.	Center for Urban Transportation Research (CUTR)	Steve Polzin Sean Barbeau	polzin@cutr.usf.edu barbeau@cutr.usf.edu
7.	Hillsborough MPO	Terry Eagan Tatiana Gonzalez Rich Clarendon Beth Alden	EaganT@plancom.org gonzalezt@plancom.org clarendonr@plancom.org aldenb@plancom.org
8.	Pinellas MPO	Chelsea Favero Marc Hanger	cfavero@co.pinellas.fl.us whanger@co.pinellas.fl.us
9.	Pinellas County	Ken Jacobs	kjacobs@pinellascounty.org
10.	Pasco MPO	Ali Atefi	aatefi@pascocountyfl.net
11.	Pasco County	Jennifer Carpenter	jcarpenter@pascocountyfl.net
12.	Florida DOT Central Office	Doug McLeod	douglas.mcleod@dot.state.fl.us
13.	Florida Department of Health	Daragh Gibson Allison Nguyen	Daragh.Gibson@flhealth.gov Allison.Nguyen@flhealth.gov
14.	Florida's Turnpike	Alison Stettner Shannon Estep	Alison.Stettner@dot.state.fl.us shannon.estep@dot.state.fl.us

U.S. Department of Transportation
Intelligent Transportation System Joint Program Office

15.	City of Temple Terrace	Pierre Valles*	pvalles@templeterrace.com
16.	City of Plant City	Donald Rainard*	drainard@plantcitygov.com
17.	Environmental Protection Commission	Jeff Sims* Reggie Sanford	simsj@epchc.org sanford@epchc.org
18.	Pinellas Suncoast Transit Authority (PSTA)	Cassandra Eckers Borchers Heather Sobush	CBorchers@psta.net HSobush@psta.net
19.	Port Tampa Bay	Frank Kilpakis (Rennaissance Planning Group)	fkalpakis@citiesthatwork.com

Note: * denotes Intelligent Transportation System (ITS) Committee Members

Appendix B. 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 Chillura
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 Montelione
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
planhillsborough.org
planner@plancom.org
813 - 272 - 5940
601 E Kennedy Blvd
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 C. Stakeholder Survey

1. Please identify the organization under which you are employed, and what your title is.:Organization

Count	Response
1	City of Plant City
2	City of Tampa
1	DOH-Hillsborough
1	Environmental Protection Commission
1	FDOT District 7
1	Florida's Turnpike
1	Hillsborough Area Regional Transit Authority
1	Hillsborough County City-County Planning Commission
1	Hillsborough County Public Works
1	PSTA
1	Pasco MPO
1	Pinellas County
1	Pinellas PPC/MPO
1	THEA

1. Please identify the organization under which you are employed, and what your title is.:Title

Count	Response
1	Analyst
1	General manager II
1	ITS Coordinator
1	Planning Consultant
1	Planning Director
2	Planning Manager
1	Senior Planner
1	Sr. Human Services Program Specialist
1	Street Stormwater Traffic Superintendent
1	TMC Manager
1	Traffic Management Center Operations Manager
1	Traffic Studies and Safety
1	Transportation Director
1	Transportation Engineer

2. Does your organization directly collect, develop, or maintain any mobility databases or data systems? If yes, please list the types of mobility data. For the purposes of this study, mobility data is defined as volume, speed, lane occupancy, or connected vehicle data for vehicle, freight, bicycle/pedestrian, and transit modes.
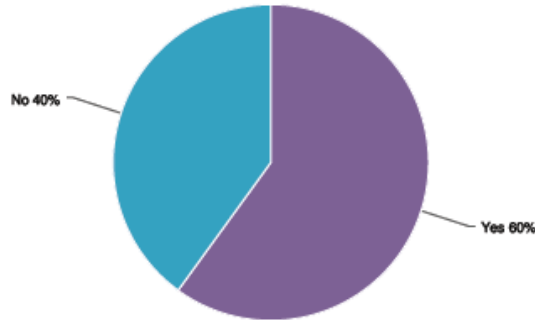
Value	Percent		Count	Statistics	
Yes	60.0%		9	Total Responses	15
No	40.0%		6		
		Total	15		

Please specify

Count	Response
1	Bluetooth Travel Time Data (vehicle) Computerized Signal System Sensor data (vehicle)
1	System counts for ATMS Traffic system. Local speed, volume, counts for safety and development.
1	Volume Speed Travel Times
1	We don't collect mobility data, as a Toll Road we collect transaction data.
1	Annual Traffic Count Program Special Counts for PD&Es, Corridor Studies, etc. Travel Time/Speed Studies Transit Routes/Ridership for Model Base Years OD Bluetooth Data for Special Studies
1	APC data tracks ridership and related data as well as bicycle rack usage. Real Time data tracks speed and on-time performance.
1	The Florida's Turnpike Enterprise collect data on volume, speed, system reliability and freight.
1	We have some sample data on all the types of mobility data listed above except data specifically for connected vehicles.
1	Speed, distance,fuel usage,route and stop ridership,wheelchair usage, TSP requests, transit fare collection. Modes: Fixed route, paratransit, and streetcar

3. What is your role with respect to the mobility databases or data systems within your organization? (select all that apply)
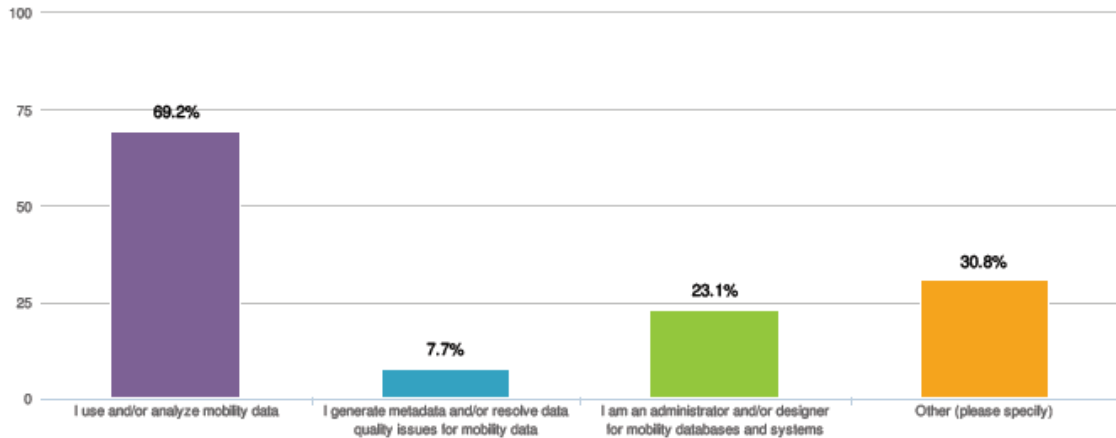
Value	Percent		Count
I use and/or analyze mobility data	69.2%		9
I generate metadata and/or resolve data quality issues for mobility data	7.7%		1
I am an IT professional responsible for technical application support, data security, backup, and/or storage of mobility data	0.0%		0
I am an administrator and/or designer for mobility databases and systems	23.1%		3
Other (please specify)	30.8%		4
		Total	13

Statistics	
Total Responses	13

Responses "Other (please specify)"	Count
Left Blank	11
Don\'t use mobility data currently	1
I do not work with mobility data, but work with other health/determinant data	1
No mobility database	1
We use transaction data for toll user billing.	1

4. How do you obtain travel time or speed data? Check all that apply
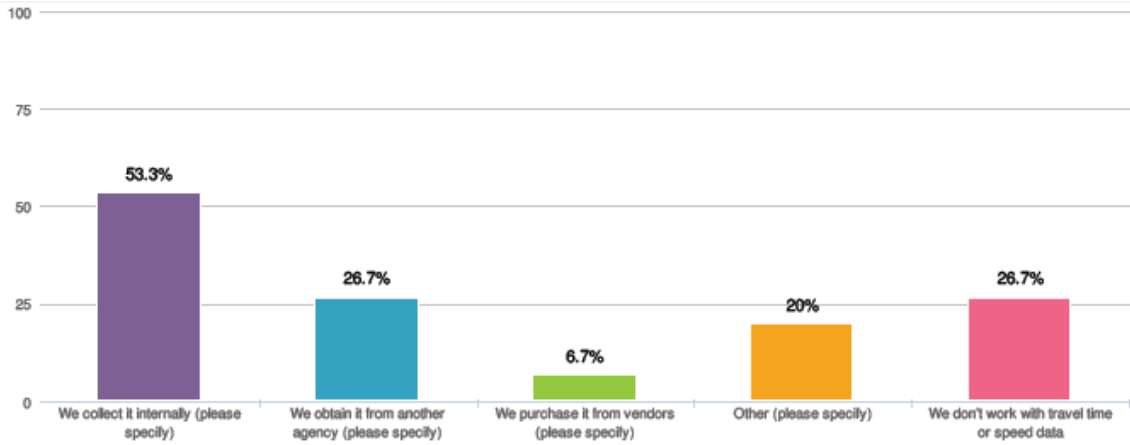
Value	Percent		Count
We collect it internally (please specify)	53.3%		8
We obtain it from another agency (please specify)	26.7%		4
We purchase it from vendors (please specify)	6.7%		1
Other (please specify)	20.0%		3
We don't work with travel time or speed data	26.7%		4
	Total		15

Statistics	
Total Responses	15

Responses "We collect it internally (please specify)"	Count
Left Blank	8
Bluetooth and loop sensors	1
Clever Devices Real Time Systems	1
Consultant Contracts\' Tasks	1
Pasco Traffic operations	1
We install road counters and collect from system loops.	1
We use machine counters and laser/radar devices	1
traffic count, toll data, Origin and Destination studies, preference surveys	1

Responses "We obtain it from another agency (please specify)"	Count
Left Blank	11
Albeck Gerken Inc.	1
FDOT	2
FDOT District Offices, Comparisons with other states, i.e. Georgia	1

Responses "We purchase it from vendors (please specify)"	Count
Left Blank	14
additional freight information is purchased through FDOT Central Office	1

Responses "Other (please specify)"	Count
Left Blank	12
Central Office Inrix purchase	1
Google Traffic/Waze	1
If we need travel speed, we will do traffic engineering studies.	1

5. What is the source of data? Check all that apply
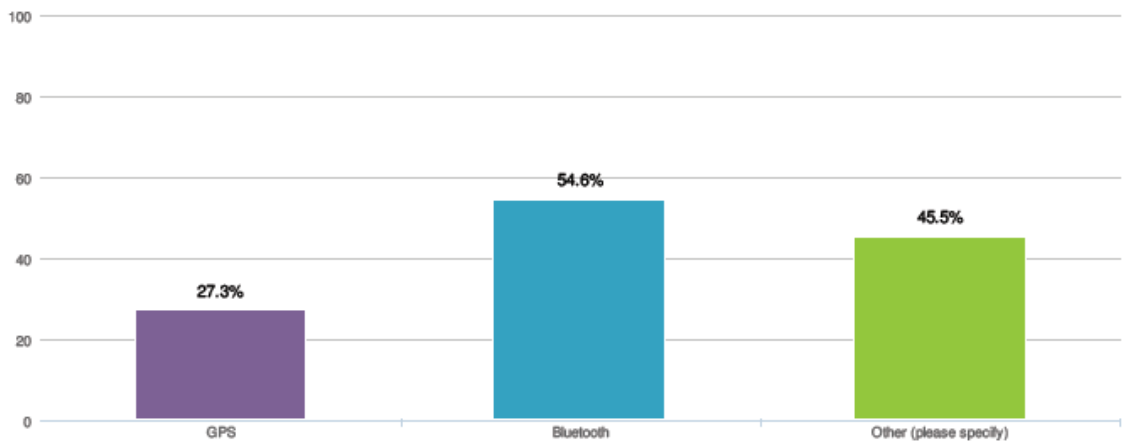
Value	Percent		Count		Statistics	
Probe	0.0%		0		Total Responses	11
GPS	27.3%		3			
Bluetooth	54.6%		6			
Other (please specify)	45.5%		5			
		Total	11			

Responses "Other (please specify)"	Count
Left Blank	10
Counters collect speed data	1
Crowd sourcing	1
Loops and road tubes	1
machine counter and laser radar devices	1
tube counts	1

U.S. Department of Transportation
Intelligent Transportation System Joint Program Office

6. On what network? Check all that apply
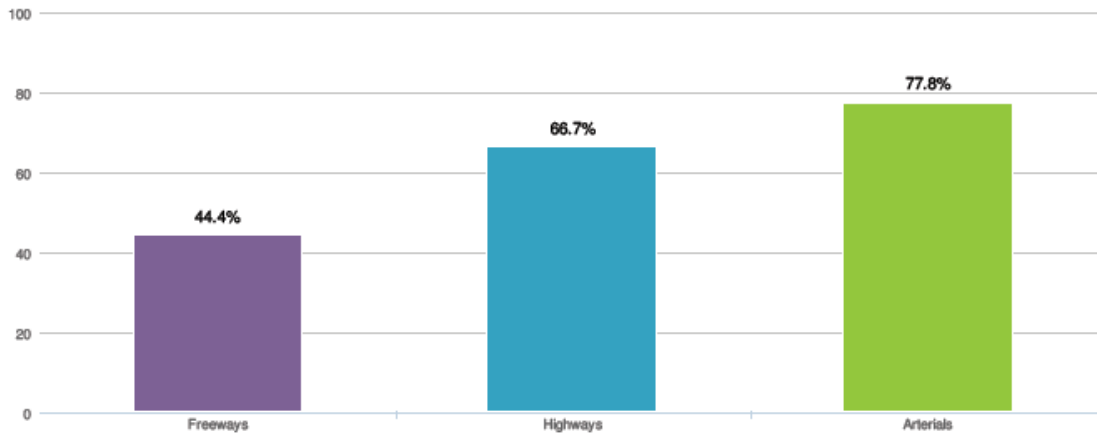
Value	Percent		Count
Freeways	44.4%		4
Highways	66.7%		6
Arterials	77.8%		7
		Total	9

Statistics	
Total Responses	9

7. On what geographic boundary? (e.g. within the city of St. Petersburg)

Count	Response
1	City of Tampa, FL
1	County wide - Pinellas
1	Hillsborough County
1	Lee Roy Selmon Expressway, Meridian Avenue, and Brandon Parkway
1	Statewide
1	Throughout District and Statewide
1	US19 Hwy which is the north/south spine of our county.
1	With in the city of Plant city limits
1	Within Pasco County
1	Within the City of Tampa and adjacent surrounding areas.
1	Within Pinellas County, anywhere the PSTA buses run. Limited parts of Hillsborough County, where PSTA bus routes run.

8. For which time period? Check all that apply
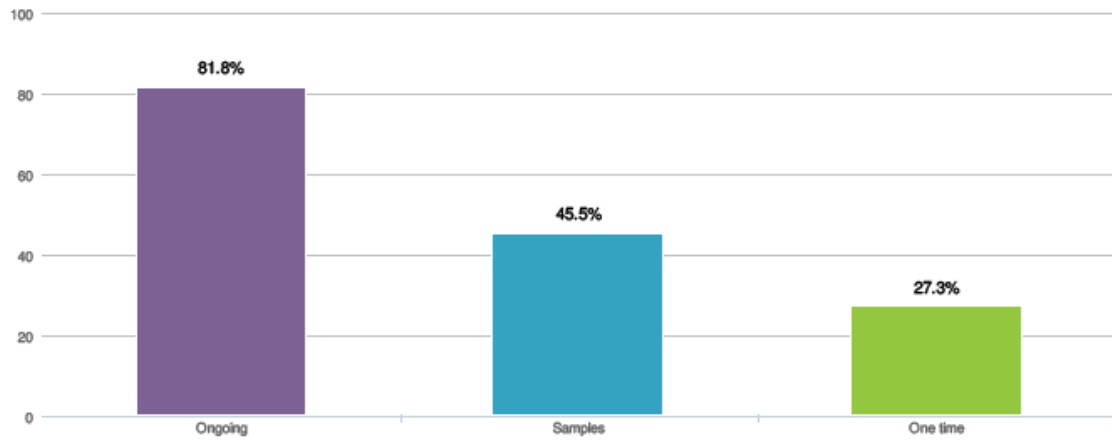
Value	Percent		Count		Statistics	
Ongoing	81.8%		9		Total Responses	11
Samples	45.5%		5			
One time	27.3%		3			
		Total	11			

Responses "Other (please specify)"	Count
Left Blank	15

9. How is it aggregated? Check all that apply
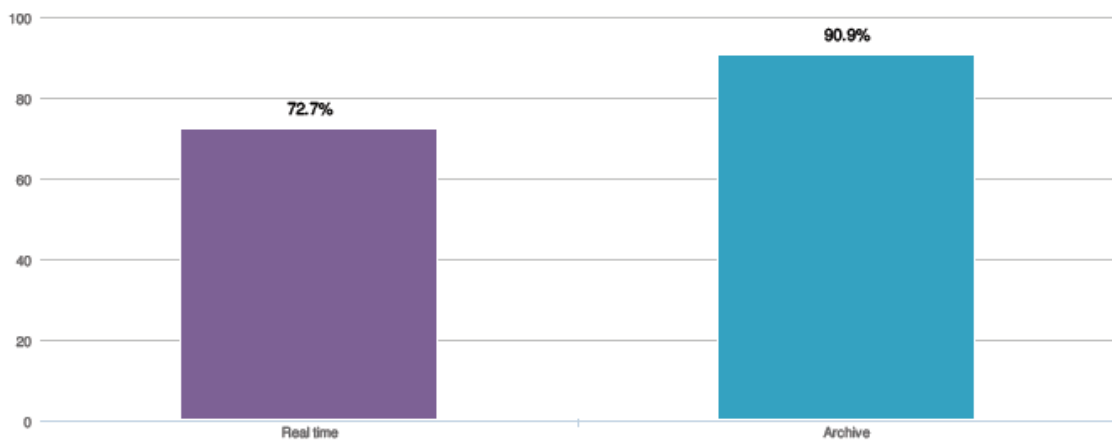
Value	Percent		Count		Statistics	
Real time	72.7%		8		Total Responses	11
Archive	90.9%		10			
		Total	11			

10. What is it used for? Check all that apply
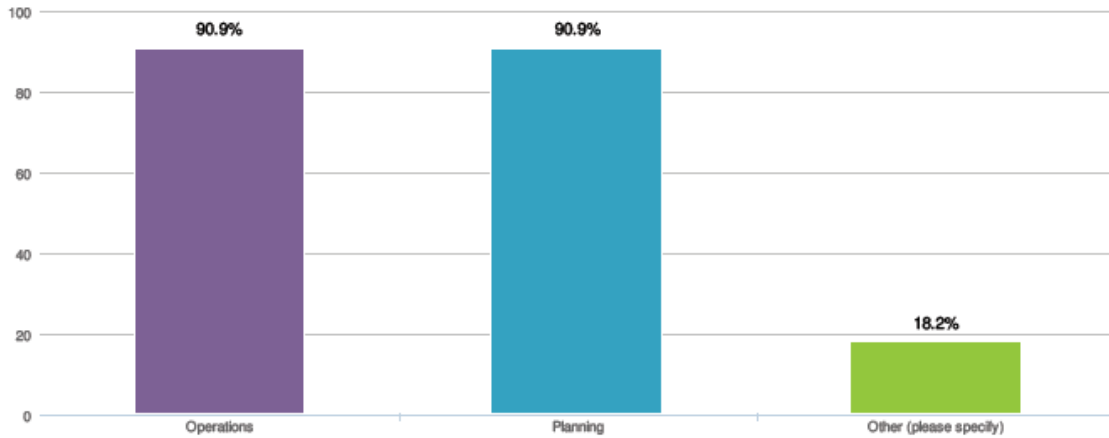
Value	Percent		Count
Operations	90.9%		10
Planning	90.9%		10
Other (please specify)	18.2%		2
		Total	11

Statistics	
Total Responses	11

Responses "Other (please specify)"	Count
Left Blank	13
Design	1
Safety	1

11. Are current speed/travel time data collection efforts meeting your business needs?
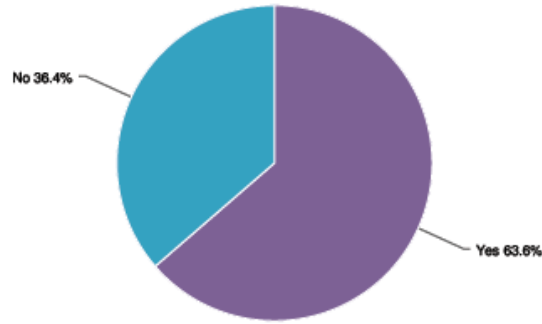
Value	Percent		Count	Statistics	
Yes	63.6%		7	Total Responses	11
No	36.4%		4		
		Total	11		

Why not?

Count	Response
1	Need additional work to make better use of expanding data sources for performance management
1	need additional travel data mainly turning movement counts at intersections on a continuous basis
1	HR intensive work to set out machine counters not to mention exposure to traffic which call be unsafe
1	Trying to obtain travel time data of more facilities. Specifically SR60 which was discontinued. It is a main beach access arterial.

12. Are data quality data collection standards in place for travel time/speed?
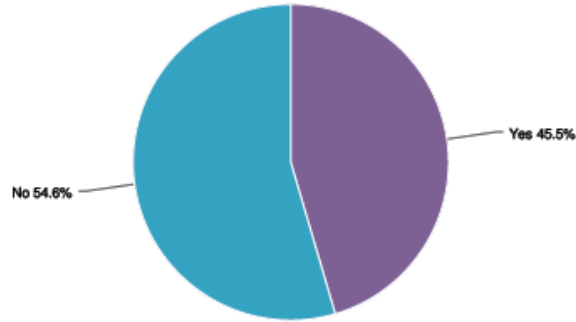
Value	Percent		Count		Statistics	
Yes	45.5%		5		Total Responses	11
No	54.6%		6			
		Total	11			

Are they adequate?
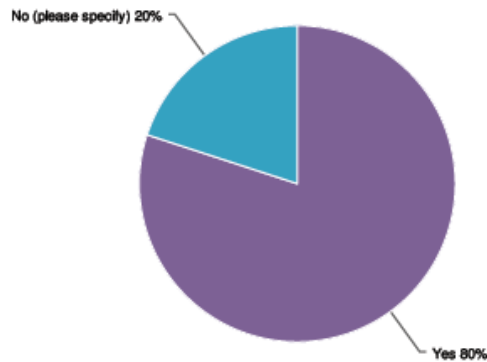
Value	Percent		Count		Statistics	
Yes	80.0%		4		Total Responses	5
No (please specify)	20.0%		1			
		Total	5			

Responses "No (please specify)"	Count
Left Blank	14
There is always room for improvement	1

13. Are you currently sharing travel time/speed data with other organizations in the region?

No 45.5%

Yes (please specify) 54.6%
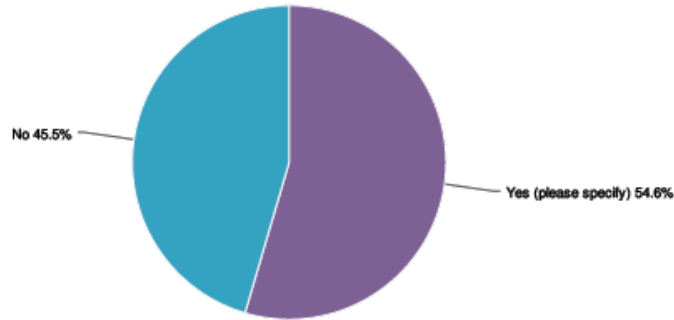
Value	Percent		Count	Statistics	
Yes (please specify)	54.6%		6	Total Responses	11
No	45.5%		5		
		Total	11		

Responses "Yes (please specify)"	Count
Left Blank	9
Anyone can obtain the data	1
FDOT D7	1
OneBusAway	1
Only for specific traffic studies.	1
Other FDOT Districts and MPOs	1
Regional CMP	1

Are these external users easily able to access the data?

Count	Response
1	As they are from specific studies, there is no reusable method.
1	No
1	Typically share the data as an exported excel sheet or other type of data base
2	Yes
1	Yes, via website or CD

Would you be willing to do so?
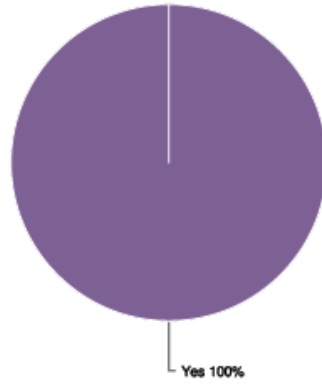
Yes 100%

Value	Percent		Count	Statistics	
Yes	100.0%		5	Total Responses	5
No	0.0%		0		
		Total	5		

14. What are the obstacles to sharing this data?
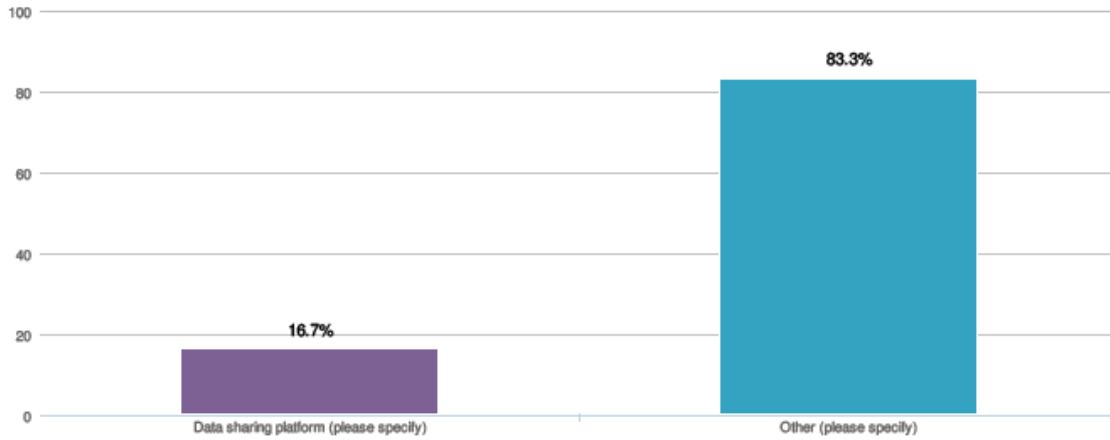
Value	Percent		Count	Statistics	
Data sharing platform (please specify)	16.7%	▮	1	Total Responses	6
Other (please specify)	83.3%	▬▬	5		
	Total		6		

Responses "Proprietary restrictions (please specify)"	Count
Left Blank	15

Responses "Data sharing platform (please specify)"	Count
Left Blank	14
linkes	1

Responses "Other (please specify)"	Count
Left Blank	10
No obstacles that I know of.	1
None	1
Not aware of any at this time	1
Site specific studies	1
We have nothing to share. FDOT shares with us.	1

15. Do you see a benefit to having access to travel time/speed data collected by others?
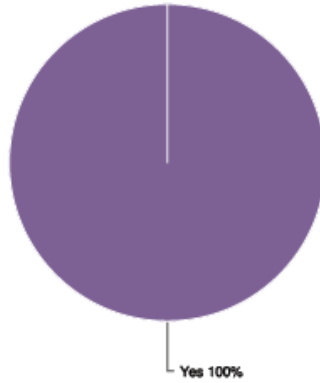
Yes 100%

Value	Percent		Count	Statistics	
Yes	100.0%		15	Total Responses	15
No	0.0%		0		
		Total	15		

Why not?

Count	Response

16. Are you aware of travel time/speed data that other agencies in the region have?
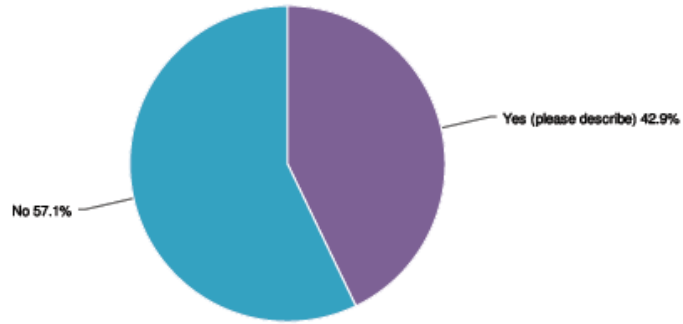
Value	Percent		Count	Statistics	
Yes (please describe)	42.9%		6	Total Responses	14
No	57.1%		8		
		Total	14		

Responses "Yes (please describe)"	Count
Left Blank	10
Aware of Travel Time/Speed studies done by FDOT for modeling purposes	1
BlueToad devices, microwave devices	1
FDOT D7 / Planning / MPO	1
FDOT/BlueTOAD	1
ITS, Sun guide	1

Do you have access to that data?
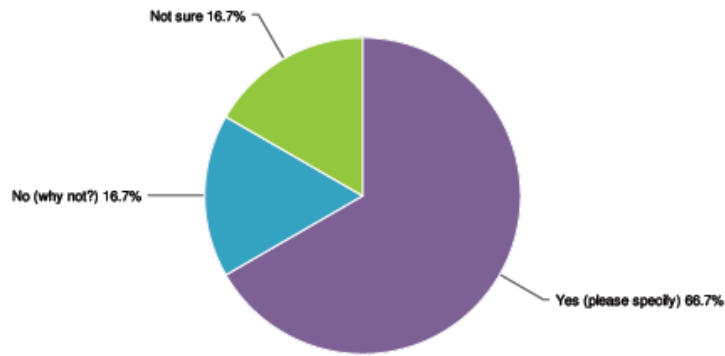
Value	Percent		Count		Statistics	
Yes (please specify)	66.7%		4		Total Responses	6
No (why not?)	16.7%		1			
Not sure	16.7%		1			
		Total	6			

Responses "Yes (please specify)"	Count
Left Blank	12
By request and not sure how old it is	1
some limited	1
via web app	1

Responses "No (why not?)"	Count
Left Blank	14
It hasn\'t been publicly advertised.	1

17. Are you aware of any untapped opportunities for sharing speed/travel time mobility data with internal or external stakeholders, thereby reducing costs associated with data collection?
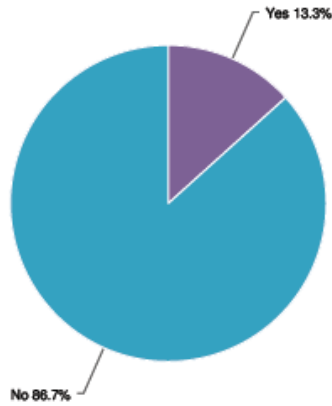
Value	Percent		Count	Statistics	
Yes	13.3%		2	Total Responses	15
No	86.7%		13		
		Total	15		

What are they?

Count	Response
1	Companies like Live Traffic Data.com are willing to install a device in signal cabinets that gather roadway performance measures. These measures are available to the municipality, but the company may also sell that information to OEMs. We are currently evaluating the same.

18. Do you collaborate with other organizations in the region on other topics? (e.g., sharing best practices, plans, or RFPs for data collection for mobility data programs)
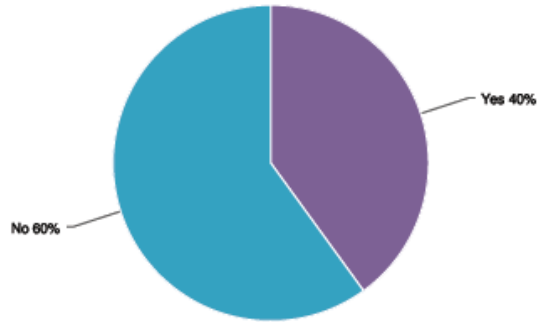
Value	Percent		Count		Statistics	
Yes	40.0%		6		Total Responses	15
No	60.0%		9			
	Total		15			

How does collaboration take place?

Count	Response
1	FDOT - should be expanded to other regional partners
1	ITS MPO, meetings and seminar's
1	Meetings like TranStat as well as collaboration through other technical groups
1	Technology committees, professional workshops, and governmental meetings.
1	We work with FDOT-D7,City of Tampa and MPO on data as needed.
1	Yes through TRT and other regional meetings

19. Do you have additional comments that would clarify any of your responses or help us better understand your data needs?

Count	Response
1	More origin and destination data would be useful to have for planning purposes.
1	Pedestrian and bicycle activity data is the most needed.
1	We don't currently use mobility data that I am aware of but the idea sounds most promising.
1	This sounds like you are really looking at roadway travel speeds/times so not sure if the transit related responses I submitted were appropriate.
1	Our data needs are limited at this time ... as needed, we occasionally request MPO for transportation figures but they are typically more historical figures such as VMT.
1	Travel speed and time data is done based on site specific needs through our GEC. We do not have a systematic way to gather such data.
1	Managing and analyzing this data is time intensive. We are currently doing it with same staffing level as before.

Appendix D. Florida DOT Multimodal Mobility Performance Measures Matrix

The Florida DOT Source Book is a compendium of current and historical data and analysis describing the performance of Florida's transportation system. It is intended to be the primary source of mobility performance measure results for the State of Florida. The table below summarizes the performance measures that characterize quantity, quality, accessibility, and utilization of travel for people and freight.

More information on data products and data sources is available at http://www.dot.state.fl.us/planning/statistics/sourcebook/.

Mode		QUANTITY	Peak Hour	Peak Period	Daily	Yearly	QUALITY	Peak Hour	Peak Period	Daily	Yearly	ACCESSIBILITY	Peak Hour	Peak Period	Daily	Yearly	UTILIZATION	Peak Hour	Peak Period	Daily	Yearly
PEOPLE	Auto/Truck	Vehicle Miles Traveled	X		X		% Travel Meeting LOS Criteria	X	X	X		Time Spent Commuting			X		% Travel Heavily Congested	X	X	X	
		Person Miles Traveled	X		X		% Miles Meeting LOS Criteria	X	X								Hours Heavily Congested			X	X
							Travel Time Reliability	X	X	X											
							Travel Time Variability	X	X	X											
							Vehicle Hours of Delay	X		X	X										
							Person Hours of Delay	X		X	X										
							Average Travel Speed	X	X												
	Transit	Passenger Miles Traveled				X	Average Headway	X				Weekday Span of Service (new for 2016)			X		Passenger Trips Per Revenue Mile (new for 2016)				X
		Passenger Trips				X															
	Pedestrian						Level of Service (LOS)	X				% Sidewalk Coverage				X					
	Bicycle						Level of Service (LOS)	X				% Bike Lane/Shoulder Coverage				X					
	Aviation	Passengers				X	Departure Reliability				X						Demand to Capacity Ratios				X
	Rail	Passengers				X	Departure Reliability				X										
	Seaports	Passengers				X															
PEOPLE & FREIGHT	Auto/Truck																% Miles Heavily Congested	X	X		
																	Vehicles Per Lane Mile	X			
	Aviation											Highway Adequacy (LOS)	X								
	Rail											Highway Adequacy (LOS)	X								
	Seaports											Highway Adequacy (LOS)	X								
FREIGHT	Truck	Combination Truck Miles Traveled		X			Travel Time Reliability	X	X	X							Combination Truck Backhaul Tonnage				X
		Truck Miles Traveled		X			Travel Time Variability	X	X	X											
		Combination Truck Tonnage			X		Combination Truck Hours of Delay			X											
		Combination Truck Ton Miles Traveled			X		Combination Truck Average Travel Speed	X	X												
		Value of Freight			X		Combination Truck Cost of Delay (new for 2016)				X										
	Aviation	Tonnage			X																
		Value of Freight			X																
	Rail	Tonnage			X							Active Rail Access				X					
		Value of Freight			X																
	Seaports	Tonnage			X							Active Rail Access				X					
		Twenty-foot Equivalent Units			X																
		Value of Freight			X																

Appendix E. 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 F. Example Charter

Scope and Purpose

This Charter establishes a Regional Mobility Data Subcommittee (hereafter called the Subcommittee), 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 Subcommittee 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 Subcommittee encourages collaboration among multiple public agencies throughout the region to share and integrate mobility data to support regional performance-based planning. The Mobility Data Subcommittee 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 F-1 shows an organizational model of this structure.

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

Figure F-1. Governance Model
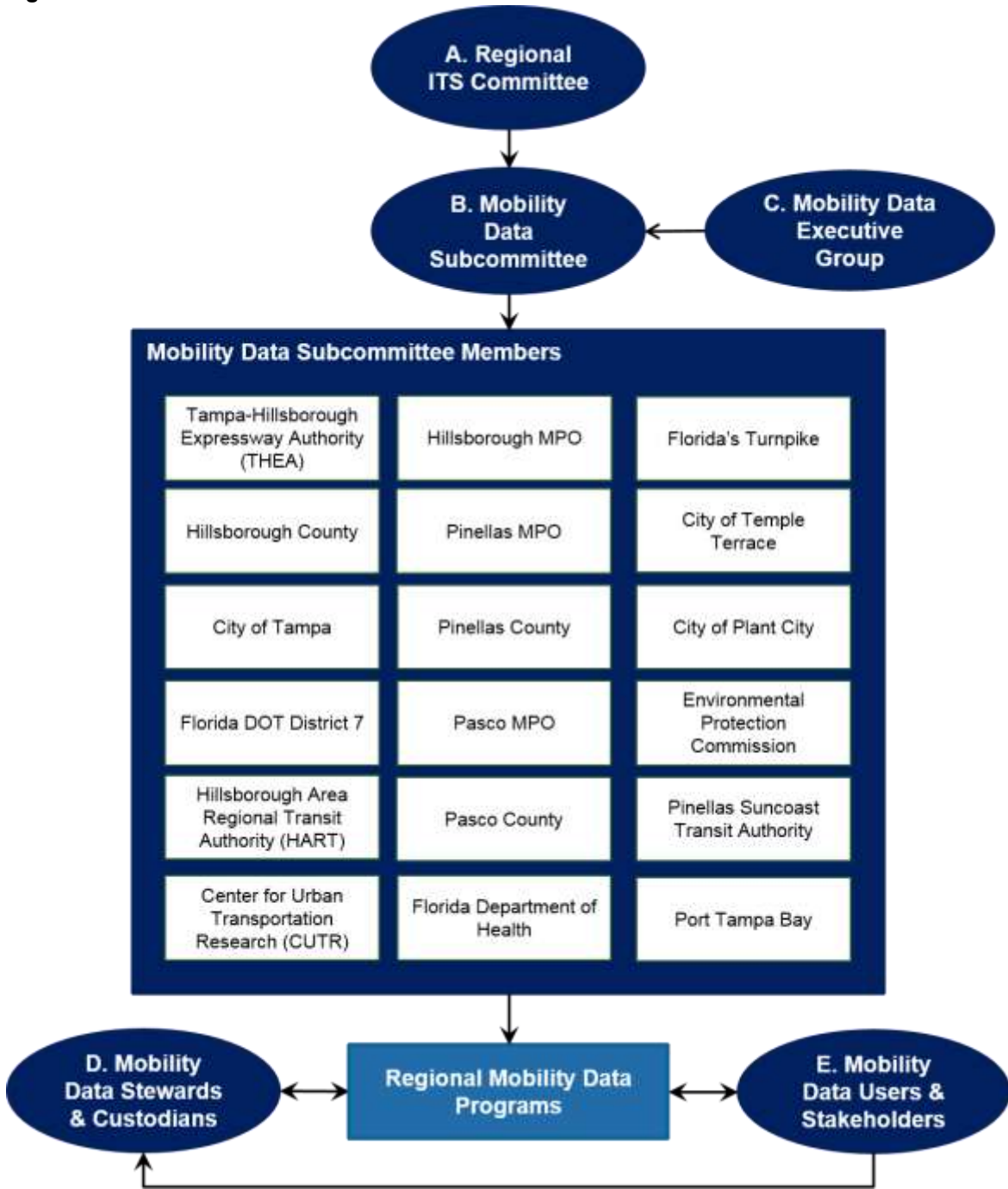
Subcommittee Objectives

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

- Share 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 Subcommittee are listed below. Each agency shall appoint a designated representative and alternate to attend Group meetings and teleconferences.

- 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
- 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 Subcommittee shall:

- Regularly attend and participate in Subcommittee 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 Subcommittee best practices are communicated to data stewards from their respective agencies

Chairmanship

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

Meetings

The Subcommittee shall meet monthly on the first Tuesday of each month via in-person meetings or teleconferences. Meetings and teleconferences will be announced at least one week in advance and conducted in accordance with a published agenda. Meetings are normally open to all interested parties but may be restricted to member agencies when deemed necessary by the Chair (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.

Activities

The Subcommittee 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 ITS Committee regarding development of mobility data products to meet business needs
- Provide recommendations to the 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

Subcommittee 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 Subcommittee 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 Subcommittee 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 Subcommittee members.

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

Approval

By signing this Charter, each member agency agrees to participate in the Subcommittee'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

_____
Date

_____
Signature

_____
Name (PRINT)

_____
Florida DOT District 7

_____
Date

_____
Signature

_____
Name (PRINT)

_____
Hillsborough Area Regional Transit Authority

_____
Date

_____
Signature

_____
Name (PRINT)

_____
Center for Urban Transportation Research

_____
Date

_____
Signature

_____
Name (PRINT)

_____
Hillsborough MPO

_____
Date

_____
Signature

_____
Name (PRINT)

_____
Pinellas MPO

_____
Date

_____
Signature

_____
Name (PRINT)

_____

Pinellas County

_____

Date

_____

Signature

_____

Name (PRINT)

_____

Pasco MPO

_____

Date

_____

Signature

_____

Name (PRINT)

_____

Pasco County

_____

Date

_____

Signature

_____

Name (PRINT)

_____

Florida Department of Health

_____

Date

_____

Signature

_____

Name (PRINT)

_____

Florida's Turnpike

_____

Date

_____

Signature

_____

Name (PRINT)

_____

City of Temple Terrace

_____

Date

_____

Signature

_____

Name (PRINT)

_____

City of Plant City

_____

Date

_____

Signature

_____

Name (PRINT)

_____

Environmental Protection Commission

_____

Date

_____

Signature

_____

Name (PRINT)

_____

Pinellas Suncoast Transit Authority

_____

Date

_____

Signature

_____

Name (PRINT)

_____

Port Tampa Bay

_____

Date

_____

Signature

_____

Name (PRINT)

Appendix G. Example Data Governance Manual

Introduction

This Data Coordination Manual provides comprehensive guidance 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 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 decision-making as a key characteristic.

---

[5] http://ntl.bts.gov/lib/48000/48500/48531/6E33210B.pdf

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) report[6]) and to collaborate on data management functions related to roadway travel mobility data.

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 good 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 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 G-1.

Table G-1. 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)

[6] http://ntl.bts.gov/lib/48000/48500/48531/6E33210B.pdf

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 Data Governance Advisory Council (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 decision-making 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:
  - o HQ Administrative
  - o Financial
  - o Planning
  - o Operations
  - o Policy
  - o Research
  - o Infrastructure
  - o Chief Council
  - o Safety
  - o Federal Lands
  - o Division Office
  - o 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 G-1 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 G-1. Framework for the Coordination Group with the DGAC
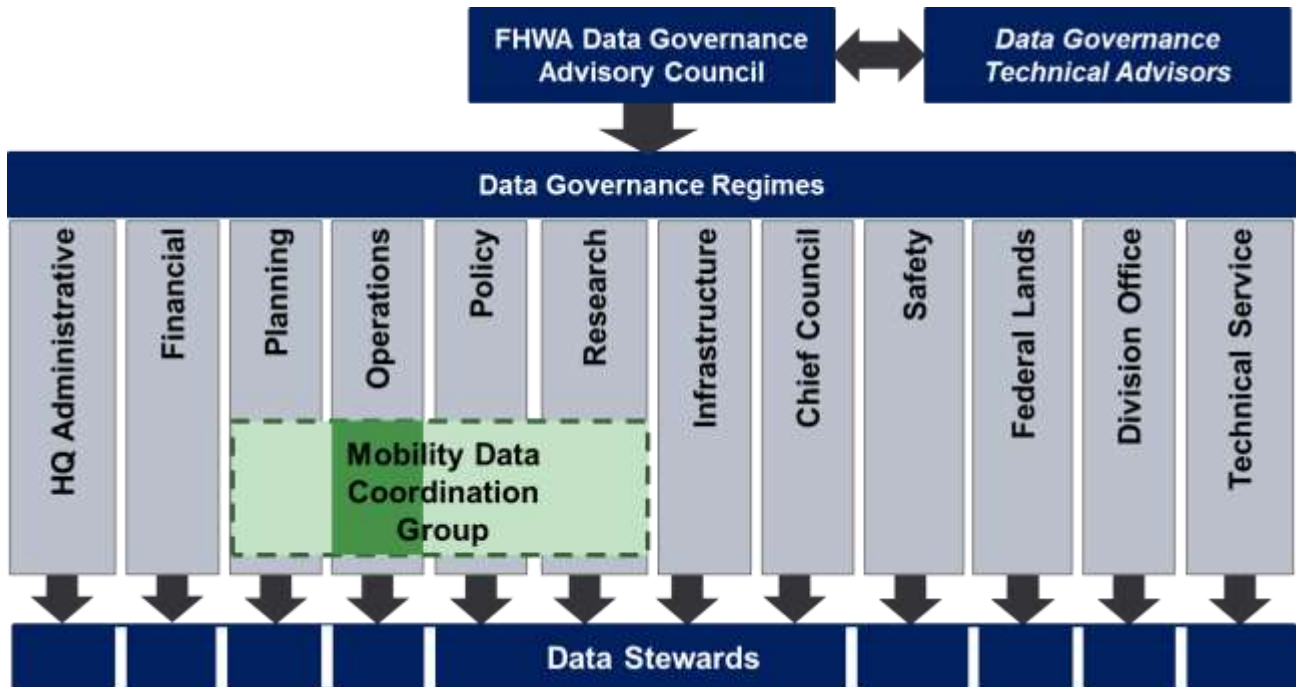
The structure for the Coordination Group is comprised of the Coordination Group Chair/Co-Chair, the Coordination Group itself, Working Groups, and Supporting Staff, as shown in Figure G-2.

- **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 RFPs, develop a Strategy Document for the Coordination Group, oversee coordination project activities, etc.).

- **Supporting Staff.** Supporting staff provide administrative support and technical guidance 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 G-2. Structure for Roadway Mobility Data Coordination Group
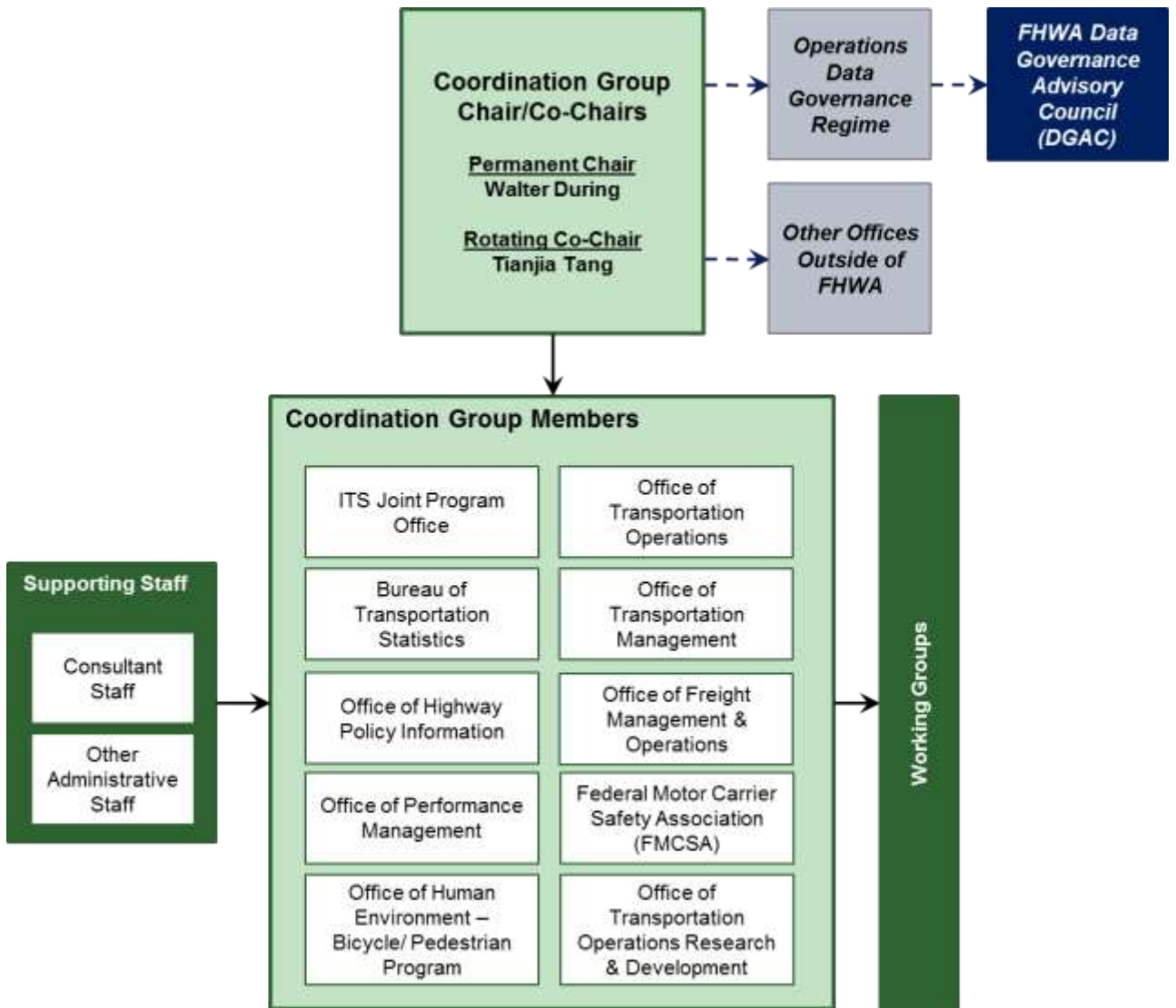
What Kind of Topics Does the Coordination Group Address?

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 in-depth 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 guidance 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 haven't 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 (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 (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 2 to 4 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 (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:

  o Provide a clear, direct, and specific statement of why the nominee deserves recognition

  o 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 G-3.

Performance indicators for Coordination Group activities (i.e., outputs) and outcomes are shown in Figures G-4 and G-5, 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 3 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 G-3. Relationship Between Group Activities (Outputs) and Outcomes
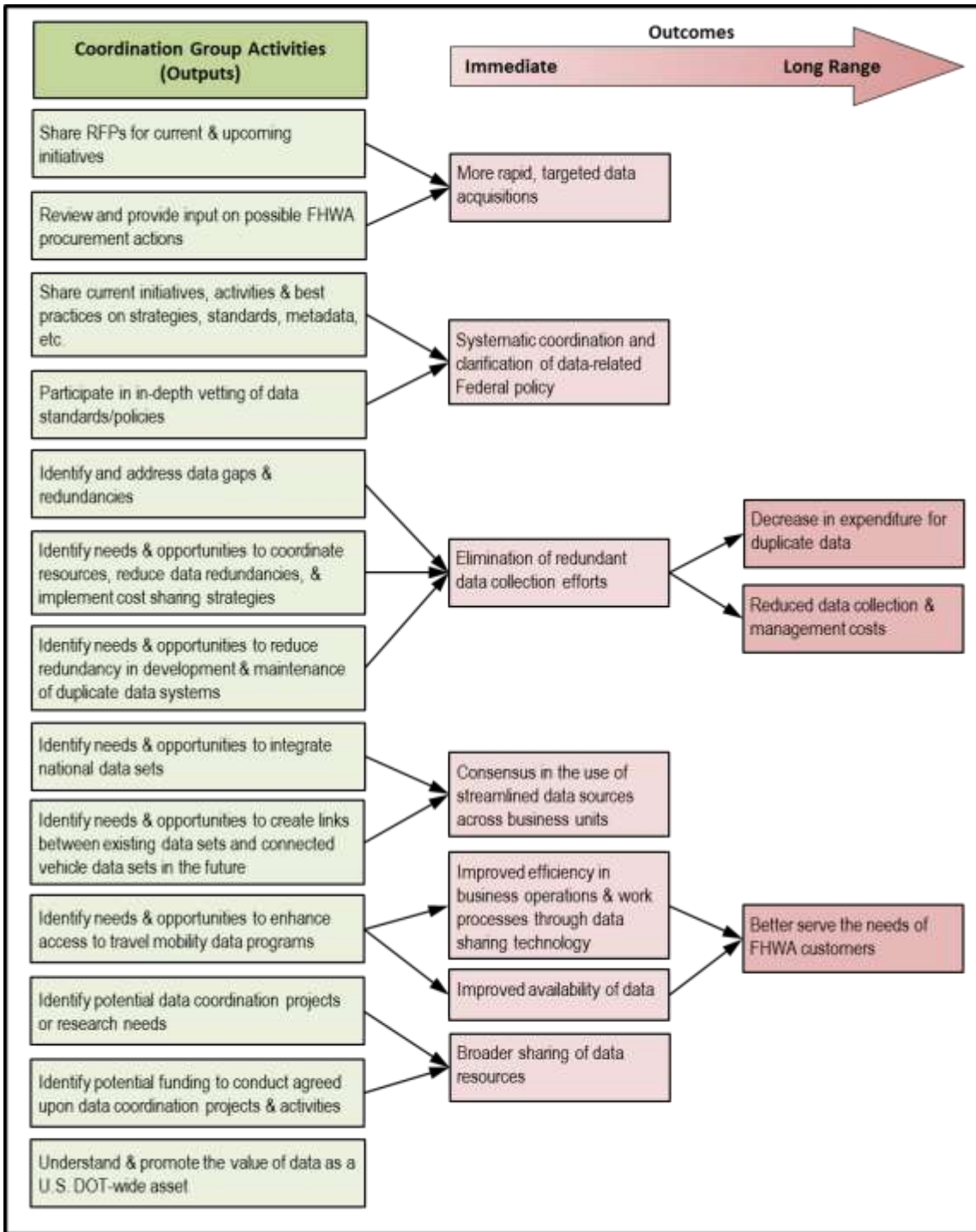
Figure G-4. Performance Indicators for Group Activities (Outputs)

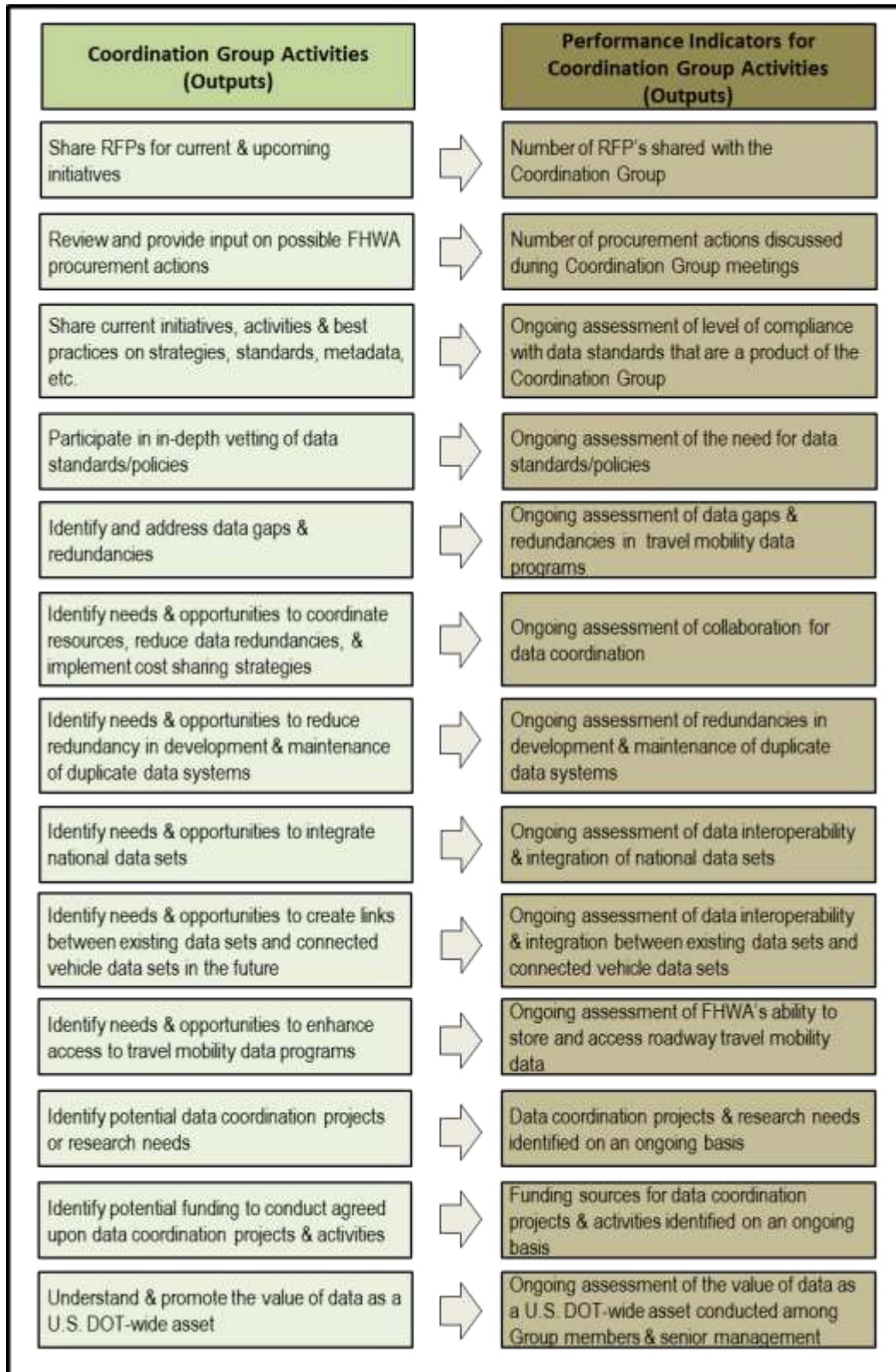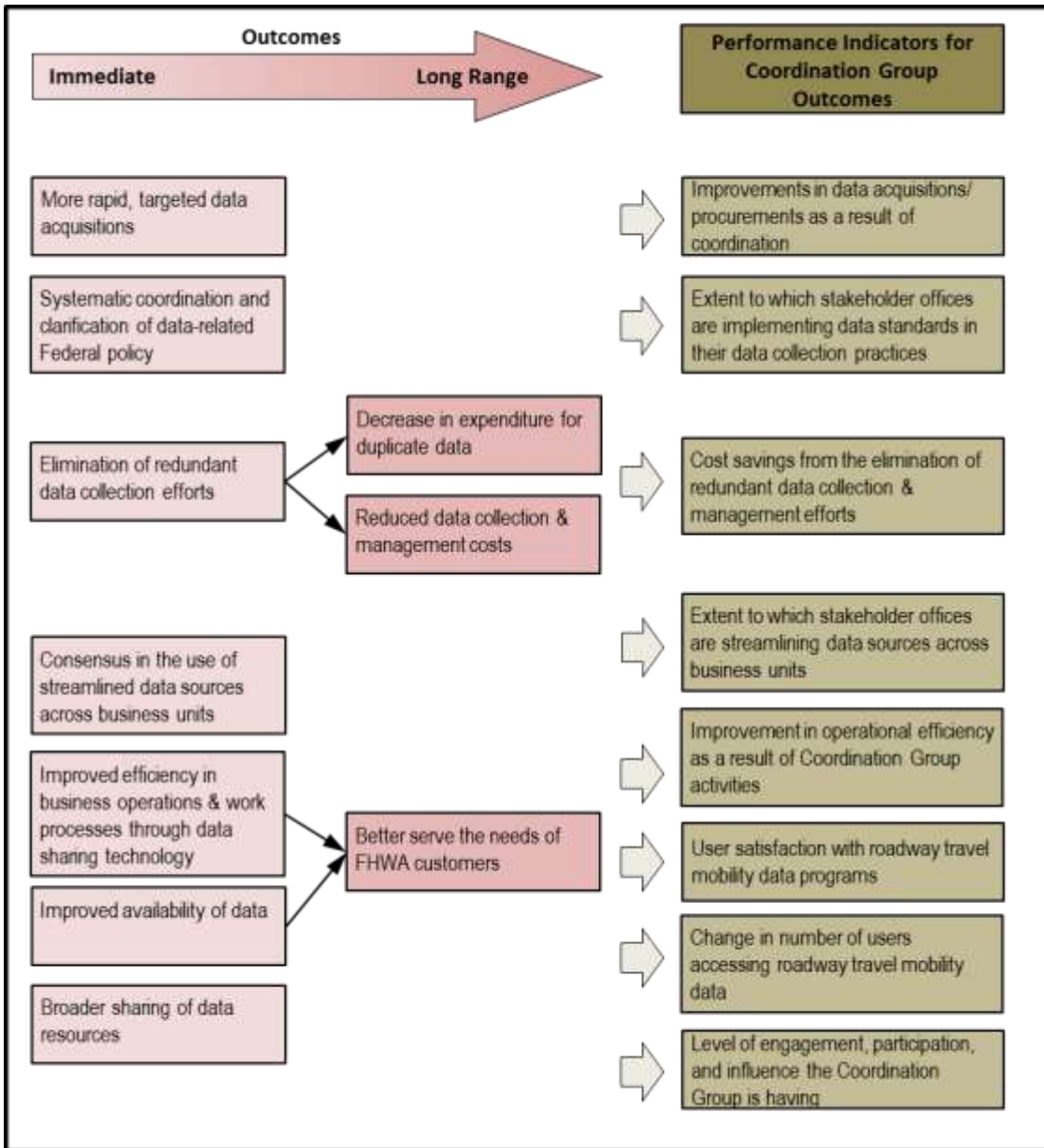| Coordination Group Activities (Outputs)	Performance Indicators for Coordination Group Activities (Outputs)
Share RFPs for current & upcoming initiatives	Number of RFP's shared with the Coordination Group
Review and provide input on possible FHWA procurement actions	Number of procurement actions discussed during Coordination Group meetings
Share current initiatives, activities & best practices on strategies, standards, metadata, etc.	Ongoing assessment of level of compliance with data standards that are a product of the Coordination Group
Participate in in-depth vetting of data standards/policies	Ongoing assessment of the need for data standards/policies
Identify and address data gaps & redundancies	Ongoing assessment of data gaps & redundancies in travel mobility data programs
Identify needs & opportunities to coordinate resources, reduce data redundancies, & implement cost sharing strategies	Ongoing assessment of collaboration for data coordination
Identify needs & opportunities to reduce redundancy in development & maintenance of duplicate data systems	Ongoing assessment of redundancies in development & maintenance of duplicate data systems
Identify needs & opportunities to integrate national data sets	Ongoing assessment of data interoperability & integration of national data sets
Identify needs & opportunities to create links between existing data sets and connected vehicle data sets in the future	Ongoing assessment of data interoperability & integration between existing data sets and connected vehicle data sets
Identify needs & opportunities to enhance access to travel mobility data programs	Ongoing assessment of FHWA's ability to store and access roadway travel mobility data
Identify potential data coordination projects or research needs	Data coordination projects & research needs identified on an ongoing basis
Identify potential funding to conduct agreed upon data coordination projects & activities	Funding sources for data coordination projects & activities identified on an ongoing basis
Understand & promote the value of data as a U.S. DOT-wide asset	Ongoing assessment of the value of data as a U.S. DOT-wide asset conducted among Group members & senior management

Figure G-5. Performance Indicators for Outcomes

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:

Walter During, P.E.
FHWA, Operations Office of Transportation Management (HOTM-1)
1200 New Jersey Avenue, S.E. E86-317
Washington, DC 20590
(202) 366-8959 Office
(202) 366-3225 Fax
walter.during@dot.gov Email

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 Custodian – 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.

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 Subcommittee. 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 Subcommittee.

Data Governance Manual – Provides comprehensive guidance to the Mobility Data Subcommittee 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 Subcommittee 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 Subcommittee Group.

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 Subcommittee – 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 Subcommittee in supporting documents.

Mobility Data Executive Group – Senior level managers from Mobility Data Subcommittee 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 Subcommittee Charter – Charter document that formally establishes the Mobility Data Subcommittee and sets forth the objectives, membership, structure, and operating framework for implementing the Subcommittee.

Mobility Data Subcommittee Co-Chairs – Designated individuals from within Hillsborough, Pasco, and Pinellas MPOs who would chair the Mobility Data Subcommittee and liaison with the 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, decision-making, and meetings.

Appendix I. Data Sharing Case Studies

This appendix explains the purpose and benefits of data sharing, particularly in an open data platform. Several data format options are presented, followed by an outline of different types of portals which can be used to publish open data. Resources for national guidance for establishing open data policies and portals are available for the public to use. Several examples of state and local best practices are provided, along with case studies where multiple transportation agencies have engaged in data sharing activities, focused on volume and speed data. In most cases the agency in charge makes the data available for public access via web tools after performing necessary processes. For each example, resources are provided for more information.

Purpose, Benefits and Common Platforms for Open Data

Open Knowledge International published the **Open Data Handbook**, which outlines the legal, social and technical aspects of open data. This handbook can be used as a reference by anyone who is seeking to open up data. Government is one of the types of organizations which collect a broad range of different types of data to perform their tasks. The centrality of the data that it collects and the laws surrounding it being open to public makes it a largely untapped resource. The handbook lists several areas where open government data has the potential to create value, either for government itself, or other groups of people and organizations, namely:

- Transparency and democratic control;
- Participation;
- Self-empowerment;
- Improved or new private products and services;
- Innovation;
- Improved efficiency of government services;
- Improved effectiveness of government services;
- Impact measurement of policies; and
- New knowledge from combined data sources and patterns in large data volumes.

In order for data to be considered "open data", the file formats they are published in must include the specifications for the software for anyone to reuse without legal, financial or technological restrictions. Open file formats allow developers to produce software packages and applications using these formats. The downside of using proprietary file formats and not publishing the format specification is creating dependence on third-party software or file format license holders, which can become prohibitively expensive or obsolete over time.

Open data is a key component for achieving interoperability. Interoperability is the ability of different information technology systems and software applications to communicate, exchange data, and use the information that has been exchanged. Combining different datasets together to develop new applications within large, complex systems is where the real value of interoperability lies.

The most effective way for data to be turned into useful information is through visualization, analysis, or summarization. The U.S. General Services Administration, who manages Data.gov, recommends government agencies to release their data in a format that facilitates processing. In other words, publishing data in machine-readable formats are likely to be more useful for application development than purely human-readable formats. Table I-1 provides several examples of data formats which can be applied to open data.

Table I-1. Example Data Formats

Format	Human-Readability	Machine-Readability
PDF (Portable Document Format)	Primary document format used to make government information available to the public.	To make a PDF machine-readable, Optical Character Recognition (OCR) is needed. Metadata on the document's author or nature of its contents can be included.
CSV (Comma Separated Variables)	The most common machine readable format, which can be produced using many standard database and spreadsheet tools.	Data is stored in a tabular, text-based format that is easily exchanged by machines, but is difficult for computers to find common elements between datasets.
XML (Extensible Markup Language)	Popular format/language for data exchange because of the ability to structure the data with tags that can be interpreted by humans.	Developed to make the metadata of documents more readily available, which is essential for search tools to find a particular document in response to particular queries.
JSON (JavaScript Object Notation)	JSON is a text-based, human-readable format for representing simple data structures and associative arrays (otherwise known as objects).	A machine readable data format derived from the JavaScript language used on many websites. Easily readable for any programming language.
RDF (Resource Description Framework)	RDF is a general-purpose language for representing information in the Web. Less human readable than the other formats listed in this table.	A data language used to represent data and information as web resources so that the can be "linked" together. It allows common terms to be linked between datasets.

Further information, including guidance on how to begin opening up data:
http://opendatahandbook.org/
https://www.data.gov/developers/blog/primer-machine-readability-online-documents-and-data

Not only is it crucial to pick the most effective data format for publishing, but picking the right portal to make open data accessible is just as important. While simple already-structured or static data that doesn't need visualization can be posted in any number of ways, other datasets need special handling in order to be useful. Below are several types of commonly used and adaptable open data portals that are available to the public sector:

Enterprise Open Source

CKAN is an open source data portal that offers helpful tools for streamlining, publishing, sharing, finding, and using large enterprise datasets. CKAN has more than 300 open source data management extensions that are constantly evolving. Features include a fast search experience, easy data uploading and the ability to plot geographic data in an interactive map. For Data.gov, CKAN works as a data harvester, pulling data from other agencies like the Department of Agriculture and

NASA, federating the data into one searchable catalog. DKAN, a derivative of CKAN, offers a plugin for Drupal, an open source content management system with the option for cloud-hosting. It is simple to deploy and maintain, and can be self-hosted through GitHub.

Map-based Portals

ArcGIS Open Data is a go-to solution for Esri software users because the open data builds directly on top of already published ArcGIS services. ArcGIS Server and ArcGIS Online allow the configuration and federation of geodata into an open data portal. Data and metadata can be viewed in the browser, and users can interact with the data and download it in several formats. ArcGIS offers a wealth of mapping options for geodata, but does not have other advanced visualization tools. There are ways to create charts and simple tools to view and interact with the datasets, however, and advanced search and filtration options are user-friendly.

Advanced Data Visualization Services

Organizations that want more data visualization should consider services like Junar, Socrata and OpenDataSoft.

Junar is an easy-to-use, software-as-a-service open data cloud platform that focuses on powerful analysis and visualizations. It offers a range of routines, protocols, and tools for building software applications, otherwise known as Application Program Interfaces (APIs), which enable developers and users to integrate data back into their own applications, and is currently used for open data portals by the cities of Sacramento and Palo Alto.

Socrata can host significantly large datasets. Users can publish to Socrata using a desktop sync tool or APIs; data can also be uploaded natively as CSV files, Excel files or TSV files. The portal offers support for shapefiles as well (e.g., KML, KMZ and GeoJSON). Socrata has tools structured around metadata management and workflow, like filter tools to narrow the information, export data, conduct analytics, create visualizations – like charts and map overlays – and view the data from a spatial perspective. The City of Chicago uses Socrata for its public data portal of 5.8 million records of crime data dating back to 2001. The New York Police Department also uses Socrata to publish and publicly display crash and collision data.

OpenDataSoft also allows for interaction and visualization through automated API generation. The platform is easy to use, works well with large datasets, supports geospatial formats, leverages Elasticsearch and ensures near real-time search and analysis. Publishing and management of data are easy with live dashboards and the OpenDataSoft display is designed for display on mobile devices.

Further information:
https://gcn.com/articles/2015/07/10/open-data-portal.aspx
http://ckan.org/
http://www.nucivic.com/dkan/
http://opendata.arcgis.com/
https://socrata.com/

Git is a distributed version control system which is used by services such as GitHub, BitBucket, GitLab, or Gitorious. The advantages of using a distributed version control system (versus non-distributed version control systems such as subversion or CVS) is that when a user clones the project,

it includes the entire project history. This allows a developer to commit, branch, and tag changes on their local machine without interacting with a server. Among open-source projects, GitHub is the most widely service to manage project code. It stores a copy of the project's repository and allows developers to fork a project's repository to use as their own centralized repository. GitHub also has user-friendly documentation functionality.

Further information:
https://github.com/
https://www.unleashed-technologies.com/blog/2014/08/01/what-github-and-how-can-it-benefit-your-development-team

National Initiatives

Project Open Data

The White House developed *Project Open Data* – this collection of code, tools, and case studies – to help agencies adopt the Open Data Policy and unlock the potential of government data. Project Open Data has evolved over time as a community resource to facilitate adoption of open data practices. It is published on GitHub as a collaborative, open source project for Federal employees, as well as members of the public. Since policy cannot keep up with the pace of technology advancement, Project Open Data was designed to be a living document, with the continual update of technology pieces that impact open data best practices. The Project Open Data Metadata Schema and Open Data Policy M-13-13 policies (refer to links below) have very regulated release cycles.

Further information:
https://project-open-data.cio.gov/
https://project-open-data.cio.gov/schema/
https://www.whitehouse.gov/sites/default/files/omb/memoranda/2013/m-13-13.pdf

Data.gov (The home of the U.S. Government's open data)

In accordance with the 2013 Federal Open Data Policy, Data.gov is managed and hosted by the U.S. General Services Administration. It allows governmental agencies to share data for public access on various topics. Just like Project Open Data, it is an open-source project that is developed publically on GitHub. Data.gov does not host data directly, but rather aggregates metadata about open data resources in one centralized location. Therefore, data sets displayed on Data.gov must follow the Project Open Data metadata schema. Once an open data source meets the necessary format and metadata requirements, the Data.gov team can pull directly from it as a Harvest Source, synchronizing that source's metadata on Data.gov as often as every 24 hours.

Further information:
https://www.data.gov/

Public Safety Open Data Portal

The Police Foundation's Public Safety Open Data Portal is intended to serve as a central clearinghouse for accessing, visualizing and analyzing local and national law enforcement and public safety open datasets. The portal currently contains select datasets from agencies participating in the White House's Police Data Initiative (PDI) as well as national data to provide context for the local data.

Further information:
https://publicsafetydataportal.org/

State & Local Open Data Portals

In 2014, the Center for Data Innovation ranked each state's progress in creating open data policies and portals (see http://www.datainnovation.org/2014/08/state-open-data-policies-and-portals/). The top-scoring states in terms of quality of open data policies and quality of data portals were Hawaii, Illinois, Maryland, New York, Oklahoma, and Utah. The following case studies present several examples of portals which contain extensive catalogs of open data, are relatively simple to navigate, and provide data in machine-readable formats. The portals also provide links to APIs to download particular data and have other information designed specifically for developers looking to build applications using the data.

Maryland

One of the major strengths of Maryland's open data efforts is its Council on Open Data, a group that is comprised of 37 government, academic, and private-sector leaders in Maryland. The group meets at least twice a year to discuss recommendations to the state's Legislature and improve transparency in the state. Senate Bill 644 mandates that open data be released to the public in multiple machine readable formats. The state's public datasets are housed via the Socrata Open Data Platform. Nearly 400 datasets are transportation-related, including traffic volumes, vehicle miles of travel, port cargo, transit ridership, incident locations, and road network performance measures.

Further Information:
https://data.maryland.gov/
http://www.govtech.com/data/Maryland-Legislation-Creates-Council-on-Open-Data.html
http://technical.ly/baltimore/2013/05/13/data-maryland-gov-launches/

City of Chicago

The City of Chicago's Data Portal is dedicated to promoting access to government data and encouraging the development of creative tools to engage and serve Chicago's diverse community. The Socrata-powered site hosts over 600 datasets presented in easy-to-use, machine-readable formats about City departments, services, facilities and performance. Among these are average daily traffic counts, taxi trips, Divvy bikeshare trips, CTA bus speeds, and transportation system performance metrics. Datasets published on the Data Portal are fed into WindyGrid, the City of Chicago's internal situational awareness platform. Recently, the City released OpenGrid (see http://opengrid.io/), a new interface into the Data Portal which allows members of the public who may not have access to Geographic Information Systems (GIS) or other data visualization tools to layer data on top of other datasets. This open-source, low-cost business intelligence tool allows governments, non-profits, and corporations to enable real-time situational awareness.

Further information:
https://data.cityofchicago.org/
https://socrata.com/case-study/chicago-growing-open-data-economy/

New York City

As part of an initiative to improve the accessibility, transparency, and accountability of City government, NYC Open Data offers access to a repository of government-produced, machine-readable data sets, also housed via Socrata (see https://nycopendata.socrata.com/). One of the areas within NYC Open Data is real-time traffic speed data. Real-time speed data are being collected by speed detectors belonging to different cities and State agencies. NYCDOT's Traffic Management Center (TMC) gathers this data from certain locations, mostly on major arterials and highways to create the Traffic Speeds Map (available for public access at http://nyctmc.org). NYCDOT also uses this information for emergency response and management.

Further information:
https://data.cityofnewyork.us/Transportation/Real-Time-Traffic-Speed-Data/xsat-x5sa/data

Miami-Dade County

Miami-Dade County's transportation-related data is provided through a GIS open data site as a public service to its residents and visitors. This open data portal is powered by Socrata. The County is continually editing and updating GIS data to improve positional accuracy and information. Data can be previewed in the map and downloaded as a spreadsheet, shapefile. KML or linked via API. Currently there are nearly 200 GIS datasets available for download. However, no volume or speed data is available on this site.

Further information:
https://opendata.miamidade.gov/

Traffic Monitoring Programs Case Studies

Case studies on statewide traffic monitoring were conducted by FHWA's Office of Highway Policy Information (https://www.fhwa.dot.gov/policyinformation/tmguide/tmg_2013/compendium-of-designing.cfm).

Regional Integrated Multi-Modal Information Sharing (RIMIS)

The Delaware Valley Regional Planning Commission (DVRPC) is the federally designated Metropolitan Planning Organization (MPO) that serves the greater Philadelphia region, including nine counties. These agencies share their traffic data and resources through the Regional Integrated Multi-Modal Information Sharing (RIMIS) Project, whose primary objective is to provide information about incidents, maintenance and construction activity, and special events that impact the transportation system. In addition to event information, RIMIS is a common platform to distribute CCTV images, VMS messages and traffic speeds.

Further information:
http://www.dvrpc.org/Transportation/TSMO/RIMIS/
http://www.dvrpc.org/operations/pdf/2009-02_RIMIS.pdf

Internet Traffic Monitoring System (iTMS)

The Bureau of Planning and Research (BPR) in the Pennsylvania DOT partners with Metropolitan Planning Organizations (MPOs), Rural Planning Organizations (RPOs), PennDOT Engineering Districts, and vendors to accomplish traffic counting programs. The traffic data shared between these

agencies will be eventually made available for public users through iTMS. The type of information provided by this tool include AADT, count frequency, count year, and latitude/longitude at any given site locations.

Further information:
http://www.dot7.state.pa.us/itms/main.htm

Internet Traffic Data Upload System (iTDUS)

This data sharing platform was created by BPR in the Pennsylvania DOT. It allows the traffic counting partners of the Bureau to submit their data quickly and more accurately. iTDUS has automated error checks for formatting before the data files are entered into the database. The user is notified immediately if the file does not meet the submittal format. Traffic Counting Partners are now able to submit a site in less than one minute and the analyst can review the site right after submittal, whereas previously it would take up to a week to get the same file checked and ready for the mainframe.

Further information:
https://www.dot7.state.pa.us/itdus/

Traffic Count Database System

The system, which is part of the Mid-Ohio Regional Planning Commission (MORPC) Transportation Data Management System, is the result of a multi-jurisdictional effort in modernizing traffic count data sharing in the Central Ohio region. Five agencies—Franklin County, City of Columbus, Delaware County, Licking County Area Transportation Study and Ohio Department of Transportation (ODOT)—directly input traffic counts into the system, and MORPC collects and inputs traffic counts from private consultants and other local governments across the region. The data are then being shared with the public instantaneously. Users can retrieve traffic count data by entering specific criteria or by clicking a location on the built-in Google Map.

Further information:
http://www.morpc.org/our-region/data-maps-tools/transportation/index
http://www.ms2soft.com/wp-content/uploads/2014/12/25_CaseStudy-MORPCTrafficCountDatabase51.pdf

Appendix J. Sample Data Directory Website

Appendix K. Memorandum of Understanding – Regional Mobility Data Business Planning

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 Data Business Plan 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 website

    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 Data Business Plan 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 data business plan 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 decision-making 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

_____

Date

_____

Signature

_____

Name (PRINT)

_____

Title

_____

Pinellas MPO

_____

Date

_____

Signature

_____

Name (PRINT)

_____

Title

_____

Pinellas County

_____

Date

_____

Signature

_____

Name (PRINT)

_____

Title

_____

Pasco MPO

_____

Date

_____

Signature

_____

Name (PRINT)

_____

Title

_____
Pasco County

_____
Date

_____
Signature

_____
Name (PRINT)

_____
Title

_____
Florida Department of Health

_____
Date

_____
Signature

_____
Name (PRINT)

_____
Title

_____
Florida's Turnpike

_____
Date

_____
Signature

_____
Name (PRINT)

_____
Title

_____
City of Temple Terrace

_____
Date

_____
Signature

_____
Name (PRINT)

_____
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

U.S. Department of Transportation