# MID-AMERICA REGIONAL COUNCIL PILOT OF THE DATA BUSINESS PLAN FOR STATE AND LOCAL DEPARTMENTS OF TRANSPORTATION

# DATA BUSINESS PLAN

Final Report

November 2017

Publication number—FHWA-HOP-18-012



#### **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. FHWA does not endorse any specific products, services, or enterprises. Products and manufacturers' names appear in this document because they are considered essential to the objective of the report. They are included for informational purposes only and are not intended to reflect a preference, approval, or endorsement of any one product or entity

#### **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. The FHWA periodically reviews quality issues and adjusts its programs and processes for continuous quality improvement.

**Technical Report Documentation Page** 

3. Recipient's Catalog No.

2. Government Accession No.

**1. Report No.** FHWA-HOP-18-012

4. Title and Subtitle  Mid-America Regional Council Pilot of the Data Business Plan for State and Local Departments of			5. Report Date November 2017			
Transportation: Data Business Plan	iness Plan for State	· —				
-		6	5. Performing Organization	ı Code		
7. Author(s)		8	3. Performing Organization	Report No.		
Anita Vandervalk, Dena Snyder, Rafael Almario, Pra						
9. Performing Organization Name And Address		1	0. Work Unit No. (TRAIS)	)		
Cambridge Systematics, Inc. 1566 Village Square Boulevard, Suite 2						
Tallahassee, FL 32309		1	1. Contract or Grant No.			
		I	DTFH61-12-D-00048			
12. Sponsoring Agency Name and Address		1	3. Type of Report and Per	iod Covered		
U.S. Department of Transportation ITS Joint Program Office-HOIT			Final Report 2015-2017			
1200 New Jersey Avenue, SE Washington, DC 20590		1	4. Sponsoring Agency Cod	le		
, assimgton, 2 © 20070		I	HOTM			
15. Supplementary Notes						
FHWA COTM: Walter During						
16. Abstract						
As part of the U.S. Department of Transportation (DC (FHWA) Office of Operations developed a guide for creation, development, and implementation of a DBP implement, and maintain a DBP, including: stakehold data management practices. The Mid-America Region	State DOT and loc for roadway trave er outreach, data a	eal agency staff charged with mobil mobility data. The guide provide assessment and improvement plan,	lity data-related responsibili s systematic instructions on data governance processes a	ties to follow in the how to plan for, and documents, and		
Performance management is an important component of MARC's activities, and the agency is actively working to: 1) meet the federally mandated requirements on performance measures, and 2) develop its own performance management program with a focus on mobility. MARC staff have identificated opportunities for increased collaboration and efficiency in the development of a robust performance management program. Likewise, the agency hopes equipped and prepared for shifts in transportation as a result of technology, including automation and big data.				taff have identified		
To address these needs, MARC formed a Data Coord awareness of data initiatives, and ensure that MARC' guiding document for the DCC and to better understa process for developing, collecting, calculating, and re	s data and data pro nd how mobility d	ocesses are more accessible to stak ata can support various initiatives.	eholders. MARC developed The expected outcome of the	this DBP to be a		
17. Key Words		18. Distribution Statement				
Data business plan, guide, stakeholder coordination, outreach, gap assessment, data management, data governance, roadway mobility data, implementation plan		No restrictions.				
			1	T		
19. Security Classif. (of this report)	•	assif. (of this page)	21. No. of Pages	22. Price		
Unclassified	Unclassified		104	N/A		

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

### TABLE OF CONTENTS

CHAPTER 1. INTRODUCTION	1
Scope	2
Organization	
CHAPTER 2. STAKEHOLDER OUTREACH	5
Stakeholder Registry	5
Stakeholder Outreach	5
CHAPTER 3. DATA AND GAP ASSESSMENT	11
Data Inventory	11
Data Assessment.	
Assessment of Capability	
Summary of Gaps	
Improvement Strategies	
CHAPTER 4. DATA GOVERNANCE FRAMEWORK	35
Data Principles	
Data Governance Model	
Roles and Responsibilities	
Rules of Engagement	
Governance Documentation	
CHAPTER 5. IMPLEMENTATION PLAN	43
APPENDIX A. STAKEHOLDER REGISTRY	
APPENDIX B. STAKEHOLDER LETTER	
APPENDIX C. STAKEHOLDER SURVEY	
APPENDIX D. EXAMPLE DATA SHARING AGREEMENT	75
APPENDIX E. EXAMPLE DATA GOVERNANCE MANUAL	77
Introduction	77
What Is the Roadway Mobility Data Coordination Group?	
How Is the Coordination Group Structured?	79
What Kind of Topics Does the Coordination Group Address?	
Data Coordination Projects	
How Does the Coordination Group Work?	
What Is Expected of Members?	
How Will Success of the Coordination Group Be Measured?	
What Additional Documentation Is Available?	
Who Is the Key Contact for Information?	90
APPENDIX F. GLOSSARY OF DATA MANAGEMENT AND GOVERNANCE	E TERMS91

APPENDIX G. REGIONAL DATA SHARING CASE STUDIES	93
Bicycle/Pedestrian Data Sharing Scheme Between Mid-America Regional Council and	Overland
Park	93
Kansas City Regional Map	
APPENDIX H. EXTERNAL DATA SHARING CASE STUDIES	95
Purpose, Benefits and Common Platforms for Open Data	95
National Initiatives	
State and Local Open Data Portals	99
Traffic Monitoring Programs Case Studies	
APPENDIX I. BEST PRACTICES	103
City of Chicago	103
Delaware Valley Regional Planning Council	104
APPENDIX J. ACRONYMS	107

## LIST OF TABLES

Table 1. Pilot contacts	5
Table 2. Stakeholder engagement plan	7
Table 3. External mobility data inventory.	
Table 4. Internal mobility data inventory.	21
Table 5. Stakeholder needs and challenges.	
Table 6. Improvement strategies.	
Table 7. Data governance roles and responsibilities. <sup>1,2</sup>	39
Table 8. Stakeholder registry.	50
Table 9. Coordination group member offices.	78
Table 10. Example data formats.	96
LIST OF FIGURES	20
Figure 1. Chart. Assessment of capability.	
Figure 1. Chart. Assessment of capability	37
Figure 1. Chart. Assessment of capability  Figure 2. Organization chart. Data governance model  Figure 3. Flow chart. Framework for the coordination group with the Data Governance Advisory	37
Figure 1. Chart. Assessment of capability	37
Figure 1. Chart. Assessment of capability  Figure 2. Organization chart. Data governance model  Figure 3. Flow chart. Framework for the coordination group with the Data Governance Advisory Council.	80
Figure 1. Chart. Assessment of capability  Figure 2. Organization chart. Data governance model  Figure 3. Flow chart. Framework for the coordination group with the Data Governance Advisory Council  Figure 4. Organization chart. Structure for roadway mobility data coordination group	37 80 81
Figure 1. Chart. Assessment of capability	37 80 81 87

#### **CHAPTER 1. INTRODUCTION**

The Mid-America Regional Council (MARC) is both an association of city and county government, as well as the metropolitan planning organization (MPO) for the Kansas City Region, encompassing 119 city governments and nine counties split across Kansas and Missouri. MARC collects, manages, reports, and shares a variety of mobility data for various purposes. One important initiative they have in place is performance management. MARC is actively working to meet the performance management requirements of the Moving Ahead for Progress in the 21<sup>st</sup> Century (MAP-21) and the Fixing America's Surface Transportation (FAST) Acts. It also has its own performance measures program with a focus on mobility.

MARC identified the following challenges that need to be addressed:

- 1. Be better equipped and prepared for shifts in transportation as a result of technology. MARC refers to this as *Digital Transportation*.
- 2. The traditional planning model is starting to fall short of MARC's needs in preparing for the future. Through scenario planning, MARC can reinvent how its planning processes are conducted.
- 3. Make policy-making more integrated with analysis. This depends on access to good information and increased analytical capability.

An important common denominator for these three needs is data, along with the people and processes to manage it. This Data Business Plan (DBP) serves as a framework to develop a process for managing mobility data to better support mobility performance measurement in the region. Performance measure areas include transit operations, highway operations, freight operations and bicycle and pedestrian (bicycle/pedestrian) usage. Mobility data to support performance measures include on-time transit performance, bicycle/pedestrian counts, and travel time/speed and Vehicle Miles Traveled (VMT) for vehicles and freight.

"At MARC, we have good technical capacity, but we need to be better prepared for the future challenges and opportunities. We need an ability to have accessible, robust, connected data management practices. The aim is not just data for the sake of data; it needs to serve the purpose of understanding the region."

David Warm, MARC Executive Director

During the development of this DBP in 2016, MARC made great strides with its data processes. With the hiring of an additional staff member, the agency is developing a geographic information system (GIS) inventory to document existing GIS data at MARC and identify gaps. This will enable MARC to be proactive rather than reactive in addressing gaps.

In addition, MARC staff created the Data Coordination Group to lead the agency's data management practices and ensure MARC's data and data processes are more accessible to external stakeholders. Currently, MARC's data often consists of separate, siloed databases or

spreadsheets. There needs to be better systems of data collection, standards, and governance. Ultimately, MARC staff desire to reach a point where there is a robust data-sharing culture, where MARC divisions and external partners assist each other by adding value to their data by using, combining, validating, and analyzing it.

The current challenges MARC experiences in managing its data can be grouped around three areas:

- 1. **Data Systems:** Some of the data sets required to calculate the measures listed above are difficult to analyze due to their large size and network conflation challenges.
- 2. **Technology:** Analyzing the large data sets requires knowledge of specialized software tools, such as Statistical Analysis Software (SAS), R, Oracle, etc.
- 3. **Governance:** There is a need for internal data collaboration within MARC, as well as externally with regional partner agencies.

To address these concerns, MARC developed this DBP to better understand 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 United States Department of Transportation (U.S. DOT) Roadway Transportation DBP project, in which the MPO pilot tested a guide document to help State DOT and local agency staff charged with mobility data-related responsibilities to develop, implement, and maintain tailored data business plans for mobility data.

The expected outcome of this effort is to advance a process for developing, collecting, calculating, and reporting on performance measures to support mobility in the region. To meet this need, the DBP provides clear tasks, strategies, benchmarks, performance measures, and timelines to ensure there is accountability for actions. The DBP establishes a clear roadmap that will result in improved data sharing with stakeholders, improved ability to develop and use performance measures, support applying for grants, and demonstrate a return on investment in data efforts.

#### **SCOPE**

For the purposes of this pilot, mobility data is defined as on-time performance data for transit, bicycle/pedestrian counts, and travel time/speed and VMT for vehicles and freight. However, MARC wants the DBP to serve as a living document and go beyond that initial set of data. The geographic scope of the DBP is limited to the nine counties that encompass the region.

#### **ORGANIZATION**

The remainder of the DBP is organized as follows:

• Chapter 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.

- Chapter 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 identifies gaps and overlaps that exist in program activities, as well as recommended strategies and actions to address the gaps.
- Chapter 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.
- **Chapter 5: 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: Example Data Sharing Agreement.
- Appendix E: Example Data Governance Manual.
- Appendix F: Glossary.
- Appendix G: Regional Case Studies.
- Appendix H: External Case Studies.
- Appendix I: Best Practices.

#### CHAPTER 2. STAKEHOLDER OUTREACH

Stakeholders for Mid-America Regional Council's (MARC) Data Business Plan (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 MARC area, and describes their involvement throughout development of the DBP.

#### STAKEHOLDER REGISTRY

Table 1 identifies the pilot site champion and supporting staff who served as the main points of contact for the MARC pilot.

Name Role Email **Phone Number** Agency ihubbell@marc 816-701-8319 **MARC** Jim Hubbell Pilot Site Champion .org FHWA Office of **FHWA** walter.during@ Walter During 202-366-8959 **Operations** dot.gov avandervalk@c Cambridge Systematics, Anita Vandervalk Principal 850-671-0204 Inc. Investigator amsys.com Cambridge Systematics, Dena Snyder Deputy Principal dsnyder@cams 713-977-0745 Investigator ys.com Inc.

Table 1. Pilot contacts.

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 identifies the stakeholders engaged in each step of the DBP development, the feedback desired, and engagement mechanisms to gather input from stakeholders.

Outreach with the pilot site took place through the following activities:

- **Stakeholder Letter.** Jim Hubbell distributed a stakeholder letter introducing the pilot project. The letter is provided in appendix B.
- Stakeholder survey. Two online stakeholder surveys were 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

June 8 to 30, 2016. One survey was distributed to external stakeholders while another to internal ones. The external survey was sent to 18 stakeholders from 11 agencies and received eight responses from eight agencies. The internal survey was sent to 15 MARC stakeholders and received six responses. The 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 onsite 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 Guide.

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

Table 2. Stakeholder engagement plan (continuation).

Data Business Plan Development Process	Key Actions	Relevant Pilot Site Stakeholders	Stakeholder Input Needed	Outreach Mechanism
Step 4. Improvement Plan	Identify improvements needed to address gaps within each assessment area.  Identify desired future condition.  Identify strategies/actions needed to move to next level of capability.  Prioritize strategies/actions.  Develop Improvement Plan.  Revise the Improvement Plan, as needed.	Pilot Site Champions Regional Stakeholders	Obtain input on improvements needed to address gaps. Obtain input on desired maturity level and steps needed to achieve the goals and objectives of the DBP. Obtain input on priorities and schedule for implementing strategies/actions. Assign responsibilities for planned implementation (to be formalized through a charter). Obtain updates on shifting priorities or other data management/governance initiatives.	Phone interviews
Step 5. Data Governance Processes and Documents	Develop data governance model.  Determine data governance roles and responsibilities.  Develop supporting documentation.	Pilot Site Champions Regional Stakeholders	Obtain consensus on the data governance model and data governance roles and responsibilities. Obtain input and consensus on supporting documentation.	Phone interviews
Step 6. Data Management Practices	Identify data management practices, standards, and policies needed to support management of mobility data.	Pilot Site Champions Regional Stakeholders	Obtain input on data management practices, standards, and policies needed in each focus area.	Phone interviews
Step 7. Develop DBP	Document the DBP.	Pilot Site Champions Regional Stakeholders	Obtain feedback on the DBP.	Phone interviews Stakeholder workshop

Table 2. Stakeholder engagement plan (continuation).

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

#### CHAPTER 3. 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 in the Mid-America Regional Council (MARC) area.

#### DATA INVENTORY

One of the Metropolitan Planning Organizations' (MPO) 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.

#### **Mobility Data Inventory**

Table 3 and Table 4 provide a comprehensive mobility data inventory for external and internal regional stakeholders, respectively. The tables include 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.
- **Network Type**—Whether the data is collected on freeways, arterials, or other roads.
- **Geographic Boundary**—The geographic boundary for data collection.
- Data Collection Standards—Whether there are existing standards for data collection.
- **Business Needs**—Whether the data is meeting the organization's or division's business needs.
- **Data Sharing**—Whether the data is shared and with whom.
- **Data Sharing Obstacles**—Obstacles faced when trying to share data.
- **Data Documentation**—The availability and quality of data documentation.
- **Data Management Structure**—Whether there is an organizational structure in place to manage the data (Table 3 only).
- **Collaboration**—How the organization collaborates with other external organizations (Table 3 only).

Table 3. External mobility data inventory.

		Organization						
	City of Overland Park, KS	Kansas City Area Transportation Authority (KCATA)	MoDOT	City of Olathe	Johnson County, KS	HERE North America	City of Lee's Summit	KCMO— Persons with Disabilities
Mobility Data Collected	Bicycle volume, vehicular volume, vehicular speed	Number of transit boardings by stop, transit on-time arrival, transit ridership, transit travel time, and other data (including General Transit Feed Specification (GTFS), operational statistics, maintenance, etc.)	Transit ridership, vehicular speed, vehicular volume, (vehicular class), freight speed, freight volume, (freight class)	Pedestrian volume, vehicular speed, vehicular volume	Bicycle/ pedestrian infrastructure data, vehicular speed, vehicular volume	Vehicular speed Freight speed	Bicycle and pedestrian volume, transit ridership, vehicular speed, vehicular volume	Bicycle and pedestrian volume, vehicular speed, vehicular volume

Table 3. External mobility data inventory (continuation).

				Organ	ization			
	City of Overland Park, KS	Kansas City Area Transportation Authority (KCATA)	M <sub>0</sub> DOT	City of Olathe	Johnson County, KS	HERE North America	City of Lee's Summit	KCMO— Persons with Disabilities
Data Source	All are collected internally.	All are collected internally	Transit ridership is obtained from transit agencies. The rest is collected internally, but vehicular and freight speeds are also obtained from HERE.		They coordinate data collection collaborating with cities inside the County, KDOT, KCATA, and county departments.	They collect the data	They collect data for all. Transit ridership and vehicular speed and volume are also obtained from others agencies (MoDOT, U.S. DOT, Operation Green Light, MARC, KCATA, OATS, school districts. Lastly, vehicular volume is often obtained from consultants that submit traffic impact studies.	All datasets collected internally.

Table 3. External mobility data inventory (continuation).

				Organ	ization			
	City of Overland Park, KS	Kansas City Area Transportation Authority (KCATA)	MoDOT	City of Olathe	Johnson County, KS	HERE North America	City of Lee's Summit	KCMO— Persons with Disabilities
Network Type	Arterials and collectors	A variety of facilities, including local, arterials, and freeways.	Vehicular and freight speed data is collected for freeways and arterials. The rest is collected on freeways, arterials, and collectors.	Arterials	All datasets are collected for freeways and arterials, except for bicycle/ pedestrian data, collected for arterials and other roads.	Freeways and arterials	Vehicular speed and volume is gathered for freeways, arterials, and other roads. Bicycle/pedestrian volume and transit ridership are collected for arterials and other roads.	Arterials
Geographic Boundary	Overland Park	KCATA Region	Statewide	City of Olathe	Johnson County (and Johnson and Miami Counties for vehicular speed)	Global	All data is available within the boundary of City of Lee's Summit.	Kansas City, Missouri

Table 3. External mobility data inventory (continuation).

				Organ	ization			
	City of Overland Park, KS	Kansas City Area Transportation Authority (KCATA)	MoDOT	City of Olathe	Johnson County, KS	HERE North America	City of Lee's Summit	KCMO— Persons with Disabilities
Data Collection Standards	Yes	Yes, but transit on-time arrival is not adequate, and other datasets are uncertain regarding adequacy.	Yes	Yes	All have standards, except for vehicular volume	Yes	Yes	Yes = Pedestrian volume No = Bicycle volume, vehicular speed, vehicular volume.
Meeting Business Needs?	Yes for bicycle and vehicular volume. No for vehicular speed.	Not for on-time arrival. Undefined/ unknown for the rest.	Yes = transit ridership, vehicular speed, vehicular volume. No = Freight speed and freight volume.	Yes	Yes	Yes	Bicycle volume not meeting business needs.	Bicycle volume not meeting business needs.

Table 3. External mobility data inventory (continuation).

				Organ	ization			
	City of Overland Park, KS	Kansas City Area Transportation Authority (KCATA)	MoDOT	City of Olathe	Johnson County, KS	HERE North America	City of Lee's Summit	KCMO— Persons with Disabilities
If No, why Not	"The speed data is random (when residents complain about speeding in their neighborhood) and sometimes quite old data is used."	definition for data collection does not match the way public would see as on-time. Some	Need more detailed data, as datasets are based on truck volume, but do not tell us what the truck is hauling, if it is empty or full, or its origin or destination.				Currently the peak/ commuter bicycle volume is counted, but this does not accurately reflect the demand or use to properly measure performance and consider improvements. Daily counts would be more useful, but more time consuming and expensive to obtain. Currently, the data collection is done at the same time as	Needs a plan and resources for implementation.

				Organ	nization			
	City of Overland Park, KS	Kansas City Area Transportation Authority (KCATA)	MoDOT	City of Olathe	Johnson County, KS	HERE North America	City of Lee's Summit	KCMO— Persons with Disabilities
Data Sharing	The volume	Ridership is	All datasets	Pedestrian	All datasets	Public-sector	vehicle and pedestrian counts to efficiently gather information during the same opportunity.	All datasets are
	counts are shared with MARC and the general public.	publicly available. Other datasets are shared internally and with other organizations.	are shared with MPOs, RPCs, and the Blueprint coalition.	volume and vehicular speed are only shared internally. Vehicular volumes are shared with KDOT, the Chamber of Commerce, and the general public.	are shared internally and with other organizations (public works, parks, cities, MARC, and Emergency Managements). In addition, bicycle/pedestrian data is shared with general public.	agencies, automotive industry, media, and others.	volume and transit ridership are shared with other organizations and with the general public. Vehicular speeds are shared with the general public. Bicycle and pedestrian counts are not shared with anyone.	shared with other city divisions. Pedestrian and vehicular volumes are shared with general public.

Table 3. External mobility data inventory (continuation).

				Organ	ization			
	City of Overland Park, KS	Kansas City Area Transportation Authority (KCATA)	MoDOT	City of Olathe	Johnson County, KS	HERE North America	City of Lee's Summit	KCMO— Persons with Disabilities
Data Sharing Obstacles		There is no good structure or interface for sharing on an ongoing basis.			The costs and restrictions of vehicular data are an obstacle.			
Data Documentation		Bad for on-time arrival. Ok for the rest.	No documentation for freight data. "OK" documentation for the rest.	volume. Good =	Good = bicycle/ pedestrian and vehicular speed OK = vehicular volume		Bad = bicycle/ pedestrian volume OK = vehicular speed Good = Transit ridership and vehicular volume.	OK = Bicycle volume and vehicular speed Good = Pedestrian volume and vehicular volume

Table 3. External mobility data inventory (continuation).

		Organization											
	City of Overland Park, KS	Kansas City Area Transportation Authority (KCATA)	MoDOT	City of Olathe	Johnson County, KS	HERE North America	City of Lee's Summit	KCMO— Persons with Disabilities					
Data Management Structure	To manage this data, certain individuals or work groups are tasked with developing count needs and deploying equipment	No	MoDOT has a Technology Steering Committee to review significant projects with respect to cost.		No	Yes, through a license agreement.	Agency has a management structure, defined data collection measures, defined data collection frequency targets, annual data reporting. Data measures and methods are derived from standards of practice (e.g., Federal Highway Administration (FHWA) performance metrics, HCM level of service methods).	Unknown					

Table 3. External mobility data inventory (continuation).

				Organ	ization			
	City of Overland Park, KS	Kansas City Area Transportation Authority (KCATA)	MoDOT	City of Olathe	Johnson County, KS	HERE North America	City of Lee's Summit	KCMO— Persons with Disabilities
Collaboration		Currently	MoDOT	Communicati	•	They work	Lee's Summit	
	quarterly	working on a	collaborates	on with other		with agencies		collaboration.
	meeting with	new regional	with MPOs	agencies	with other	to better	with other	
	the Johnson	dashboard.	and RPCs by	happens in	agencies	understand	organizations	
	County Traffic	Collaboration	email,	the form of	through	their needs.	in assisting	
	Engineers to	with MARC and	webinar, and	employees	in-person		with data,	
	discuss	local	meetings. It	with similar	meetings,		planning and	
	common areas	jurisdictions,	does the same	duties talking	emails and		analysis.	
	of interest.	sharing data on	with MPTA	in person,	webinars/		-	
	٥		with transit	phone call,	conference			
		basis.	data.	or email.	calls.			

Table 4. Internal mobility data inventory.

Mobility Data Collected		Data Source	Type	Geographic Boundary	Standards	Needs?	If No, Why Not?	Data Sharing	Data Sharing Obstacles	<b>Documentation</b>
Volume	Performance Management Team (Jim Hubbell)	internally		Metropolitan Planning Area	Yes		counts and locations are needed to develop	Shared with Internal/ external stakeholders, and through public portal		Ok
	pedestrian Planning (Kaitlyn Service)		roads	MARC's MPO boundary with an emphasis in MARC's air quality planning boundary	Yes		resources to expand bicycle/ pedestrian counting program by incorporating more counting equipment and establishing	P		OK
		Collected internally	Arterials	KC Metro Area	Don't know	Yes		and consultants	Compatibility: when data is not in Miovision format, it can get lost.	Nonexistent

Table 4. Internal mobility data inventory (continuation).

Mobility Data	Contact		Network	Geographic	Data Collection	Meeting Business		Data	Data Sharing	Data
Collected		Data Source			Standards		Why Not?	Sharing		Documentation
Pedestrian	Traffic	Collected	Arterials	KC Metro	Don't	Yes	-	Other cities		Nonexistent
Volume	•	internally		Area	know			and consultants		
	(Ray Webb) Performance	Collected	Arterials	Metropolitan	Yes	No	More	Shared with		Ok
	Management			Planning	108			internal/		OK
	Team (Jim	internary		Area			•	external		
	Hubbell)							stakeholders,		
	,							and through		
							develop	public portal		
							regional,			
							seasonal			
							factors			
	Bicycle/	Collected		MARC's	Yes			Shared		Ok
		internally		MPO				internally		
	Planning			boundary with an			1	and		
	(Kaitlyn Service)			emphasis in				externally— with the		
	Service)			MARC's air			1	City; in		
				quality				future with		
				planning			1 0	all		
				boundary			more counting			
							equipment and			
							establishing	MARC		
								region		
							involvement			
							from local			
							jurisdictions			

Table 4. Internal mobility data inventory (continuation).

Mobility Data Collected	Contact Name	Data Source		Geographic Boundary			If No, Why Not?	Data Sharing	Data Sharing Obstacles	Data Documentation
pedestrian Facilities	Information System (GIS) (Andrea Repinsky)	pedestrian facilities come from city and county governments who own the facilities	other (shared use pathways, minor	specified	Yes	No	L L	General public		Bad
Transit On-Time Arrival	C	Obtained	Freeways; arterials		Don't know	Yes		Shared internally		OK
	Management Team (Jim Hubbell)			Metropolitan Planning Area	Yes		inconsistent definitions of transit on-time	Shared with internal/ external stakeholders, and through public portal		Nonexistent
Other—	(Andrea	from transit	Freeways, arterials, other	Not specified	Don't know	No	1	Shared internally		Not specified

Table 4. Internal mobility data inventory (continuation).

Mobility Data Collected	Contact Name	Data Source		•	Data Collection Standards			Data Sharing	Data Sharing Obstacles	Data Documentation
Transit Ridership			Streets and highways	KCATA	Don't know	Yes		Shared internally		OK
	Performance Management Team (Jim Hubbell)	Obtained from State	Streets and highways	Metropolitan Planning Area	Yes	Yes		Shared with internal/ external stakeholders, and through public portal		Nonexistent
	(Andrea	from transit	Streets and highways	Not specified	Don't know	Yes		Shared internally		Not specified
Transit speed	Modeling	Obtained from transit		KCATA	Don't know		Difficult to obtain, and the reliability of the tracking system might not be optimal.			Bad
	GIS (Andrea	Obtained from transit	Streets and highways	Not Specified	Don't Know		Not specified	Shared Internally		Not specified

Table 4. Internal mobility data inventory (continuation).

Mobility Data	Contact		Network	Geographic	Data Collection	Meeting Business		Data	Data Sharing	Data
Collected	Name	<b>Data Source</b>	Type	Boundary	Standards	Needs?	Why Not?	Sharing	Obstacles	<b>Documentation</b>
Vehicular	Modeling	INRIX	Freeways,	MARC	Don't	No	Transferring	Shared	Proprietary	OK
speed			arterials	Regional	know		speed to	internally	restrictions	
				Planning			transportation			
				Boundary,			model			
				except Ray			networks can			
				County			be			
							burdensome			
	Traffic	Collected	Arterials	KC Metro	Don't	Unknown		Other cities		Nonexistent
	Operations	internally		Area	know			and		
	(Ray Webb)	-						consultants		
	Performance	HERE	Freeways,	Metropolitan	Yes	Yes		Shared	License	Good
	Management	(NPMRDS)	arterials	Planning				internally	agreements for	
	Team (Jim	and INRIX		Area				and with	speed/travel	
	Hubbell)							member	time data limit	
								organizations	sharing to	
								upon request	some extent	

Table 4. Internal mobility data inventory (continuation).

Mobility Data Collected		Data Source	Type	Geographic Boundary	Standards	Needs?	If No, Why Not?	Data Sharing	Data Sharing Obstacles	Data Documentation
Vehicular volume	8			MARC Regional Planning Boundary, except Ray County	Don't know	Yes		Shared internally and with the general public		OK
	Management Team (Jim Hubbell)			Metropolitan Planning Area	Yes		Would be helpful to have more consistent regional data for vehicular volumes		MARC does not manage/ maintain vehicular or truck volume data in a way it can be easily shared	Nonexistent
		Collected internally	Arterials	KC Metro Area	Don't know	Unknown		Other cities and consultants		Nonexistent
	Modeling	Obtained from State DOTs and local cities	,	MARC Regional Planning Boundary, except Ray County	Don't know		$\mathcal{C}$		Proprietary restrictions	OK
	Performance Management Team (Jim Hubbell)			Metropolitan Planning Area	Yes	Yes		internally and with	_	Good

Table 4. Internal mobility data inventory (continuation).

Mobility Data	Contact		Network	Geographic	Data Collection	Meeting Business		Data	Data Sharing	Data
Collected		Data Source			Standards		Why Not?	Sharing		Documentation
Freight volume			Freeways, arterials	MARC Regional Planning Boundary, except Ray County	Don't know	Yes		Shared internally and with the general public		OK
	Management Team (Jim Hubbell)		arterials	Metropolitan Planning Area	Yes		Would be helpful to have more consistent regional data for truck volumes		MARC does not manage/ maintain vehicular or truck volume data in a way it can be easily shared	Nonexistent

#### **DATA ASSESSMENT**

The stakeholder outreach process was used to identify stakeholder needs related to the collection, management, governance, and use of MARC's mobility data programs, stakeholder coordination, and current capability/maturity. Table 5 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 5. Stakeholder needs and challenges.

Dimension	Stakeholder Need	Source					
Data Systems	Need to have more consistent regional data for vehicular and truck volumes.						
·	The practices with regards to file storage and organization vary tremendously among departments and staff, and there are no formal standards.						
	Desire to expand bicycle/pedestrian collaboration effort between MARC and local jurisdictions to a regional scale.						
	There are inconsistent definitions of transit on-time arrival across different agencies. Need to have standards.						
	Transferring probe speeds to transportation model networks can be burdensome. Developing and adopting a universal network or a linear referencing system (e.g., ARNOLD) might be the solution.						
	Need to ensure compatibility of Miovision data with others for traffic operations data.						
	Need better, more and systematic automation of data collection and assembly processes. There are certain core databases that are the ones in need of automation. MARC needs to identify them.						
	Need to maintain vehicular or truck volume in a way it can be easily shared.						
	Need to determine a model to obtain buy in from cities as to why they need to share.	Workshop					
Technology & Tools	Need software and skills to enable development of performance measures over time.	Workshop					
	Need tools to work with large datasets that are part of the <i>Digital Transportation</i> .	Workshop					
Data Governance	Need to develop ideas and structure for memorandums of understanding (MOU), business rules to get everything in place.						
	Need to be prepared for the future—i.e., evolving data sources and the world of <i>Digital Transportation</i> .						
	Need to have awareness in license agreements. License agreements for probe speed data limit sharing.						
	There is strong need to create awareness and exposure to examples of good data management practices across the agency.						

Table 5. Stakeholder needs and challenges (continuation).

Dimension	Stakeholder Need	Source					
Data	Need to ensure better systems for data. Eliminate the "one-off"	Workshop					
Governance	data projects, instead ensuring they are part of a Data Master Plan.						
	Need to establish an internal collaboration mechanism for data						
	coordination, including plan for quarterly meetings and agenda						
	items.						
	Need a better form of regular communication and collaboration						
	among data users and collectors within MARC.						
	Need to develop a data catalog to list all data, source, and where it						
	is housed (and who is responsible).						
	Need to change data culture through staff training, management	Workshop					
	support, and organizational structures.						
	Need clarity of priorities, systems and action items.	Workshop					
	Desire to show how data management adds value.	Workshop					
	Desire to have the ability to develop mobile apps.	Workshop					

#### ASSESSMENT OF CAPABILITY

An assessment of the MARC region's capabilities for collecting, managing, governing, and using mobility data was conducted using a capability maturity model. A 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 Data Business Plan (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 Analysis Tools and Uses:** 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 Management and 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?
- **Data Interoperability 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?

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 1 presents the draft results of the capability assessment. The hollow circle ( $\bigcirc$ ) 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 ( $\bigcirc$ ) indicates no gap, in which the desired level of capability is the same as the current level. The yellow circle ( $\bigcirc$ ) indicates a small gap (e.g., one level difference) between current and desired levels of capability. The red circle ( $\bigcirc$ ) indicates a large gap (e.g., two levels) between current and desired levels of capability.

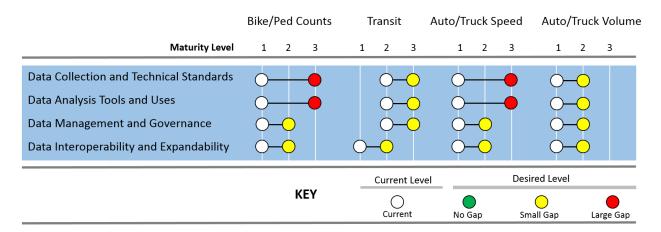


Figure 1. Chart. Assessment of capability.

(Source: Cambridge Systematics, Inc.)

### SUMMARY OF GAPS

The content below summarizes the gaps that exist in program activities by data type. The FHWA recommends that MARC address these gaps to advance the region from current to desired levels of capability within the assessment areas:

- Bicycle/Pedestrian Counts.
- The overall model of data sharing is good (see bicycle/pedestrian case study in appendix G for more information). MARC staff desire to expand this effort to a regional scale by encouraging more municipalities to join through data-sharing partnerships.

#### • Transit:

MARC gathers transit data—including ridership and on-time arrival—from various agencies. However, since their role is to support regional partners rather than collecting data, MARC does not have control of the quality and standards of the data.

## • Auto/Truck Speed:

- MARC collects speed data through various mechanisms in an ad-hoc manner when needed.
- Floating Car: MARC collects before-after travel runs to assess projects.
- Probe Speed: MARC acquires probe speed (NPMRDS and INRIX) on an as-needed basis.
- MARC needs better resources (staff and tools) to analyze probe speed data.
- Staff: Need to develop level of data proficiency for all staff.
- Tools: Tools should enable less technically savvy people to analyze and understand data.

## • Vehicle/Truck Volume:

- Similar to transit data, MARC simply gathers data from other agencies. They do not
  have a way to validate the volume data they receive; and yet, the data is used to
  support their modeling efforts.
- There could be opportunities for MARC to establish data volume standards (e.g., develop standard definitions or data-sharing schema).
- For freight volume, there is no automatic process in place.
- Data Systems: Gaps related to data systems, data elements, data collection methods, duplicative data collection efforts, data storage environments, quality of data, data standards, data integration, data analysis, documentation, and system access.

## • Interoperability and Expandability for All Data Types:

- Currently, MARC's data often consists of separate, siloed databases or spreadsheets.
   There needs to be better systems of data collection, standards, and governance.
- Need to demonstrate how sharing data and agreeing on standardization benefits partner agencies.
- Need to link data to business needs.

# **IMPROVEMENT STRATEGIES**

This section summarizes strategies for MARC 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. The recommended improvement strategies to address each assessment dimension and gap identified above will be prioritized in section 5, as shown in Table 6.

**Table 6. Improvement strategies.** 

Area of	
Improvement	Strategies
Data Systems	Reach out to local governments to determine how to have more consistent regional data for vehicular and truck volumes, and how to make this data easier to share.
	Reach out to relevant stakeholders to determine a common definition of transit on-time arrival across different agencies.
	Reach out to local governments to expand bicycle/pedestrian collaboration effort.
	Determine steps to develop and adopt a common network or a linear referencing system.
	Determine standards regarding file storage and organization among departments.
	Identify core datasets that are ripe for automation.
Technology & Tools	Determine what tools are needed now and in the future to conduct performance management and work with <i>Digital Transportation</i> data.
Data	Develop ideas and structure for MOUs, business rules to get everything in
Governance	place.
	Determine what steps could be taken to improve the limitation that license
	agreements put in data sharing.
	Consider the creation of a Data Master Plan that ensures projects are planned programmatically.
	Define an internal collaboration mechanism for data coordination, including plan for quarterly meetings and agenda items.
	Define a system of better communication and collaboration among data users and collectors within MARC.
	Develop and use a list of questions to test whether data initiatives/projects are valid and possibly use the list of questions in the quarterly data coordination meetings: Is the data already collected? What is the data for? Who else could use it? Is there a list of metadata? Etc.
	Develop a data catalog to list all data, source, where it is housed, and who is responsible for maintaining/updating it.
	Determine what needs to change for: 1) communication, 2) staff training, 3) job descriptions, and 4) organizational structures in order to change data culture within MARC.

**Table 6. Improvement strategies (continuation).** 

Area of	
Improvement	Strategies
	Consider having a mechanism to show how data management adds value—
	for instance, conduct a risk assessment (what if MARC does not have the data
	or it is not integrated?).
	Consider hiring someone able to develop mobile apps or create an open data
	platform so the public can do so.

### CHAPTER 4. 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 decisionmaking should be guided by the following set of core data principles:<sup>1</sup>

- **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 decisionmaking.

# 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.

<sup>&</sup>lt;sup>1</sup> American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Data, Data Subcommittee Efforts on Core Data Principles Web site, <a href="https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnx0cmJkYXRhc2">https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnx0cmJkYXRhc2</a> VjdGlvbnxneDoyZTFmZjA2NWIyNjdjMDM3.

The model diagram in Figure 2 proposes a formal structure for mobility data governance for the Mid-America Regional Council (MARC). The following components are depicted in the model diagram:

- Data Coordination Committee (DCC).
- Department Director's Meeting.
- Mobility Data Stewards.
- Mobility Data Users and Stakeholders.

MARC's DCC would serve as the management committee for this Data Business Plan (DBP). The DCC could take the lead in ensuring that MARC's data and data processes are more accessible to external stakeholders. Although this DBP focuses on mobility, the DCC would coordinate data collection, data acquisitions, and cross cutting data management issues (e.g., data quality, standards, metadata, data privacy, and security) for other types of data within MARC and between MARC and other external partners. The DCC could have a Mobility Data Subcommittee that would consist of designated individuals who are responsible for the oversight of mobility data programs to support the business functions of their divisions.

The DCC should be led by two cochairs and have clear steps forward. It should:

- Include at least one person from each business area.
- Identify best practices.
- "Take the drudgery out of data."
- Define roles and responsibilities.
- Meet monthly at first.

The DCC could be supported by MARC's Department Director's Meeting (B), which consists of senior-level managers from member agencies. This group would not necessarily participate at the DCC meetings, but would provide executive-level support for data governance activities, including dedicating resources as needed and establishing memorandums of understanding (MOU) for data sharing with other partner agencies. An example data-sharing agreement is provided in appendix D. The DCC would update the Directors on activities of the DCC, success stories, accountable progress, and requests for approval of initiatives.

Besides the internal work for data coordination, the DCC would ensure appropriate coordination with external stakeholders. Mobility data stewards (C) within MARC and partner agencies would ensure that the mobility data collected, maintained, and used by their agency is managed according to common standards or policies.

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

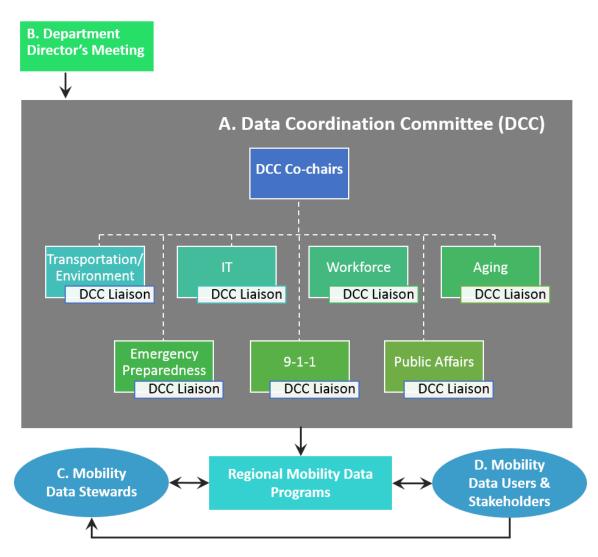


Figure 2. Organization chart. Data governance model.

(Source: Cambridge Systematics, Inc.)

## **ROLES AND RESPONSIBILITIES**

The following data governance roles are defined for the region:

- DCC—The designated individuals from MARC's offices responsible for the oversight of data programs to support the business functions of their offices. This group dictates the policies, procedures, and business practices associated with mobility data programs.
- **DCC Cochairs**—Designated individuals who would cochair the DCC and liaison with the Department Director's Meeting.
- **Department Director's Meeting**—Senior-level managers from MARC. This group would provide executive-level support for data governance, including dedicating resources as needed, and establishing memorandums of understanding for data sharing with other partner agencies.

- **Mobility Data Stewards**—Individuals within MARC and partner agencies who ensure that the mobility data collected, maintained, and used by their agency is managed according to common standards or policies.
- **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 7 defines the roles and responsibilities for supporting the governance framework. These roles/responsibilities should be vetted with members of the DCC. 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 7. Data governance roles and responsibilities. 1, 2

Role	Description	Responsibilities
Role	Association of individuals from MARC offices who collect and provide data and establish business rules and processes for the mobility data that is collected, maintained, and used by MARC. These individuals may serve as data stewards or subject matter experts for mobility data within their office.	1. Develop "rules of engagement" regarding collaboration and coordination for the committee.  2. Establish policies and procedures for the collection and use of mobility data and information.  3. Coordinate resources and cost sharing strategies to reduce redundancy in regional data collection, integration, and data systems.  4. Identify and address gaps and redundancies in regional mobility data collection activities.  5. Share current activities and best practices in mobility data collection and management.  6. Facilitate sharing of data with internal stakeholders.  7. Share procurement plans and RFPs for mobility data.  8. Review RFPs and provide recommendations based on best practices.  9. Determine standards and procedures for collection, maintenance, and use of data programs and products.  10. Provide recommendations to the Department Director's Meeting regarding development of mobility data products to meet business needs.  11. Recommend technology tools to support mobility data management and sharing  12. Identify external data stewards.  13. Reach out to external stakeholders to identify data stewards for mobility
		data programs within their respective agencies and facilitate collaboration.
Department Director's	Group of senior-level managers from MARC that the DCC reports to.	<ol> <li>Provide executive level support for data governance.</li> <li>Dedicate resources to support data management and governance as</li> </ol>
Meeting	The diat the Dec reports to.	needed.
		3. Establish data sharing agreements and memorandums of understanding internally and with other partner agencies.

Table 7. Data governance roles and responsibilities (continuation).

Role	Description		Responsibilities
Mobility Data	Individuals within MARC and partner	1.	Identify and manage metadata.
Stewards	agencies who are responsible for	2.	Identify and resolve data quality issues.
	ensuring mobility data that is	3.	Determine business and security needs of data.
	collected, maintained, and used by	4.	Communicate data quality issues to individuals that can influence
	their agency is managed according to		change, as needed.
	common standards or policies.	5.	Provide input to data analysis.
Mobility Data	Association of people comprised of	1.	Communicate their agency's business needs supported by mobility data
Users and	internal and external stakeholders		programs.
Stakeholders	who share a common interest as users	2.	Provide feedback on data quality and use of mobility data programs.
	of mobility data.		

<sup>&</sup>lt;sup>1</sup> National Cooperative Highway Research Program (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.

<sup>&</sup>lt;sup>2</sup> 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.

#### RULES OF ENGAGEMENT

If a DCC 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 Requests for Proposals (RFP) 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 data sharing agreement is provided in appendix D.

## **GOVERNANCE DOCUMENTATION**

Once the DCC 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 E.
- **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 development of 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 Information Technology (IT) professionals in defining/using the data correctly when developing or enhancing data systems. An example glossary is provided in appendix F.

#### **CHAPTER 5. IMPLEMENTATION PLAN**

Implementation is not a one-time event, but rather the policies, standards, and procedures identified in the Data Business Plan (DBP) should become part of the day-to-day business practices of Mid-America Regional Council (MARC). The Data Coordination Council (DCC) may conduct regular workshops and meetings to implement the Plan, and all stakeholders are responsible for addressing the improvement items (identified in section 3). 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, MARC should provide an annual report or briefing to senior management (i.e., the Department Director's Meeting) that provides an executive-level summary of data systems, status of integrating the data systems, regional collaboration, successes achieved or new enhancements needed for existing systems, and recommendations for how to address issues.

This section provides a proposed roadmap to implement this DBP through the following steps:

1) Establish the DCC by following section 4. Jim Hubbell to lead. By March 1, 2017:

#### Cochairs:

Jim Hubbell and Jay Heermann.

#### Core Members:

Ray Webb

Karen Clawson

Frank Lenk

Kaitlyn Service

Sasan Baharaeen

Andrea Repinsky

Paul Bushore

Aaron Bartlett

Amanda Graor

Eileen Yang

Whitney Morgan

## Other Members:

Office Liaisons.

2) Hold First Meeting of DCC—Jim Hubbell and Jay Heermann. By April 30, 2017.

Agenda Items for first meeting:

- a. Charter and MOU.
- b. Articulate charge of committee AND go back to UPWP to reference programs and link to DBP.
- c. Consider organizing and hosting a Data/Technology Summit with partner agencies and private sector vendors.
- d. Plan for items listed in 3 below.
- 3) Assign Tasks for DCC—Assign and plan timeframes for first year and responsible parties—Jim Hubbell and Jay Heermann.
  - a. Meeting Plan—Set dates for monthly meetings and agendas of DCC for first year—Cochairs.
  - b. Coordination with Department Directors—Set plans for quarterly updates to Department Directors.
  - c. Develop business case for why a common LRS is necessary.
  - d. Develop process for testing data projects—Develop and use a list of questions to test whether data initiatives/projects are valid and possibly use the list of questions in the quarterly data coordination meetings:
    - i) What is the data for?
    - ii) Is the data in need already collected by someone else?
    - iii) What business need does it serve?
    - iv) Who else could use it? (Internal and external)
    - v) What are the risks associated with NOT collecting the data?
    - vi) Can we request or set up the data so that it can be used for other purposes?
    - vii) What are the contractual restrictions?
    - viii) Can the contract be modified to minimize restrictions and allow for greater sharing?
  - e. Define a system of better communication and collaboration among data users and collectors within MARC.
  - f. Data Integration.
    - i) Develop a data catalog to list all data, source and where it is housed (and who is responsible).
    - ii) Set internal standards in data collection, file storage, and organization among departments.

- iii) Identify core datasets that are ripe for automation—start with core datasets from geographic information system (GIS) Data Inventory (Jay Heermann).
- iv) Develop mechanism to automate datasets identified in previous substep.
- g. Identify Best Practices for Data Management.
  - i) Review appendices G, H, and I for case studies and best practices from other agencies. Evaluate how to apply their lessons learned to MARC's data management needs and goals. Appendix G showcases regional data-sharing initiatives led by MARC; appendix H describes open data initiatives from across the country; and appendix I identifies best practices in data management initiatives from the City of Chicago and Delaware Valley Regional Planning Council (DVRPC).

# h. Address Needs by Data Type.

- i) Bicycle/Pedestrian Counts.
  - (1) Continue expanding the bicycle/pedestrian count data sharing model so that other jurisdictions may join. Discuss how to encourage more municipalities to join through data-sharing partnerships and explore partnering with vendor to expand coverage.
- ii) Transit.
  - (1) Consider developing a regional initiative with Transit partners so that the region can agree on quality and standards of transit data for maximum benefit.
- iii) Auto/Truck Speed.
  - (1) Assess the need for systematic collection of speed data.
  - (2) Evaluate resources needed (staff and tools) to better analyze probe speed data and develop a plan to target said needs.
- iv) Vehicle/Truck Volume.
  - (1) Consider developing a regional initiative to set standards in volume data collection and processing.
  - (2) Come up with standard definitions and sharing mechanisms.
- i. Skill Development.
  - Determine what needs to change for communication, staff training, job descriptions, and internal structures to improve data culture within MARC. Determine additional staff needs such as more data scientists.
  - ii) Review job assignments to make sure they are in line with MARC's data management needs; it may be necessary to add additional detail on staff skills.
  - iii) Determine whether MARC needs to hire staff with application development skills and/or with ability to create open data platform.

- j. Inventory.
  - i) Share GIS Inventory with DCC—Jay Heermann.
  - ii) Complete MARC Inventory.
- k. Data Culture—Identify steps to change culture; do research on data culture to support better data management in agencies. Getting stakeholder buy-in requires a change in culture. "We appreciate data, but we don't appreciate organizing the data." Data culture needs to account for:
  - i) Staff training.
  - ii) Management support.
  - iii) Organizational structures.
- 1. Prioritize data items for interoperability and determine core MARC datasets.
- m. Stakeholder Outreach Plan—External Collaboration.
  - i) Build on stakeholder list and identify external stakeholders and outreach mechanism.
  - ii) Reach out to local governments to determine how to have more consistent regional data for vehicular and truck volumes, and how to make this data easier to be shared.
  - iii) Reach out to relevant stakeholders to determine a common definition of transit on-time arrival across different agencies.
  - iv) Reach out to local governments to expand bicycle/pedestrian collaboration effort.
  - v) Determine steps to develop and adopt a common network or a linear referencing system.
- 4) Other Ideas to Consider.
  - a. Determine what tools are needed now and in the future to conduct performance management and work with Digital Transportation data.
  - b. Determine what steps could be taken to improve the limitation that license agreements put on data sharing.
  - c. Consider the creation of a Data Master Plan that ensures projects are planned programmatically.
  - d. Consider having a mechanism to show how data management adds value—for instance, conduct a risk assessment.
  - e. Develop an example memorandum of understanding (MOU) by mode.
  - f. DBP needs to clearly explain why a common Linear Referencing System (LRS) is needed.
  - g. How can MARC be more automated about data?
  - h. Need to identify return on investments.
  - i. Investigate idea of centralized data storage model.

- j. Add language in the DBP that indicates how the mobility data governance could be expanded to other areas.
- k. Seek to centralize data storage and data requests.
- 1. Planning versus Operations: MARC hopes to better harness the potential use of operational data for its planning purposes. Right now, the agency has one set of tools and processes for its long-range planning processes, and another for the immediate future (e.g., Operation Greenlight).
- m. Monetizing Data: MARC staff hope the public sector in general can find more ways to monetize partnerships with the private sector. For example, WAZE may be a consideration.
- n. Open Data Portals. Develop methods to measure the success of an open data portal. Number of visits is not a good way; need to gauge how much people are using the portal and its data.

The execution of this DBP will position MARC to better manage its data processes, increase its technical capacity, perform analysis-driven policymaking, and expand its role as a leader in integrating regional data. This will, in turn, help the agency prepare for and embrace the challenges and opportunities that the *Digital Transportation* trend brings. Using the DCC as its coordinating body, MARC will be able to use data to better understand, collaborate, and make informed decisions in the region.

#### APPENDIX A. STAKEHOLDER REGISTRY

Stakeholders include any internal or external person or organization that collects, owns, maintains, uses, interfaces with, accesses, or benefits from roadway travel mobility data. Internal stakeholders may include those involved in traffic operations, traffic safety, roadway design, pavement design, maintenance, air quality, modal, and connected vehicle capture activities. External stakeholders may include State and local transportation agencies, traffic management centers, transportation system managers, Corridor Coalitions, transit agencies, metropolitan planning organizations, researchers, freight operators, private data providers (e.g., INRIX, Nokia-Navteq-HERE, TomTom, TrafficCast, etc.), neighboring State departments of transportation (DOT), media providers, the traveling public, and the Federal Highway Administration (FHWA). Site stakeholders should also include the individuals who will fulfill various data governance roles identified in the Guide:

- **Data Governance Council**—Senior-level managers across business areas responsible for roadway travel mobility data.
- **Data Stewards**—Individuals responsible for ensuring data is collected, maintained, and used in accordance to the policies established by the data governance council.
- **Data Business Owners**—Individuals responsible for establishing business requirements for the use of roadway travel mobility data in their business area.
- **Data Custodians**—Information Technology (IT) staff responsible for data system support.
- Working Group—Collective group of internal and external stakeholders responsible for collecting and providing data and establishing business rules for roadway travel mobility data systems.
- **Community of Interest**—Collective group of internal and external stakeholders who are users of roadway travel mobility data.

Table 8 identifies specific stakeholders to be engaged in each step of the Data Business Plan (DBP) development.

Table 8. Stakeholder registry.

				Roles and Responsibilities		ès	
Name	Agency	Email	Туре	Governance	Stewards	Business Owners	Custodians
Ron Achelpohl	MARC	rona@marc.org	Internal	X			
Frank Lenk	MARC	flenk@marc.org	Internal	X			
Jay Heermann	MARC	jheermann@marc.org	Internal	X		X	X
Jim Hubbell	MARC	jhubbell@marc.org	Internal	X			
Paul Bushore	MARC	pbushore@marc.org	Internal	X		X	
Eileen Yang	MARC	eyang@marc.org	Internal		X		
Aaron Bartlett	MARC	abartlett@marc.org	Internal		X		
Andrea Repinsky	MARC	arepinsky@marc.org	Internal		X	X	
Whitney Morgan	MARC	wmorgan@marc.org	Internal		X		
Muril Stone	MARC	mstone@marc.org	Internal		X		
Karen Clawson	MARC	kclawson@marc.org	Internal		X		
Ray Webb	MARC	rwebb@marc.org	Internal	X		X	
Amanda Graor	MARC	agraor@marc.org	Internal	X			
John Hwang	MARC	jhwang@marc.org	Internal				X
Sasan Baharaeen	MARC	sasan@marc.org	Internal	X			X
Cities	Various		External				
Counties	Various		External				
Developers	Various		External				
General Public	Various		External				
Chuck Ferguson	Kansas City	cferguson@kcata.org	Data				
_	Area Transportation Authority (KCATA)		Provider				
Karen Miller	MoDOT	Karen.Miller@modot. mo.gov	Data Provider				
Dana Majors	KDOT	danam@ksdot.org	Data Provider				
Randy Johnson	KC Scout	randy.johnson@modot. mo.gov	Data Provider				
Monali Shah	HERE	monali.shah@here.com	Data Provider				
	US Census		Data Provider				

## APPENDIX B. STAKEHOLDER LETTER

Dear Stakeholders,

The Mid-America Regional Council (MARC) is excited to announce its selection to participate as a pilot site for a Federal Highway Administration (FHWA) data business planning initiative. The FHWA Office of Operations and its consultant team, Cambridge Systematics, Inc., will assist the metropolitan planning organization (MPO) in developing a tailored Data Business Plan (DPB) to improve the management and governance of roadway travel mobility data, which, for the purposes of this effort, is defined as volume, speed, lane occupancy, and connected vehicle data for vehicle, freight, bicycle/pedestrian, and transit modes. The DBP will be a living document that addresses the data needs of the MPO and its local partners, tackling technical and institutional needs alike. The pilot effort will involve stakeholder outreach to gather your feedback and input, a data gap assessment, and development of an action plan for improving the management and governance of mobility data in the region.

This initiative is part of the U.S. Department of Transportation (DOT) Roadway Transportation DBP project, whereby the FHWA Office of Operations developed a U.S. DOT roadway transportation data business plan final report (FHWA-JPO-13-084) for State and local transportation agencies. The guide is intended to help these agencies understand 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 and updating the data. The process will also help solidify working relationships by identifying how various offices/agencies share and exchange roadway travel mobility data to both internal and external stakeholders. Finally, the DBP will help identify potential duplicative data collection efforts, leading to more rapid, targeted data acquisitions that would reduce future data collection/management costs.

In order to have a positive impact in our data processes, commitments are needed not only from MARC, but also from our stakeholders. We hope your offices can engage in a meaningful and collaborative way, including responding to a survey, participating in two onsite meetings, and committing to working with other stakeholders in the creation and implementation of the DBP.

Within the next few weeks, the consultant team will reach out to stakeholders with a survey to gather your input regarding data practices, goals, and issues. Subsequent follow-up phone interviews are planned.

Should you have any questions on this initiative, please do not hesitate to contact me or Mr. Walter During at his address below.

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

Jim Hubbell, AICP
Principal Transportation Planner
816-701-8319
jhubbell@marc.org
Walter During
FHWA Office of Operations
202-366-8959

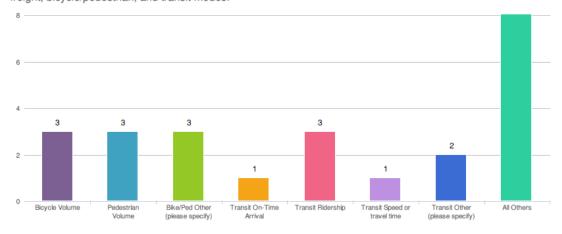
walter.during@dot.gov

# APPENDIX C. STAKEHOLDER SURVEY

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

Count	Response
1	City of Lee's Summit
1	City of Olathe
1	City of Overland Park, KS
1	HERE North America
1	Johnson County KS
1	KCATA
1	MoDOT
1	PWD-KCMO

2. What mobility datasets do you or your organization directly collect, develop, maintain, or use? For the purposes of this study, mobility data is defined as volume, speed, and operational performance data for vehicle, freight, bicycle/pedestrian, and transit modes.



Responses "Bike/Ped Other (please specify)"	Count
Left Blank	6
Bike Routes, Shared Use Paths, Sidewalks	1
No specific bike/ped counts, but boardings by stop could be used in pedestrian dataset	1
school crossings	1
Responses "Transit Other (please specify)"	Count
Left Blank	7
GTFS, operational stats, maintenace, accidents/incidents, etc.	1
See KCATA	1
Responses "Vehicular Other (Please specify)"	Count
Left Blank	3
Centerline, Traffic Counts	1
Class	1
Delay	1
O/D	1
Some signal parameters like occupancy percentage, cycle failures, etc.	1
classification	1
Responses "Freight Other (please specify)"	Count
Left Blank	6
ADT% of Truck Volume	1
Class	1
Railroads, Truck Routes	1

# 3. What is your role with respect to each mobility dataset?

	I am responsible for collecting or updating the data	I use and/or analyze the data	I generate metadata and/or resolve data quality issues	I am an IT professional responsible for technical application support, data security, backup, and/or storage of the data	I am an administrator and/or designer for databases and systems	Other (please specify)	Responses
Bicycle	1	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	1	4
Volume	25.0%	50.0%	0.0%	0.0%	0.0%	25.0%	
Pedestrian	<b>0</b>	3	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	3
volume	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
Bike/Ped	1	1	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	2
other	50.0%	50.0%	0.0%	0.0%	0.0%	0.0%	
Transit On-	<b>0</b>	1	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	1
time arrival	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
Transit	<b>0</b>	2	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	2
Ridership	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	
Transit Speed	1	1	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	2
or travel time	50.0%	50.0%	0.0%	0.0%	0.0%	0.0%	
Transit Other	<b>0</b> 0.0%	2 100.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	2
Vehicular Speed or travel time	<b>3</b> 42.9%	<b>3</b> 42.9%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>1</b> 14.3%	7
Vehicular	<b>1</b>	4	<b>0</b>	<b>0</b>	<b>0</b>	1	6
volume	16.7%	66.7%	0.0%	0.0%	0.0%	16.7%	
Vehicular other	1 20.0%	<b>3</b> 60.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	1 20.0%	5
Incident/crash	<b>2</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	1	8
data	25.0%	62.5%	0.0%	0.0%	0.0%	12.5%	
Freight Speed	1	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	1	2
or travel time	50.0%	0.0%	0.0%	0.0%	0.0%	50.0%	
Freight volume	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	1 100.0%	1
Freight other	1 33.3%	1 33.3%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	1 33.3%	3

Please specify your role:Bicycle volume

Count Response

Please specify your role:Pedestrian volume

Count Response

Please specify your role:Bike/Ped other

Count Response

Please specify your role:Transit On-time arrival

Count Response

Please specify your role:Transit Ridership

Count Response

1 MoDOT's role: collect, analyze, share and use it to determine state transit assistance allocation

Please specify your role:Transit Speed or travel time

Count Response

Please specify your role:Transit Other

Count Response

Please specify your role: Vehicular Speed or travel time

Count Response

MoDOT's role: collect, do a qa review, consume (HERE data), analyse and share data

Please specify your role: Vehicular volume

Count Response

1 MoDOT's role: collect, do a qa review, analyse and share data

Please specify your role: Vehicular other

Count Response

1 MoDOT's role: collect, do a qa review, analyse and share data

Please specify your role:Incident/crash data

Count Response

1 MoDOT's role: collect, do a qa review, analyse and share data

Please specify your role:Freight Speed or travel time

#### Count Response

MoDOT's role: collect, do a qa review, consume (HERE data), analyse and share data

Please specify your role:Freight volume

#### Count Response

1 MoDOT's role: collect, do a qa review, analyse and share data

Please specify your role:Freight other

#### Count Response

MoDOT's role: collect, do a qa review, analyse and share data

#### 4. Who Collects the Data?

	We collect it internally	We obtain it from another agency	We purchase it from vendors	Other	Responses
Bicycle volume	3 100.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	3
Pedestrian volume	3 100.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	3
Bike/Ped other	<b>2</b> 100.0%	1 50.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	2
Transit On-time arrival	1 100.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	1
Transit Ridership	<b>2</b> 66.7%	<b>2</b> 66.7%	<b>0</b> 0.0%	<b>0</b> 0.0%	3
Transit Speed or travel time	<b>2</b> 100.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	2
Transit Other	1 50.0%	1 50.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	2
Vehicular Speed or travel time	7 100.0%	<b>1</b> 14.3%	<b>1</b> 14.3%	<b>0</b> 0.0%	7
Vehicular volume	6 100.0%	3 50.0%	<b>0</b> 0.0%	<b>1</b> 16.7%	6
Vehicular other	6 100.0%	<b>1</b> 16.7%	<b>0</b> 0.0%	<b>1</b> 16.7%	6
Incident/crash data	<b>7</b> 100.0%	<b>5</b> 71.4%	<b>0</b> 0.0%	1 14.3%	7
Freight Speed or travel time	<b>2</b> 100.0%	<b>0</b> 0.0%	1 50.0%	<b>0</b> 0.0%	2
Freight volume	1 100.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	1
Freight other	3 100.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	3

Please indicate which agency/agencies you obtain data from.

#### Count Response

- All cities in JoCo, KDOT, KCATA, county departments
- Kansas City Police Department, MSHP
- Rural transit agencies, HWP
- MoDOT, USDOT, FHWA, Operation Green Light, MARC, KCATA (Transit), OATS (Transit), School Districts, Misc. State Crash Databases (e.g. Highway Patrol, STARS, LETS, etc.), Available Health Organization (e.g. Jackson County Health Assessment).
- 1 KDOT, KHP, Johnson county, other bordering cities in Johnson County (Lenexa, Overland Park, Gardner, etc.)

Please indicate which vendor(s) you obtain data from.

Count	Response
1	HERE

Please specify Other (i.e., how you obtain the data).

#### Count Response

Other traffic data is often obtained from private development/consultants that submit traffic impact studies.

## 5. On what network?

	Freeways	Arterials	Other (e.g., trails)	Responses
Bicycle volume	<b>0</b> 0.0%	3 100.0%	<b>2</b> 66.7%	3
Pedestrian volume	<b>0</b> 0.0%	3 100.0%	<b>2</b> 66.7%	3
Bike/Ped other	<b>0</b> 0.0%	2 100.0%	2 100.0%	2
Transit On-time arrival	1 100.0%	1 100.0%	1 100.0%	1
Transit Ridership	1 50.0%	2 100.0%	2 100.0%	2
Transit Speed or travel time	1 50.0%	2 100.0%	1 50.0%	2
Transit Other	2 100.0%	2 100.0%	1 50.0%	2
Vehicular Speed or travel time	4 57.1%	<b>7</b> 100.0%	<b>3</b> 42.9%	7
Vehicular volume	<b>3</b> 50.0%	6 100.0%	<b>5</b> 83.3%	6
Vehicular other	<b>3</b> 50.0%	6 100.0%	<b>2</b> 33.3%	6
Incident/crash data	3 42.9%	<b>7</b> 100.0%	<b>4</b> 57.1%	7
Freight Speed or travel time	2 100.0%	2 100.0%	<b>0</b> 0.0%	2
Freight volume	1 100.0%	1 100.0%	1 100.0%	1
Freight other	<b>2</b> 66.7%	3 100.0%	<b>2</b> 66.7%	3

## Please specify

Count	Response
1	Other = major/ minor collectors
1	Other includes collector and local roads.
1	Vehicular speeds and volumes are taken on arterials and collectors.
1	collect transit data for all routes and stops on a variety of streets

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

Count	Response
1	City Limits
1	KCMO
1	Overland Park

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

Count	Response
1	City Limits
1	City of Olathe
1	КСМО

6. On what geographic boundary? (e.g., Johnson County):Bide/Ped other

Count	Response
1	City of Olathe
1	Johnson County

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

Count	Response
1	City Limits
1	region
1	statewide

6. On what geographic boundary? (e.g., Johnson County):Transit Speed or travel time

Count	Response
1	region

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

Count	Response
1	Johnson County
1	region

# 6. On what geographic boundary? (e.g., Johnson County): Vehicular Speed or travel time

Count	Response
1	City Limits
1	City of Olathe
1	Global
1	Johnson County, Miami County
1	КСМО
1	Overland Park
1	statewide

# 6. On what geographic boundary? (e.g., Johnson County): Vehicular volume

Count	Response
1	City Limits
1	City of Olathe
1	Johnson County
1	КСМО
1	Overland Park
1	statewide

# 6. On what geographic boundary? (e.g., Johnson County): Vehicular other

Count	Response
1	City Limits
1	Johnson County
1	KCMO
1	North America & others
1	Overland Park
1	statewide

6. On what geographic boundary? (e.g., Johnson County):Incident/crash data

Count	Response
1	City Limits
1	Johnson County
1	КСМО
1	North America & others
1	Overland Park
1	region
1	statewide

6. On what geographic boundary? (e.g., Johnson County): Freight Speed or travel time

Count	Response	
1	North America & others	
1	statewide	

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

Count	Response	
1	City Limits	
1	statewide	

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

Count	Response	
1	Johnson County, Miami County	
1	statewide	

# 7. Are data collection standards in place for the data? Bicycle volume

	Yes/No	If yes, are they adequate?	Total
Yes	66.7% <b>2</b>	50.0% 1	60.0%
No	33.3% 1	0.0% <b>0</b>	20.0%
I don't know	0.0% <b>0</b>	50.0% 1	20.0%
Total	3	2	5

Pedestrian volun	ne			
		Yes/No	If yes, are they adequate?	Total
Yes		100.0% 3	33.3% 1	66.7% 4
I don't know		0.0% <b>0</b>	66.7% 2	33.3% 2
Total		3	3	6
Bike/Ped other				
	Yes/No		If yes, are they adequate?	Total
Yes	100.0% 2		100.0% 2	100.0% 4
Total	2		2	4
Γransit On-time a	arrival			
	Yes/No		If yes, are they adequate?	Total
Yes	100.0% 1		0.0% <b>0</b>	50.0% 1
No	0.0% <b>0</b>		100.0% 1	50.0% 1
Total	1		1	2
Transit Ridership	)			
		Yes/No	If yes, are they adequate?	Total
Yes		100.0% 3	66.7% 2	83.3% 5
I don't know		0.0% <b>0</b>	33.3% 1	16.7% 1
Total		3	3	6
Transit speed or	travel time			
		Yes/No	If yes, are they adequate?	Total
Yes		100.0% 1	0.0% <b>0</b>	50.0% 1
I don't know		0.0% <b>0</b>	100.0% 1	50.0% 1
Total		1	1	2
Transit other				
		Yes/No	If yes, are they adequate?	Total
Yes		50.0% 1	0.0% <b>0</b>	33.3% 1
Total		2	1	3

		Yes/No	If yes, are they adequate?	Total
I don't know		50.0% 1	100.0% 1	66.7% 2
Total		2	1	3
Vehicular speed	l or travel time Yes/No		If yes, are they adequate?	Total
Yes	85.7% <b>6</b>		100.0% <b>5</b>	91.7% 11
No	14.3% <b>1</b>		0.0% <b>0</b>	8.3% 1
Total	7		5	12
Vehicular volum	е			
_	Yes/No		If yes, are they adequate?	Total
Yes	66.7% <b>4</b>		100.0% <b>4</b>	80.0% 8
No	33.3% <b>2</b>		0.0% <b>0</b>	20.0%
Total	6		4	10
Vehicular other				
	Yes/No		If yes, are they adequate?	Total
Yes	83.3% <b>5</b>		100.0% 4	90.0% 9
No	16.7% <b>1</b>		0.0%	10.0%
Total	6		4	10
Incident/crash d	ata			
		Yes/No	If yes, are they adequate?	Total
Yes		83.3% 5	100.0% 4	90.0% 9
I don't know		16.7% 1	0.0% <b>0</b>	10.0%
Total		6	4	10
Freight speed or	r travel time			
	Yes/No		If yes, are they adequate?	Total
Yes	100.0% 2		100.0% 1	100.0%
Total	2		1	3
Freight volume				

	Yes/No	If yes, are they adequate?	Total
Yes	100.0% 2	100.0% 2	100.0% 4
Total Freight other	2	2	4
	Yes/No	If yes, are they adequate?	Total
Yes	100.0% 2	100.0% 2	100.0% 4
Total	2	2	4

# 8. Are the current datasets meeting your business needs?

	Yes	No	Responses
Bicycle volume	1 25.0%	3 75.0%	4
Pedestrian volume	3 100.0%	<b>0</b> 0.0%	3
Bike/Ped other	2 100.0%	<b>0</b> 0.0%	2
Transit On-time arrival	<b>0</b> 0.0%	1 100.0%	1
Transit Ridership	3 100.0%	<b>0</b> 0.0%	3
Transit Speed or travel time	1 100.0%	<b>0</b> 0.0%	1
Transit Other	2 100.0%	<b>0</b> 0.0%	2
Vehicular Speed or travel time	<b>6</b> 85.7%	<b>1</b> 14.3%	7
Vehicular volume	<b>6</b> 100.0%	<b>0</b> 0.0%	6
Vehicular other	5 83.3%	1 16.7%	6
Incident/crash data	<b>6</b> 100.0%	<b>0</b> 0.0%	6
Freight Speed or travel time	1 50.0%	1 50.0%	2
Freight volume	1 50.0%	1 50.0%	2
Freight other	1 50.0%	1 50.0%	2

65

Why not, and how could you improve the data quality?

#### Count Response

- Plan and resources for implementation
- 1 The speed data is random (when residents complain about speeding in their neighborhood) and sometimes quite old data is used.
- Need more detailed data, as datasets are based on truck volume, but do not tell us what the truck is hauling, if it's empty or full, or its origin or destination
- Currently the peak/commuter bike volume is counted, but this does not accurately reflect the demand or use to properly measure performance and consider improvements. Daily counts would be more useful, but more time consuming and expensive to obtain. Currently the data collection is done at the same time as vehicle and pedestrian counts to efficiently gather information during the same opportunity.
- 1 on-time arrival information definition for data collection doesn't match the way public would see as on-time, some technical issues

# 9. Please indicate with whom is this data shared or made available to:

	Other divisions/business units within my organization (please specify)	Other external organizations (please specify)	General public	We currently do not share this with anyone	Responses
Bicycle volume	<b>2</b> 66.7%	1 33.3%	1 33.3%	1 33.3%	3
Pedestrian volume	<b>2</b> 66.7%	<b>0</b> 0.0%	1 33.3%	1 33.3%	3
Bike/Ped other	2 100.0%	2 100.0%	1 50.0%	<b>0</b> 0.0%	2
Transit On-time arrival	1 100.0%	1 100.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	1
Transit Ridership	3 100.0%	3 100.0%	3 100.0%	<b>0</b> 0.0%	3
Transit speed or travel time	1 100.0%	1 100.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	1
Transit other	<b>2</b> 100.0%	2 100.0%	1 50.0%	<b>0</b> 0.0%	2
Vehicular speed or travel time	<b>4</b> 66.7%	<b>3</b> 50.0%	<b>3</b> 50.0%	<b>0</b> 0.0%	6
Vehicular volume	6 100.0%	5 83.3%	<b>5</b> 83.3%	<b>0</b> 0.0%	6
Incident/crash data	6 100.0%	<b>4</b> 66.7%	<b>3</b> 50.0%	0 0.0%	6
Vehicular other	3 50.0%	<b>3</b> 50.0%	2 33.3%	<b>1</b> 16.7%	6
Freight speed or travel time	<b>1</b> 50.0%	2 100.0%	1 50.0%	<b>0</b> 0.0%	2
Freight volume	<b>1</b> 50.0%	1 50.0%	1 50.0%	1 50.0%	2
Freight other	2 100.0%	2 100.0%	2 100.0%	<b>0</b> 0.0%	2

Please specify other divisions/organizations you share data with.

# Count Response

1	Government, enterprise, automotive industry, media, and more.
1	Public Works, Parks, Cities, MARC, Emergency Mgmt.
1	We share the school crossing data with our local school districts and local law enforcement. We share vehicular volumes with KDOT, the Chamber and the public. We share crash data with KDOT.
1	Police Department, Planning Department, Administration Department, MARC, MoDOT, Economic Development Council, City Council, etc.
1	We place a lot of our data on-line for the public to see and use. We also share our counts with MARC.
1	MPOs, RPCs, Blueprint coalition externally; Internally throughout any division/ district where data is needed
1	Public Works Department Divisions City Planning Department Divisions Parks & Recreations Department Water Department

# 10. What are obstacles to sharing this data with other entities?

	Proprietary restrictions (please specify)	Data sharing platform (please specify)	Other (please specify)	Responses
Bicycle volume	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	0
Pedestrian volume	0 0.0%	0 0.0%	<b>0</b> 0.0%	0
Bike/Ped other	0 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	0
Transit On-time arrival	0 0.0%	2 100.0%	<b>0</b> 0.0%	2
Transit Ridership	0 0.0%	2 100.0%	<b>0</b> 0.0%	2
Transit speed or travel time	0 0.0%	2 100.0%	<b>0</b> 0.0%	2
Transit other	0 0.0%	1 100.0%	<b>0</b> 0.0%	1
Vehicular speed or travel time	0 0.0%	<b>0</b> 0.0%	1 100.0%	1
Vehicular volume	0 0.0%	<b>0</b> 0.0%	1 100.0%	1
Incident/crash data	1 33.3%	1 33.3%	<b>2</b> 66.7%	3
Vehicular other	0 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	0
Freight speed or travel time	0 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	0
Freight volume	0 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	0
Freight other	0 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	0

# Please specify

Count	Response
1	Confidentiality and liability
1	No good structure or user-interface for sharing on an ongoing basis
1	Vehicular data Cost, Transit data format, Crash data requires maintainer's permission
1	cannot share site specific or person specific information on incident/ crash data

#### 11. How good is the documentation for each dataset you have/work with?

	Non-existent	Bad	OK	Good	Responses
Bicycle volume	<b>0</b> 0.0%	1 33.3%	<b>2</b> 66.7%	<b>0</b> 0.0%	3
Pedestrian volume	<b>0</b> 0.0%	1 33.3%	1 33.3%	1 33.3%	3
Bike/Ped other	<b>0</b> 0.0%	<b>0</b> 0.0%	1 50.0%	1 50.0%	2
Transit On-time arrival	<b>0</b> 0.0%	1 100.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	1
Transit Ridership	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>2</b> 66.7%	1 33.3%	3
Transit Speed or travel time	<b>0</b> 0.0%	<b>0</b> 0.0%	1 100.0%	<b>0</b> 0.0%	1
Transit Other	<b>0</b> 0.0%	<b>0</b> 0.0%	2 100.0%	<b>0</b> 0.0%	2
Vehicular Speed or travel time	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>4</b> 57.1%	<b>3</b> 42.9%	7
Vehicular volume	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>3</b> 50.0%	<b>3</b> 50.0%	6
Vehicular other	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>5</b> 83.3%	<b>1</b> 16.7%	6
Incident/crash data	1 16.7%	1 16.7%	<b>2</b> 33.3%	<b>2</b> 33.3%	6
Freight Speed or travel time	1 50.0%	<b>0</b> 0.0%	1 50.0%	<b>0</b> 0.0%	2
Freight volume	1 100.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	<b>0</b> 0.0%	1
Freight other	1 33.3%	1 33.3%	1 33.3%	<b>0</b> 0.0%	3

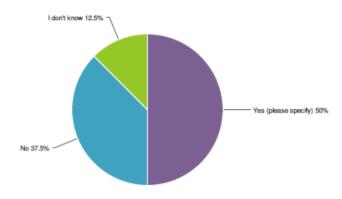
12. What significant changes are planned for the data systems you work with? Include changes in data collection, dissemination, data uses, or storage of the data.

Count Response

1	Data can be cumbersome to track and generate useful reports.
1	Source for crash data may change. Possible divided roads in centerline.
1	The plan is no plan
1	TMS Data Zone created to provide TMS data in an easily consumable way, started with traffic data and plan to add safety & other data; TMS Modernization project to bring the software up to date; the new FAST Act/ MAP-21 requirements for data based on the final Performance Measure rules
1	We are currently refocusing our priorities to intersection and turning movement counts. We also are looking to start systematic ped and bike counts within our community.

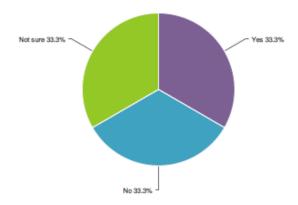
We are just starting our bike counting program and setting up our first counters today. We will have some permanent trail counters that will get deployed in the next month or so.

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

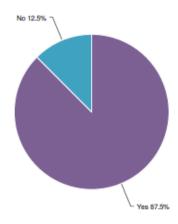


Responses "Yes (please specify)"	Count
Left Blank	5
Clear license agreement	1
We have a Technology Steering Committee to review significant projects (cost wise)	1
Management structure, defined data collection measures, defined data collection frequency targets, annual data reporting. Data measures and methods are derrived from standards of practice (e.g. FHWA performance metrics, HCM level of service methods)	1
Certain individuals or work groups are tasked with developing count needs and deploying equipment.	1

If no, would setting one be helpful?



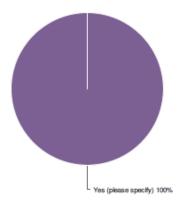
14. Do you collaborate with other organizations in the region on other topics? (e.g., sharing RFP's for current and upcoming initiatives, procurement plans, program roadmaps, vision/objective documents, sharing of current initiatives, activities, and best practices related to specific types of mobility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



How does collaboration take place?

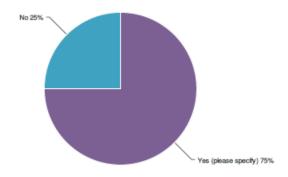
Count	Response
1	Assist with data, planning and analysis. Sharing relevant and available data.
1	Collaboration with MARC and local jurisdictions, data shared on an as-needed basis.
1	Regular Meetings, email, etc.
1	working with agencies to understand their needs
1	Share with MPOs and RPCs by email, webinar, demonstrations in meetings; also share with MPTA on transit data
1	Often one on one communication with others with similar duties in other organizations. Often in person, phone call or e-mail.
1	We have a quarterly meeting with the Johnson County Traffic Engineers to discuss common areas of interest.

15. Do you see any benefit in engaging in a data sharing partnership with MARC?



Responses "Yes (please specify)"	C	Count
Left Blank		1
Depends of what would be shared		1
Interoperability of databases initiated by MARC		1
It\'s always good to know what is happening nearby.		1
Regional planning		1
We already do some of this.		1
coordiante with ped, bike, and traffic information to improve transit service		1
interested in integratign local data into TMS; we currently get KCATA data		1
We are not an island and need to know volumes near our borders so we can predict or respond to those impacts.		1
Responses "No (please specify)"	Count	
Left Blank	9	

16. Are there any challenges in engaging in a data sharing partnership with MARC?



Responses "Yes (please specify)"	Count
Left Blank	3
Depends if there is data MARC would have to share	1
Dissemination.	1
overcome technical hurdles and establishing roles and responsibilities	1
supporting staff and guidelines	1
Having the same format so data is easily shared; needs to be collected by the same standards and rules	1
Regionally inconsistent data and performance metrics/uses of data between agencies within MARC boundary	1

17. Please indicate any additional comments that would help us with this project. For instance, what should MARC look for to achieve an effective data sharing partnership with your organization?

#### Count Response

- I compiled the comments from Design, Planning, Transit and Safety Staff for this survey. I am not a collector of the data but included all MoDOT comments in this one survey. Last comment: There are various levels of "sharing" so clearly defining the scope of sharing is critical. I can share something with you by giving you a hard copy report, emailing you a data set, or set up a database where multiple agencies can enter their data, extract it to analyze and review. This wide range of "sharing" needs clarification on any data integration project.
- Supporting IT designer to: a) evaluate and compile available data, b) eliminate duplication of efforts to create data, and c) identify the options to generate the needed data
- When requesting data in an RFP focus on performance specs and standard data sets otherwise if you ask for customized data sets you will end up paying much higher fees.

#### APPENDIX D. 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.

RDE.	
WHEREAS, I,and on behalf of	, am authorized to execute this agreement for (hereinafter "Contributor");
WHEREAS, Contributor desires to voluntarily DOT RDE;	y add its Data, as defined and described below, to the US
WHEREAS, Contributor desires to grant to US in support of the goals and objectives of its rese	S DOT the rights to use and disseminate the Data as needed earch projects; and
WHEREAS, US DOT desires Contributor to below;	voluntarily add its Data, as defined and described in detail
Contributor definition and description of submi	itted data:
	e, non-exclusive rights to the US DOT to copy, use, nt others these rights in advancing their own research goals
Signature of Data Contributor Representative	Date
Title of Representative and Organization Name	2

#### APPENDIX E. EXAMPLE DATA GOVERNANCE MANUAL

#### INTRODUCTION

This Data Coordination Manual provides comprehensive guide to members of the U.S. Department of Transportation (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 (DBP) (Phase 1),<sup>2</sup> 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 DBP, which documents stakeholder needs and gaps related to roadway travel mobility data programs and data business planning within U.S. DOT; establishes a framework for data coordination; and provides recommendations regarding data management functions related to roadway travel mobility data.
- The culture of the Coordination Group is one of collaboration and mutual trust, with shared ownership of decisionmaking as a key characteristic.

# WHAT IS THE ROADWAY MOBILITY DATA COORDINATION GROUP?

The Coordination Group is charged with facilitating cross organizational collaboration, data sharing, and integration of roadway travel mobility data within U.S. DOT to address gaps and redundancies (documented in the U.S. DOT Roadway Transportation DBP (Phase 1) report)<sup>3</sup> and to collaborate on data management functions related to roadway travel mobility data.

77

<sup>&</sup>lt;sup>2</sup> http://ntl.bts.gov/lib/48000/48500/48531/6E33210B.pdf.

<sup>&</sup>lt;sup>3</sup> http://ntl.bts.gov/lib/48000/48500/48531/6E33210B.pdf.

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

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

The need for the Coordination Group evolved from the white paper, *Needs and Gaps in the Operation and Coordination of U.S. DOT Data Capture and Management Programs*, which was commissioned by the FHWA 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 DBP (Phase 1) report formalized the recommendation and proposed an initial structure, framework, and rules of engagement for the Coordination Group. The DBP 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 9.

**Table 9. Coordination group member offices.** 

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

#### HOW IS THE COORDINATION GROUP STRUCTURED?

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

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

- Data Governance Advisory Council. The DGAC is responsible for developing the FHWA Data Governance Plan and Framework and serves as the point of contact for coordinating data collection efforts with other modes within the Department and with other branches of government. The DGAC is assisted by Technical Advisors that assist in developing formal documentation on data governance principles, and provide input into the decisionmaking process.
- Data Governance Regimes and Coordinators. Regimes are responsible for coordinating with individual data programs, and ensuring that the Data Governance Plan and Framework are adhered to, while Regime Coordinators liaison with the DGAC and provide oversight of stewardship and management processes of data programs within their regime. There are 12 Data Governance Regimes:
  - Headquarters (HQ) Administrative.
  - Financial.
  - Planning.
  - Operations.
  - Policy.
  - Research.
  - Infrastructure.
  - Chief Counsel.
  - Safety.
  - Federal Lands.
  - Division Office.
  - Technical Services.
- **Data Stewards.** Data Stewards are subject matter experts and points of contact for the data programs they oversee. They are responsible for managing their data programs in accordance with the processes and procedures established by the DGAC and the Regime Coordinator.

The Coordination Group is managed under the Operations Regime of the DGAC, with members from other DGAC regimes, such as Planning, Policy and Research, as well as from other operating administrations and programs of the Department. Figure 3 shows how the Coordination Group fits within the DGAC framework. The Coordination Group also influences other activities/areas outside of FHWA (such as safety).

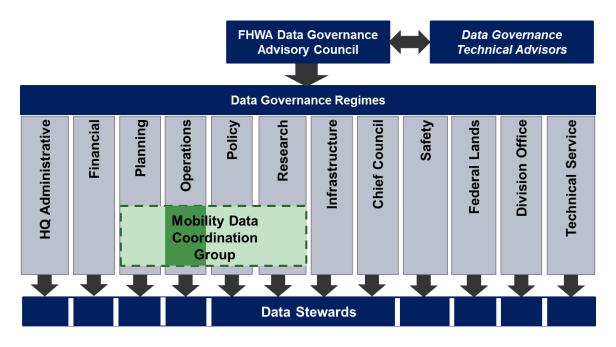


Figure 3. Flow chart. Framework for the coordination group with the Data Governance Advisory Council.

The structure for the Coordination Group comprises the Coordination Group Chair/Cochair, the Coordination Group itself, Working Groups, and Supporting Staff, as shown in Figure 4:

- Roadway Mobility Data Coordination Group Chair/Cochair. The Chair/Cochair are designated individuals from within the FHWA Office of Operations and one member agency representative who would cochair the Roadway Mobility Data Coordination Group and liaison with the FHWA DGAC and other offices outside of FHWA (such as Safety). The FHWA Office of Operations DBP champion (Walter During) would serve as the permanent chair, while the rotating Cochair 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 Request for Proposals (RFP), develop a Strategy Document for the Coordination Group, oversee coordination project activities, etc.).
- **Supporting Staff.** Supporting staff provide administrative support and technical guide to the Chair/Cochair, Roadway Mobility Data Coordination Group and Working Groups, as

needed. Supporting staff members include consultants and other administrative staff support as needed.

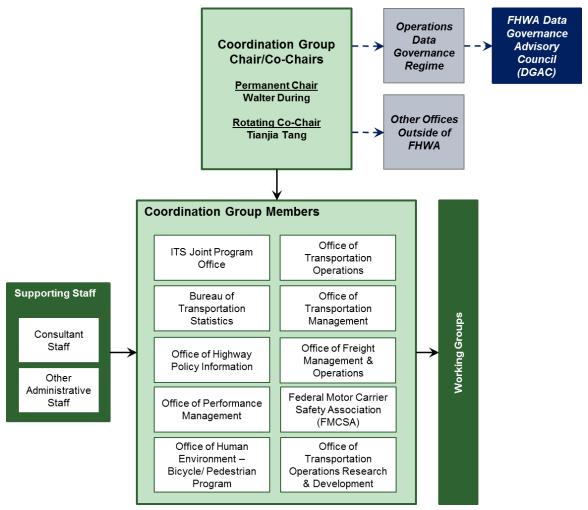


Figure 4. Organization chart. Structure for roadway mobility data coordination group.

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

#### WHAT KIND OF TOPICS DOES THE COORDINATION GROUP ADDRESS?

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

- Share RFPs for current and upcoming initiatives related to roadway travel mobility data.
- Review and provide input on possible FHWA procurement actions related to roadway travel mobility data.
- Share current initiatives, activities, and/or best practices related to roadway travel
  mobility data, including data strategies, policies, standards, metadata, architecture,
  procedures, metrics, etc.

- Participate in indepth vetting of data standards/procedures and standards for linear referencing attributes/terminology to facilitate sharing/integration of U.S. DOT roadway travel mobility data.
- To the extent possible, identify and address gaps and redundancies (documented in the DBP) 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 DBP 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 guide on developing DBPs for States and local jurisdictions.
- Investigate "big data" sources, such as crowdsourcing, social media, and private sector data sources that have not been traditionally utilized as sources for roadway travel mobility data.

- Investigate how current standards, such as the National Information Exchange Model (NIEM) and open-source, could be applied within the DBP or within an individual stakeholder office.
- Develop a tool for visualizing and analyzing large roadway travel mobility data sets within a cloud environment.

A complete list of candidate data coordination project concepts will be maintained on the Roadway Mobility Data Coordination Group Document Share site (FHWA internal site) (https://collaboration.fhwa.dot.gov/dot/fhwa/xhcx/dbp/default.aspx). Work on the first project concept will be conducted by Cambridge Systematics as part of the DBP (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/Cochair.

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

Coordination Group members seeking input on RFPs and other procurement actions related to roadway travel mobility data should share the RFP with the Chair/Cochair, who will decide whether it should be distributed to Coordination Group members for input/review. The Chair/Cochair 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/Cochair, any Coordination Group member, or through consensus by the Coordination Group. Working Groups will consist of two to four interested members, with one member serving as the lead and the remaining members serving as key content reviewers.

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

#### **Data Coordination Mechanisms**

#### **Document Share Site**

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

#### Awards

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

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

- Nominator's name, office, title, address, phone number, and email.
- Nominee's name (or contact person for a nominated organization or program), office, title, address, phone number, and email.
- A narrative, not to exceed 500 words, in support of the nomination, addressing the following areas:
  - Provide a clear, direct, and specific statement of why the nominee deserves recognition.

Elaborate on why the nominee's accomplishments are worthy of the award, including
what the nominee did (e.g., projects, activities), any challenges or issues encountered
and overcome, how they did it (initiative/leadership, teamwork/collaboration, and/or
creativity/innovation), and the results/outcomes (or major milestones) that the
nominee's efforts accomplished.

Nominations should be submitted to the Coordination Group Chair by January 31<sup>st</sup> 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 datasharing 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 5.

Performance indicators for Coordination Group activities (i.e., outputs) and outcomes are shown in Figure 6, Figure 7, and **Error! Reference source not found.**, 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 DBP 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 DBP continues. After three years, an assessment of the effectiveness of the group will be made using the outcome indicators, and the Coordination Group will decide whether to continue its activities or disband the group.

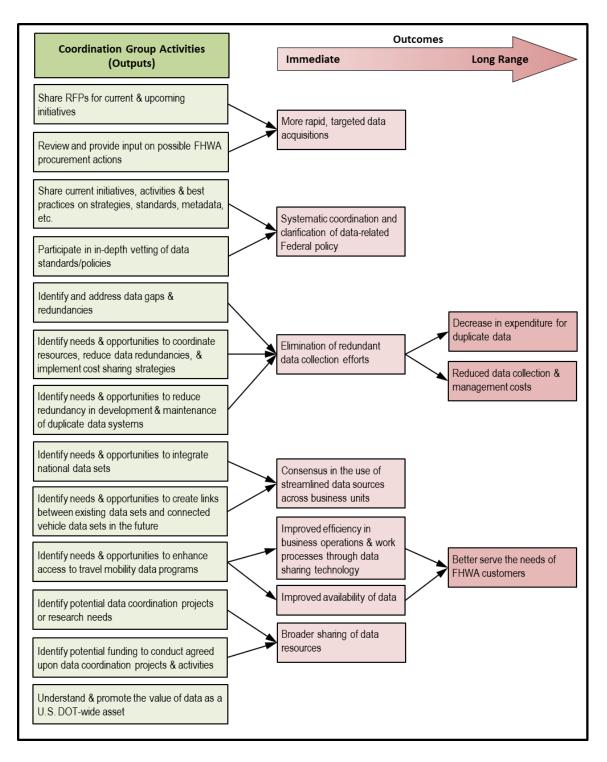


Figure 5. Flow chart. Relationship between group activities (outputs) and outcomes.

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	$\Box$	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 6. Process chart. Performance indicators for group activities (outputs).

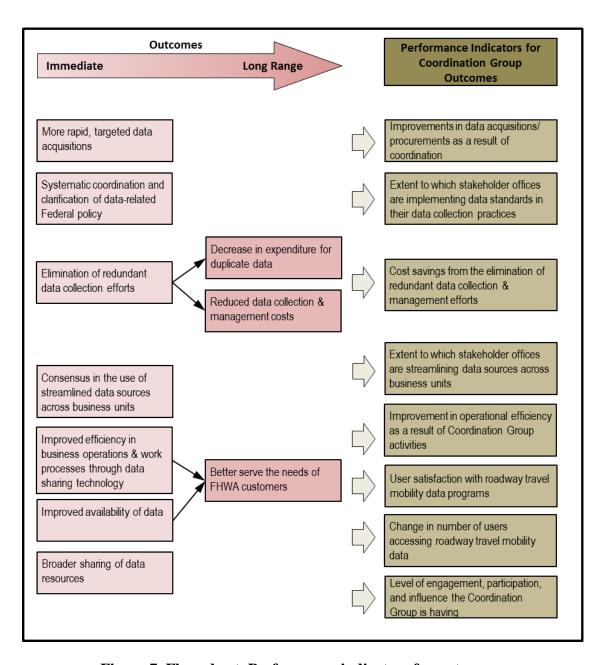


Figure 7. Flow chart. Performance indicators for outcomes.

#### 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 DBP 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 DBP, 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: <a href="http://ntl.bts.gov/lib/48000/48500/48531/6E33210B.pdf">http://ntl.bts.gov/lib/48000/48500/48531/6E33210B.pdf</a>)
- *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 DBP, which includes execution of the DBP coordination, as well as conducting two data integration test pilots to demonstrate the benefits and value of the DBP. (Available at: <a href="http://ntl.bts.gov/lib/48000/48500/48536/EBBC1DA.pdf">http://ntl.bts.gov/lib/48000/48500/48536/EBBC1DA.pdf</a>)

#### 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
Email walter.during@dot.gov

# **Appendix F. 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 the Mid-America Regional Council (MARC) 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 MARC 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**—Information Technology (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 Data Coordination Committee (DCC). 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 DCC.

**Data Governance Manual**—Provides comprehensive guide to the DCC 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 MARC and external 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 common processes and procedures.

**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**—On-time performance for transit, bicycle/pedestrian counts, and travel time/speed and vehicle miles of travel (VMT) for vehicles and truck freight.

**Department Director's Meeting**—Senior-level managers from MARC. This group would provide executive-level support for data governance, including dedicating resources as needed, and establishing memorandums of understanding for data sharing with other partner agencies.

**DCC**—The designated individuals from MARC's offices responsible for the oversight of data programs to support the business functions of their offices. This group dictates the policies, procedures, and business practices associated with mobility data programs.

**DCC Charter**—Charter document that formally establishes the DCC and sets forth the objectives, membership, structure, and operating framework for implementing the DCC.

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

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

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

#### APPENDIX G. REGIONAL DATA SHARING CASE STUDIES

This appendix highlights two important initiatives, led by the Mid-America Regional Council (MARC), that have increased data sharing in the Kansas City region. These were gathered through email and phone interviews with MARC staff.

# BICYCLE/PEDESTRIAN DATA SHARING SCHEME BETWEEN MID-AMERICA REGIONAL COUNCIL AND OVERLAND PARK

Through this initiative, MARC and the City of Overland Park share their bicycle/pedestrian count data using equipment devices coming from the same vendor, along with a common platform to analyze and visualize the data.

#### **How It Came to Fruition**

MARC owns two portable bicycle counters and four portable pedestrian counters that are available for local jurisdictions to borrow. When the City of Overland Park was considering purchasing bicycle/pedestrian counters for their own use, they contacted MARC to learn about their experience. The City ultimately opted to purchase the same equipment that MARC had and, with this decision, MARC staff saw an opportunity for collaboration. The two organizations had some fruitful discussions, after which they agreed to enter a voluntary data-sharing agreement whereby each organization has access to data produced by both sets of counters. The fact that they both use counters and software from the same vendor ensured full interoperability, maximizing their efforts to better understand bicycle/pedestrian mobility in the region.

#### **Overcoming Challenges**

When MARC purchased its counters, the agency was faced with erroneous data and a lack of standards to correct it. Beyond manually changing the count errors by "eyeballing" the data, MARC had no guidance to address this issue. Faced with this, MARC and Overland Park staff painstakingly went through the process of identifying possible causes for the data inaccuracies; and after many trials and errors, it identified certain practices to install the equipment in a way that it produced dramatically more accurate data. In other words, as MARC planner Kaitlyn Service stated, "the best way to get good data is to prevent the equipment from recording bad data" by fine-tuning how to install it.

#### **Lessons Learned and Next Steps**

The common platform allows for a low-maintenance data sharing scheme, enabling multiple organizations access to information from any given counter regardless of counter ownership. MARC hopes to continue advancing this program in the following ways:

- Develop best practices guide for data collection (equipment installation).
- Organize a cooperative purchasing agreement.
- Encourage other jurisdictions to join this initiative by acquiring compatible counter equipment.

#### KANSAS CITY REGIONAL MAP

Through this initiative, route information from all public transportation providers in the Kansas City (KC) area were incorporated into one single, dynamic map. This can be accessed through the KC Smart Moves website.<sup>4</sup>

#### **How It Came to Fruition**

The initiative was first developed by the Regional Transit Coordinating Council, which serves as a MARC-led regional advisory committee for transit policy and funding priorities. It stemmed from the idea that a transit user does not care about who manages which bus routes; instead, this user looks at the system as a whole to determine his or her mobility options. To support a more integrated system, this regional transit map is part of a larger effort to create a single brand for all transit agencies in the region. While this initial idea came from the involvement of various transit stakeholders, MARC led the effort to develop the map from General Transit Feed Specification (GTFS) data.

# **Overcoming Challenges**

This system is based on collecting GTFS feeds from transit agencies to integrate them into the regional transit map. However, some of the smaller transit agencies did not have their routes in GTFS format and their routes were not available. In one case, Kansas City Area Transportation Authority (KCATA), the largest transit provider, assisted a smaller agency in converting its routes to GTFS format. In other cases, the route information was obtained in the form of shapefiles. Another challenge was having to deal with GTFS-specific data quirks; through quality assurance (QA)/quality control (QC) and trial and error, MARC staff developed methods to address them. Lastly, certain analyses require advanced skills in database management and programming (e.g., calculating frequency of service). MARC staff did not have this capability and when having to conduct these analyses they would do so manually, spending considerable time and effort.

#### **Lessons Learned and Next Steps**

Although not all agencies were able to provide their data in GTFS format, MARC's flexibility and willingness to work with them using available resources ensured their successful inclusion in this initiative. With the hiring of two new staff with advanced data management skills, MARC hopes to automate more processes in its semi-annual update of this map.

.

<sup>&</sup>lt;sup>4</sup> http://www.kcsmartmoves.org/.

#### APPENDIX H. EXTERNAL 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 guide 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**,<sup>5</sup> 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.
- 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.

<sup>&</sup>lt;sup>5</sup> http://opendatahandbook.org/guide/en/.

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 10 provides several examples of data formats that can be applied to open data.

Table 10. Example data formats.

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

Further information, including guide on how to begin opening up data, can be found at http://opendatahandbook.org/ and 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 does not 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**

The Comprehensive Knowledge Archive Network (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 National Aeronautics and Space Administration (NASA), federating the data into one searchable catalog. Drupal Knowledge Archive Network (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 (API), 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 Tab Separated Values (TSV) files. The portal offers support for shapefiles as well (e.g., Keyhole Markup Language (KML), KML Zipped (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 nondistributed 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/

 $\underline{https://www.unleashed-technologies.com/blog/2014/08/01/what-github-and-how-can-it-benefit-your-development-team}$ 

#### 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://project-open-data.cio.gov/policy-memo/

#### **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 AND LOCAL OPEN DATA PORTALS

In 2014, the Center for Data Innovation ranked each State's progress in creating open data policies and portals (see <a href="http://www.datainnovation.org/2014/08/state-open-data-policies-and-portals/">http://www.datainnovation.org/2014/08/state-open-data-policies-and-portals/</a>). 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 comprises 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, Chicago Transit Authority (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 <a href="http://opengrid.io/">http://opengrid.io/</a>), 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, nonprofits, 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 <a href="https://nycopendata.socrata.com/">https://nycopendata.socrata.com/</a>). 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 <a href="http://nyctmc.org">http://nyctmc.org</a>). NYCDOT also uses this information for emergency response and management.

#### Further information:

 $\frac{https://data.cityofnewyork.us/Transportation/Real-Time-Traffic-Speed-Data/xsat-x5sa/data}{x5sa/data}$ 

# **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 the Federal Highway Administration's (FHWA) Office of Highway Policy Information (<a href="https://www.fhwa.dot.gov/policyinformation/tmguide/tmg\_2013/compendium-of-designing.cfm">https://www.fhwa.dot.gov/policyinformation/tmguide/tmg\_2013/compendium-of-designing.cfm</a>).

# **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 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 (MPO), Rural Planning Organizations (RPO), 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

#### **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:

 $\frac{http://www.morpc.org/data-maps/transportation/index}{http://www.ms2soft.com/wp-content/uploads/2014/12/25\_CaseStudy-MORPCTrafficCountDatabase51.pdf}$ 

#### APPENDIX I. BEST PRACTICES

This appendix highlights two organizations that have been successful in implementing data initiatives, namely the City of Chicago and the Delaware Valley Regional Planning Council (DVRPC).

#### CITY OF CHICAGO

The City of Chicago has been nationally recognized for its efforts in making data accessible to the public. The following are some lessons learned and recommendations from Brett Goldstein, the City's first Chief Data Officer:<sup>6</sup>

- The first step should be to assess existing baseline and decide where to take vision and direction for the organization.
- Philanthropic support was an important component for Chicago in this initiative. The
  MacArthur foundation sponsored a competition to encourage businesses and software
  engineers to use Chicago's open data to create helpful apps for residents. This
  competition also helped create a framework to engage with the community.
- The city created a new senior-level post within the Mayor's office: the Chief Data Officer (CDO), tasked to make government data available to the public and use data analysis as a tool to inform policy and improve services. This ensured that data initiatives had a clear mandate.
- They discovered that "there is enormous benefit to a high-profile release of a high-interest dataset early on." City officials know that crime incident data was hard to obtain in disaggregate, raw form. There was also a strong interest from the public to obtain prompt and transparent crime data. The City prioritized this data to be the first one launched, and they created publicity and buzz around it.
- Rather than getting into the business of developing apps, the City of Chicago provided a standards-based data portal that enabled them to be a platform that supports innovation from researchers, civic developers, and for-profit use.
- Providing data in machine-readable formats is of utmost importance. This may require the "tedious, but critical, work" of an intern to convert an unusable file into one that can serve as a data source.

For the data to be successful, they had to:

- Reduce the data to block size and scatter spatial coordinates in order to protect privacy.
- Capture updates and replicate them into the data set as the source system records were updated.
- Have a system in place to handle uploads, updates, and queries of large datasets.

<sup>&</sup>lt;sup>6</sup> http://beyondtransparency.org/.

- Proprietary platforms are often much easier to use and are ready to go. However, they are an investment that requires ongoing funds to be sustained. An open-source platform may demand significantly more technical skills to set it up, but may be potentially much cheaper.
- Agencies need to find ways to extract data, understand it, and load it into the platform. Think about network, storage, and systems.
- Automation is a key component to work with large datasets. "An open data program that relies on a human to keep it updated is fundamentally flawed." The Chicago portal updates itself every day.
- Sometimes public agencies will get bad press coverage due to errors or oversights in releasing data. To help prevent that from happening, it is important to develop a strong relationship with stakeholders, including explaining to the press the importance and significance of the initiative.
- Top-Down and Bottom-Up: As this data initiative gained traction and maturity, to take to the next level, the mayor issued an Open Data Executive Order mandating that each department would designate an Open Data Coordinator and determine a system of annual accountability regarding the release of open data. In the case of Chicago, Goldstein claims it made more sense to let this initiative evolve and gain momentum before an executive or legislative action. Otherwise there is a risk that it might become too prescriptive.
- There are two key items that are crucial for the success of a data initiative: 1) clear and vocal support of the executive sponsor, and 2) financial support.

#### DELAWARE VALLEY REGIONAL PLANNING COUNCIL

DVRPC was identified by MARC and the project team as leader from whom to learn about data management practices. Kimberly Korejko, Data Coordination Manager at DVRPC, shared through an interview the following lessons learned:

- It is helpful to have a clear sense of organization to coordinate data initiatives.
- In the case of DVRPC, they have set a series of coordinating levels, as shown in Figure 8.
- Data Resources and Coordination Team: This core group is comprised of staff whose daily tasks are strongly oriented toward data management. They are vital in helping complete the tasks identified through data coordination efforts.
- Advisory Teams are in charge of identifying and prioritizing data initiatives each year, as well as assisting in creating standards and policies. It is comprised of Planning, Technical, and Management staff.
- *Innovation Teams*: These teams are formed on an as-needed basis for specific needs or initiatives.
- *Member Governments and Planning Partners*: These are external stakeholders that provide data to DVRPC and may participate in data sharing initiatives.

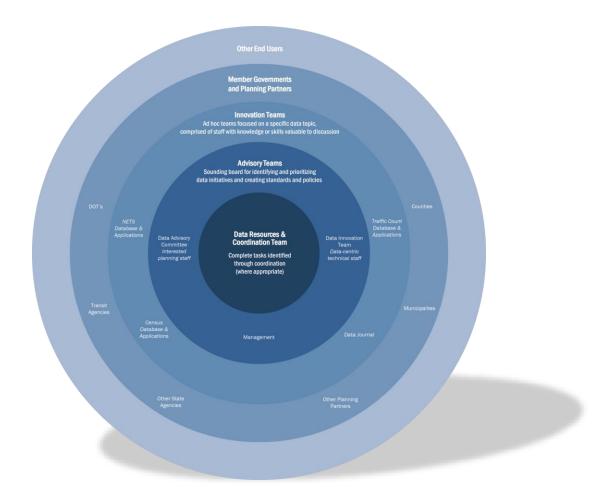


Figure 8. Chart. Data coordination framework at Delaware Valley Regional Planning Council.

(Source: DVRPC, unpublished PowerPoint presentation.)

- Other End Users may be organizations or individuals interested in information or data.
- Start with what you can, and build from there.
- DVRPC is rarely a producer of data. Instead, it uses other organization's data. As a two-State Metropolitan Planning Organization (MPO), the data it receives is often not compatible with one another. Although DVRPC has not been able to set standards, this has not prevented it from leading many data initiatives. For instance, DVRPC has an online, searchable GIS Data Catalog with data location, abstract, purpose, use limits and licensing, and data elements. The MPO is now working to create metadata for non-geographic information system (GIS datasets and hopes to have a unified, searchable interface to make data available online.
- Make management aware of the importance of data initiatives.
- It is crucial to be an advocate for data initiatives and data governance. Although one may need to repeat oneself doing this, having buy-in from upper management pays off well. In

the case of DVRPC, they were able to formally establish that members of the Innovation Team should dedicate 5 percent of their time in data governance.

- Working with Information Technology (IT) Department is key.
- It is critical that IT staff understand the *why* behind data initiatives. To roll out the Online GIS Data Catalog, DVRPC arranged for Esri to meet with IT and go through all the technical "nuts and bolts" to make the initiative successful.

#### APPENDIX J. ACRONYMS

AASHTO American Association of State Highway Transportation Officials

ADOT&PF Alaska Department of Transportation and Public Facilities

DBP Data Business Plan

DCC Data Coordination Committee

DGAC Data Governance Advisory Council

DOT Department of Transportation

DVRPC Delaware Valley Regional Planning Council

FAST Fixing America's Surface Transportation

FHWA Federal Highway Administration

GIS Geographic Information System

GTFS General Transit Feed Specification

HOTM Office of Transportation Management

IT Information Technology

KCATA Kansas City Area Transportation Authority

LRS Linear Referencing System

MAP-21 Moving Ahead for Progress in the 21<sup>st</sup> Century

MARC Mid-America Regional Council

MPO Metropolitan Planning Organization

MOU Memorandum of Understanding

NCHRP National Cooperative Highway Research Program

NIEM National Information Exchange Model

NPMRDS National Performance Management Research Data Set

QA Quality Assurance

QC Quality Control

RFP Request for Proposal

SAS Statistical Analysis Software

VMT Vehicle Miles Traveled

U.S. Department of Transportation Federal Highway Administration Office of Operations 1200 New Jersey Avenue, SE Washington, D.C. 20590

Office of Operations Web Site <a href="https://ops.fhwa.dot.gov">https://ops.fhwa.dot.gov</a>

November 2017

FHWA-HOP-18-012



U.S. Department of Transportation

Federal Highway Administration