UNITED STATES
DEPARTMENT OF TRANSPORTATION

Real-Time Data Capture and Management (DCM) Program

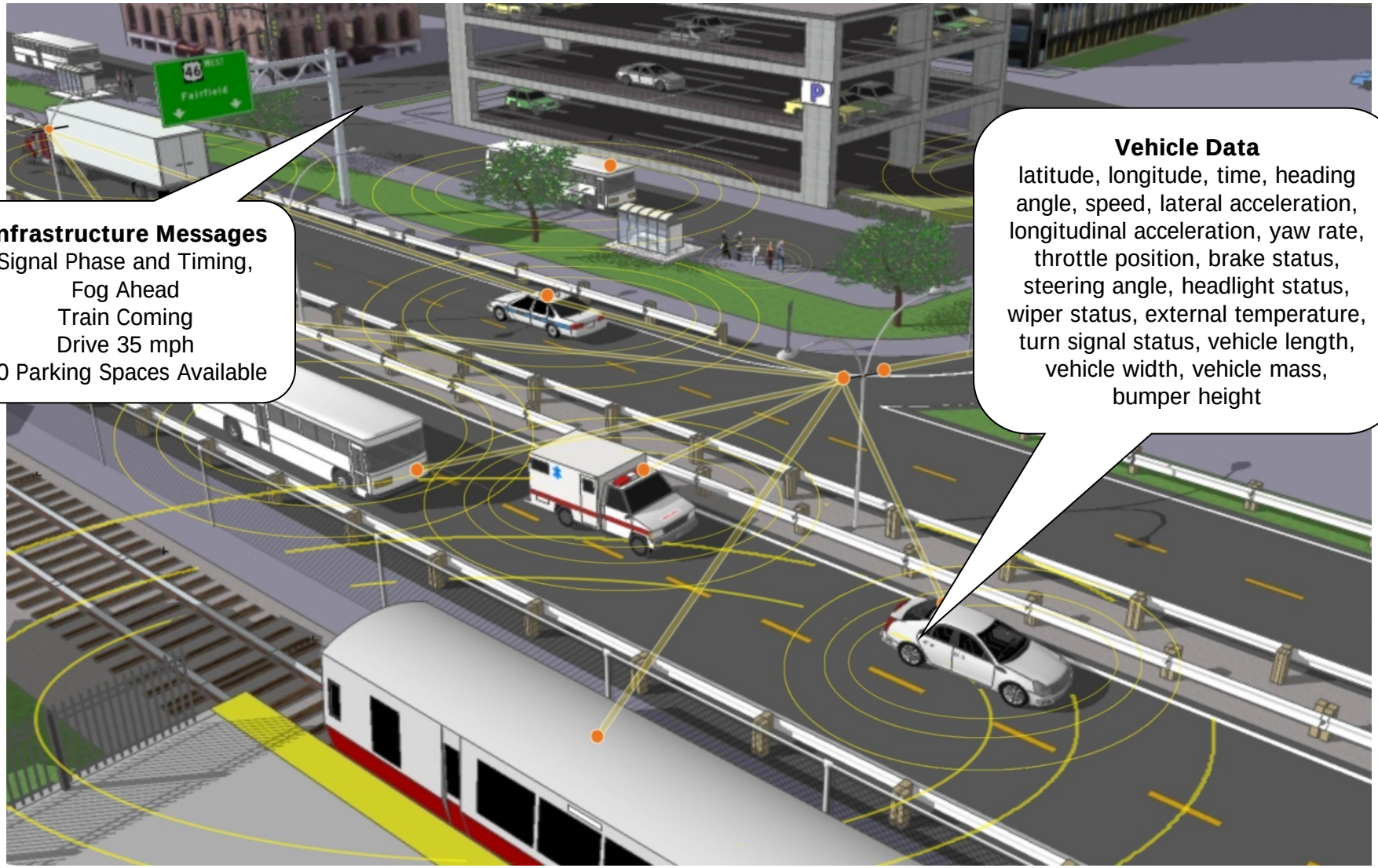
Update on Program Status

Dale Thompson

Winter Webinar Series

February 27, 2013

Fully Connected Vehicle



Infrastructure Messages
Signal Phase and Timing,
Fog Ahead
Train Coming
Drive 35 mph
50 Parking Spaces Available

Vehicle Data
latitude, longitude, time, heading angle, speed, lateral acceleration, longitudinal acceleration, yaw rate, throttle position, brake status, steering angle, headlight status, wiper status, external temperature, turn signal status, vehicle length, vehicle width, vehicle mass, bumper height

ITS Research Program Components

Applications

Safety			Mobility		Environment	
V2V	V2I	Safety Pilot	Real Time Data Capture & Management	Dynamic Mobility Applications	AERIS	Road Weather Applications

Technology

- Harmonization of International Standards & Architecture
- Human Factors
- Systems Engineering
- Certification
- Test Environments

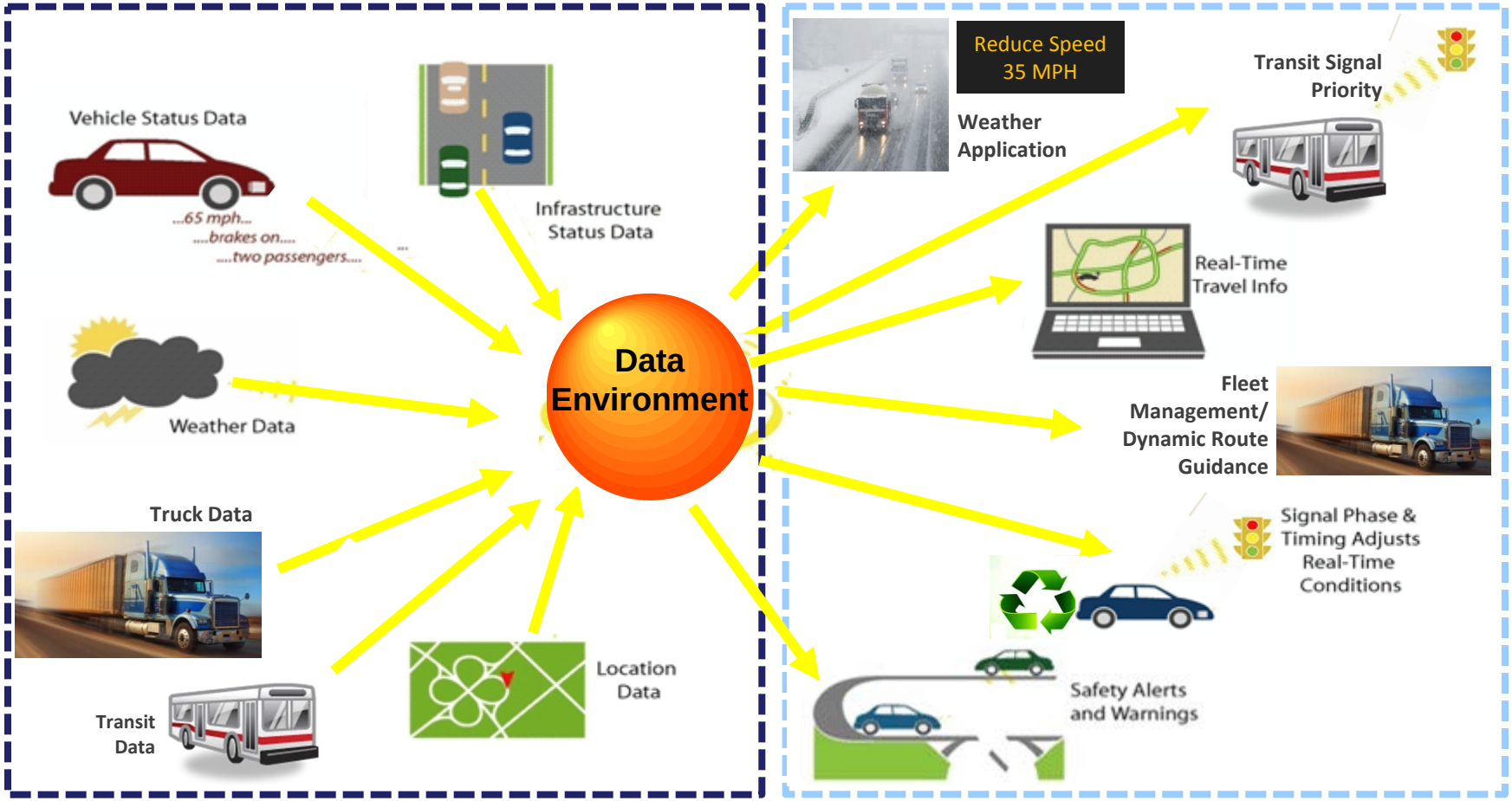
Policy

- Deployment Scenarios
- Financing & Investment Models
- Operations & Governance
- Institutional Issues

Mobility Program

Real-time Data Capture and Management

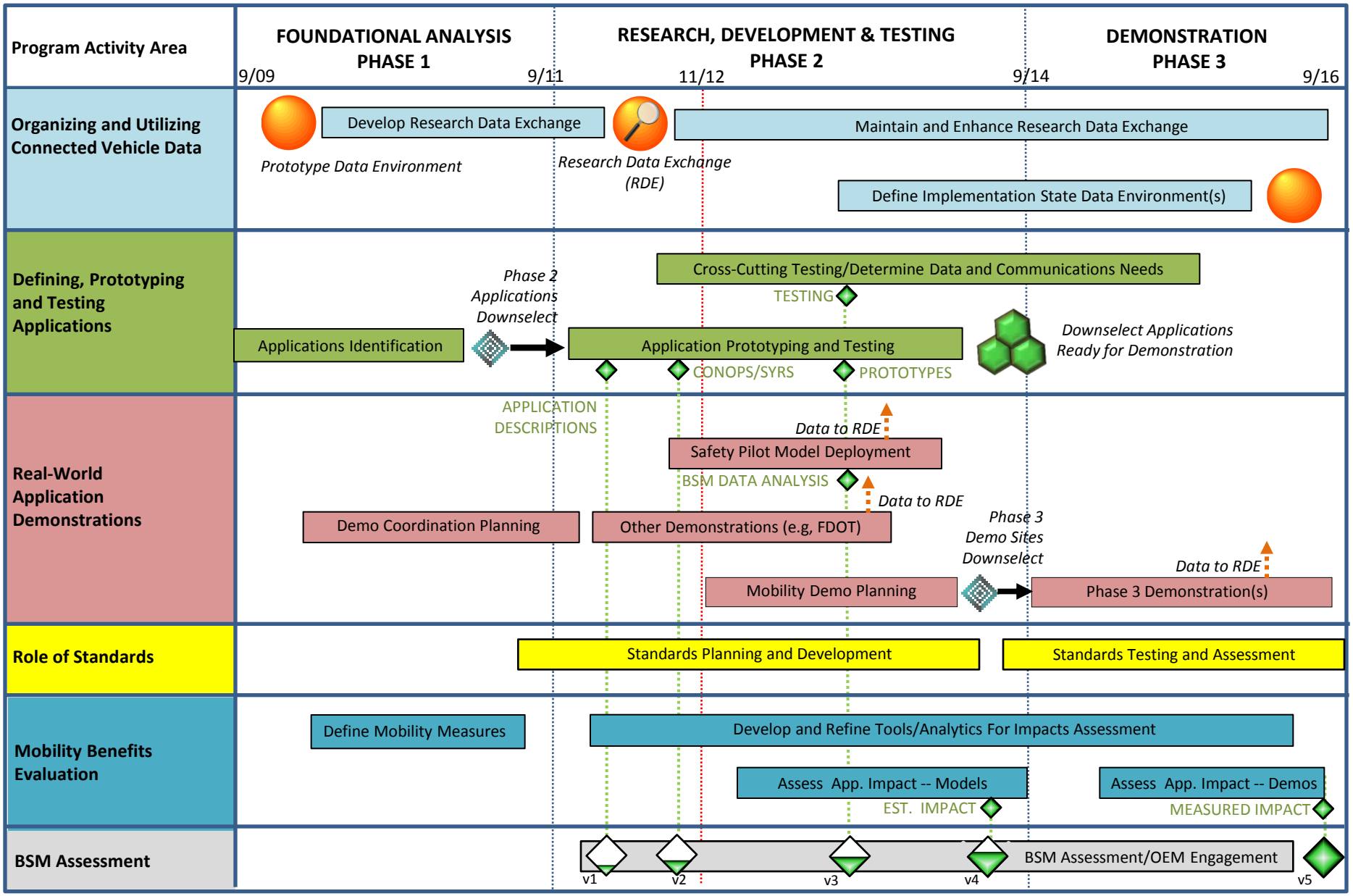
Dynamic Mobility Applications



Key Research Questions for the Mobility Program

- What are the benefits of applications enabled by connected vehicle and connected traveler data?
- What testing is required to prepare applications for eventual demonstration and deployment?
- What are the cross-cutting data and communication needs among DMA bundles?
- What is the role of Basic Safety Message (BSM)?
- How do we successfully implement Open Data and Open Source concepts within the program?

Data Capture and Management and Dynamic Mobility Applications Programs: Integrated Roadmap



DCM/DMA Integrated Roadmap v1.1 (11/26/2012)

Real-Time Data Capture and Management (DCM) Program

Background

Data Capture and Management Program (DCM): Vision and Program Objectives

Vision

- Active acquisition and systematic provision of integrated, multi-source data to enhance current operational practices and transform future surface transportation systems management

Objectives

- Enable systematic data capture from connected vehicles (automobiles, transit, trucks), mobile devices, and infrastructure
- Develop data environments that enable integration of data from multiple sources for use in transportation management and performance measurement
- Reduce costs of data management and eliminate technical and institutional barriers to the capture, management, and sharing of data
- Determine required infrastructure for transformative applications implementation, along with associated costs and benefits

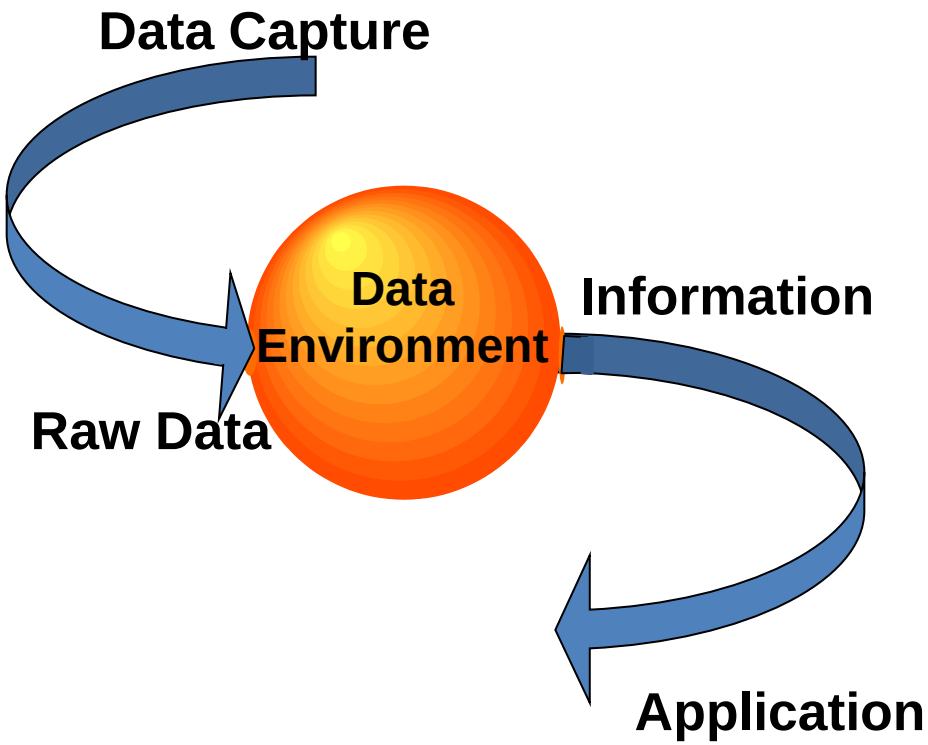
Program Partners

- ITS JPO, FTA, FHWA R&D, FHWA Office of Operations
  BTS, FMCSA

Data Environments

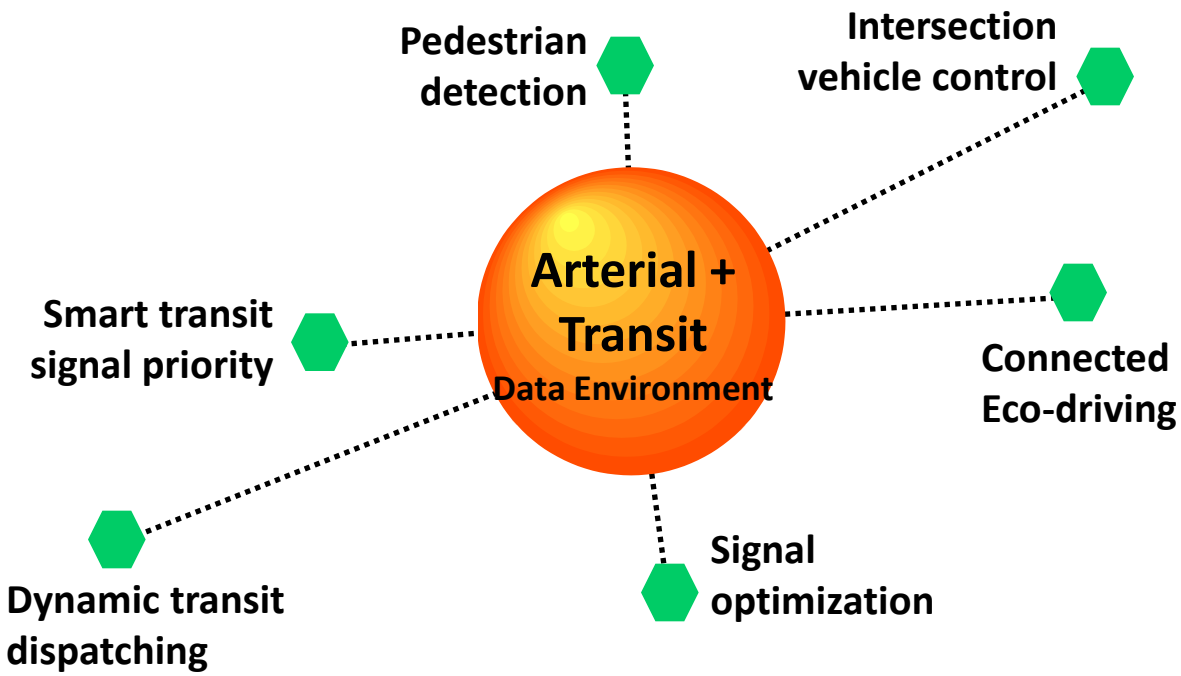
Data environment:

- well-organized collection of data of specific type and quality
- captured and stored at regular intervals from one or more sources
- systematically shared in support of one or more applications



Each Data Environment Supports Multiple Apps

Overlapping data needs and synergy between application concepts



Real-Time Data Capture and Management Program

Progress To Date Against Program Objectives

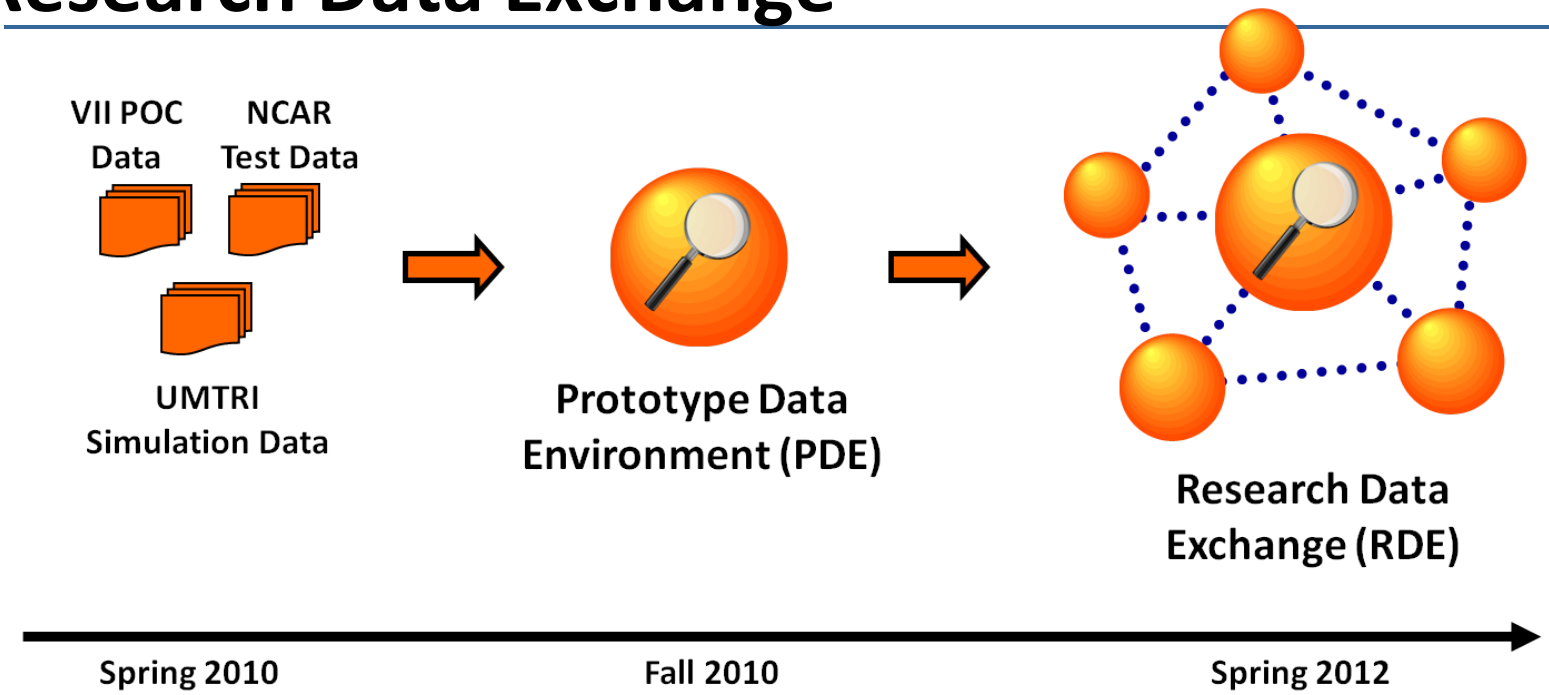
DCM Program Progress Against Objectives: Enable Systematic, Multi-Source Data Capture

- **OBJECTIVE**: Enable systematic data capture from connected vehicles (automobiles, transit, trucks), mobile devices, and infrastructure

- **PROGRESS TO DATE**: *Significant Progress in Data Management*
  - Completed exploration in nature of data management most likely to support application research and development
  - Original notion of a static database of well-organized research data replaced by a cloud-based Research Data Exchange (RDE) concept supporting real-time feeds and facilitating stakeholder interaction
  - Joint DCM+DMA effort has described the landscape of relevant standards and established a set of next steps in standards development

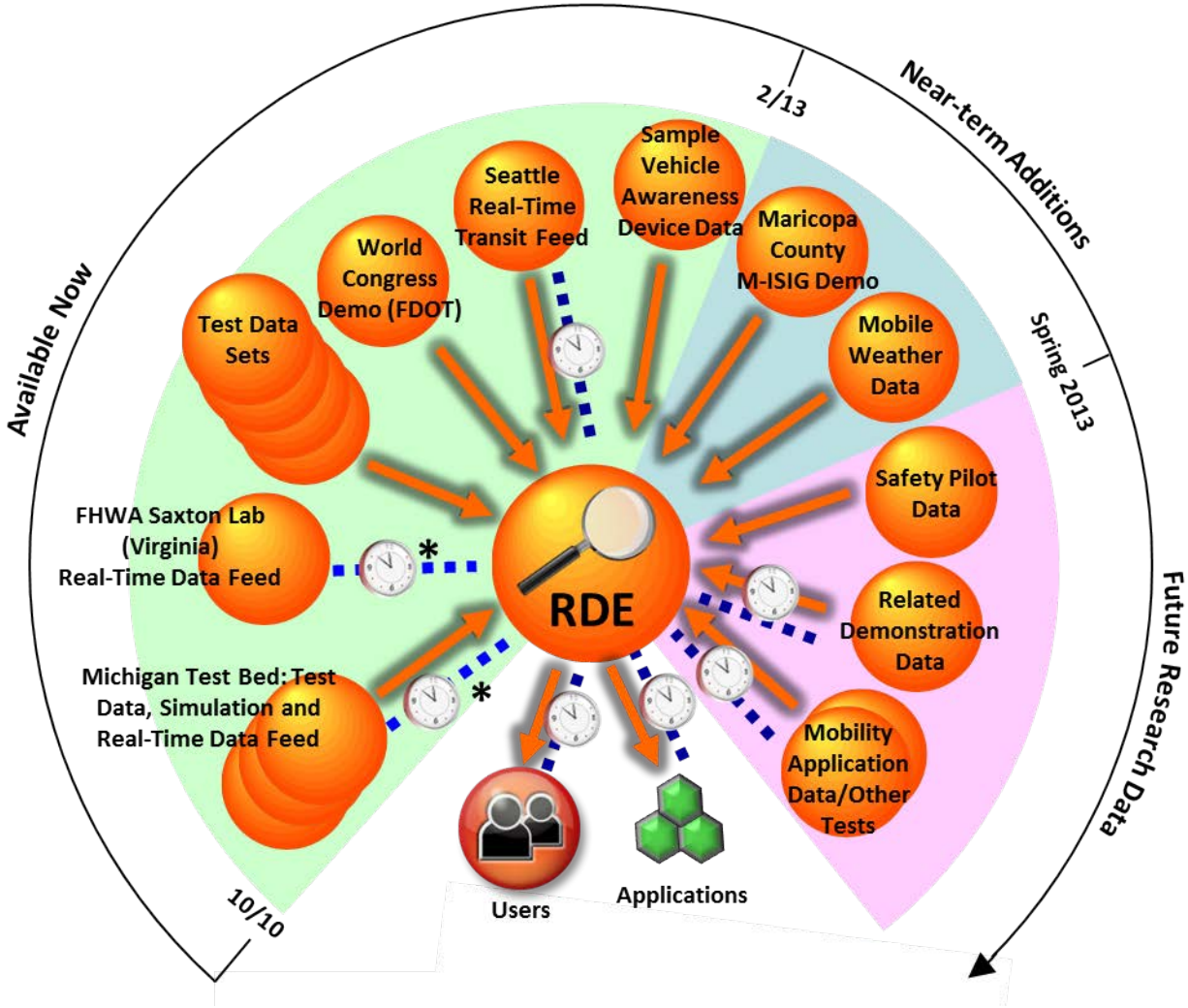
- **WHAT'S STILL NEEDED**: *Characterization of Data Capture Alternatives*
  - Coordinated field tests and simulation analysis characterizing alternative capture protocols and communications technologies
    - Basic Safety Message (BSM) and Basic Mobility Message (BMM)
    - Dedicated Short-Range Communications (DSRC) and Cellular

Evolution from Independent Data Sets to Research Data Exchange



- The Research Data Exchange (RDE) is the connected system of data environments supporting application research and development
- The RDE is *not* a single, centralized repository
  - but rather a *system of systems* linking multiple data management systems
  - some of which will be maintained and controlled outside of the USDOT, through a common web-based Data Portal
- Some data will be archived at USDOT within the RDE, other data will be archived outside of USDOT and federated with the RDE

RDE Release 1: Current and Near-Term Contents



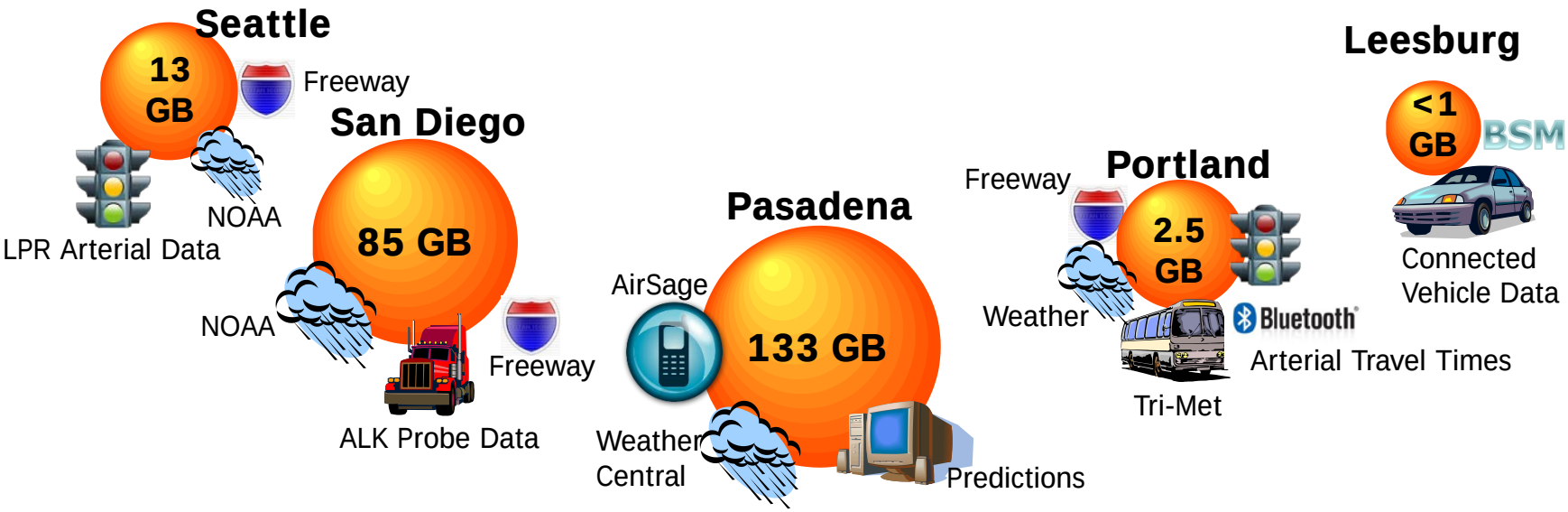
Data environment

Portal

Real-time data

* Currently unavailable due to architecture reengineering

Potential Research Supported by Near-Term RDE Data Sets



- What are the key differences between current probe data and BSM connected vehicle probe data?
- How can probe data be used in conjunction with other forms of data to enable new transformative applications?
- Can multi-modal data be fused and utilized for traveler information and systems management?

RDE Release 1 Demonstration

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RESEARCH DATA EXCHANGE

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Latest RDE News

The Research Data Exchange (RDE) Release 1 is now available! Transportation data from a variety of sources is available for download from the RDE website. The data sets include data from recently completed research projects and demonstrations and from operational implementations. Researchers, application developers, and others are invited to use the RDE in support of their endeavors.

New data sets will be added to the RDE in the future in support of ongoing Intelligent Transportation Systems (ITS) research. We look forward to your feedback on RDE Release 1.

USER LOGIN

Username

Password

LOGIN RESET

Create New Account
Forgot password

WELCOME TO THE RESEARCH DATA EXCHANGE

The Research Data Exchange (RDE) is developed as a transportation data sharing system that promotes sharing of both archived and real-time data from multiple sources (including vehicle probes) and multiple modes. This new data sharing capability will better support the needs of ITS researchers and developers while reducing costs and encouraging innovation.

The primary purpose of the DCM (Data Capture and Management) Research Data Exchange is to provide a variety of data-related services that support the development, testing, and demonstration of multi-modal transportation mobility applications being pursued under the USDOT ITS Dynamic Mobility Applications (DMA) Program and other connected vehicle research activities. Data accessible through the Research Data Exchange will be well-documented and freely available to the public. The vision of the DCM Program is to enhance current operational practices and transform future transportation systems management through the active acquisition and systematic provision of integrated data from infrastructure, vehicles, and travelers. This data is available to researchers, application developers, and others.

Basic information, including the list of data environments, is available to all site visitors. Registered users

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RDE Explore Data Environments - Windows Internet Explorer

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EXPLORE DATA

Data Environments

All

Data Sets

Please select a DE first

Data Environments

9 items found, displaying all items.

Title	Start Date	End Date	Description	Data Sets	Total Size
FDOT Orlando ITS World Congress	2010-09-01	2010-10-22	The Florida Department of Transportation (FDOT) data environment contains data recorded by Vehicle Awareness Devices (VADs) on Lynx transit buses in Orlando FL. The VADs started operation in September 2011 and continued operation during the ITS World Congress in October 2011. The contents of the recorded data include the required components of the J2735 Basic Safety Message (BSM).	2	974.0 MB
Leesburg VA Vehicle Awareness Device	2012-10-18	2012-12-19	The files in this data environment were produced by the Vehicle Awareness Device (VAD) installed on one test vehicle over a two month period. Activities included numerous repetitive trips in and around Leesburg VA and one long road trip from Ann Arbor, MI to Leesburg, VA by way of eastern Indiana. The VAD installed in the test car is identical to the VADs installed in over 2800 vehicles participating in the Safety Pilot Model Demonstration in Ann Arbor, MI.	3	534.0 MB
NCAR 2009	2009-04-06	2009-04-22	See the Vehicle Infrastructure Initiative Proof of Concept data environment for a description of the Michigan Test Bed and the data collected there in 2008. In April 2009 a second set of trials was conducted at the Michigan Test Bed, directed by the National Center for Atmospheric Research (NCAR). These trials used a smaller set of vehicles, and concentrated on collecting data during periods of rainy or snowy weather. RSE data for the the NCAR 2009 tests were available for nine days in April 2009. The data in this data environment consists of RSE and OBE data for the six days with the most good data.	8	825.8 MB
NCAR 2010	2010-01-28	2010-03-29	See the Vehicle Infrastructure Initiative Proof of Concept data environment for a description of the Michigan Test Bed and the data collected there in 2008. In late January through early April 2010 a third set of trials was conducted at the Michigan Test Bed, again directed by the National Center for Atmospheric Research (NCAR). These trials used a small set of vehicles, similar to the trials in 2009, and concentrated on comparing atmospheric data from vehicle-mounted sensors to data from a nearby fixed weather observing station. The 2010 data selected for inclusion in this data environment consists of RSE and OBE data for the six days with the most good data.	8	465.8 MB
Pasadena	2011-09-01	2011-10-31	The Pasadena data environment covers the diverse roadway network in and around the City of Pasadena, California. The data was collected in 2011 during the months of September and October. The data environment includes a variety of data sets including network data (highway network file), demand data (trip tables), network performance data (link volumes, turn volumes, speeds and capacity), work zone data, weather data, Closed Circuit Television (CCTV) camera data, and Changeable Message Sign (CMS) data. Data from simulations are included where there are no sensors, and to provide forecasts.	37	347.9 GB
			The Portland data environment provides the following data: (a) Freeway data consisting of two months of data from dual-loop detectors deployed in the main line and on-ramps of a Portland-area freeway (I-205), (b) Incident data from the Oregon Department of Transportation Advanced Traffic Management System database and planned event data from the ODOT Trip-Check Traveler Information Portal information web		

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RDE Search Data Sets

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SEARCH DATA

Start Date:

End Date:

Please Select Tags:

- Data Type
  - Incidents
  - Lane closures
  - Location metadata
  - Loop data
  - Occupancy
  - Onboard Equipment (OBE)
  - Roadside Equipment (RSE)
  - Signal
  - Simulation
  - Speed
  - Transit
  - Travel time
  - Vehicle location
  - Volume
  - Weather
- Facility
- Frequency
- Location

Search Clear

Tag Usage Mode:
OR OR_AND AND

Search Data >> Search Results

Search Parameters

Start Date: N/A :: **End Date:** N/A

Tags: N/A
[Explore tags]

Tag Search Logic: No tags are currently selected; tag search logic cannot be constructed for your view.

Tag Usage Mode: OR (What's this?)

Data Sets

10 items per page

108 items found, displaying 1 to 10. [First/Prev] 1, 2, 3, 4, 5, 6, 7, 8 [Next / Last]

Title	Data Environment	Start Date	End Date	Description	Data Files	File Size	Total File Downloads	Number of Comments	Research Projects	Link to Research Project
01 Network Definition	Pasadena	2011-09-01	2011-10-31	The 01Network data set includes the Pasadena Highway Network file and Highway detector location file in ArcGIS format. The Highway Network is based on a NAVTEQ Q4/2010 sourced network for the City of Pasadena, California.	1	18.8 MB	0	0	0	Please select a project
02 Census Block Groups	Pasadena	2011-09-01	2011-10-31	The 02CensusBlockGroups data set includes the Census Block Group shape file. The Mygistics real-time model classifies the traffic analysis zones (TAZ) into two groups: internal ones and external ones. The internal TAZ location and boundary are directly imported from the Census Block Group 2010 data; the external TAZ are aggregates from block groups at the model area cordons.	1	17.2 MB	0	0	0	Please select a project
03 Mobile Sightings	Pasadena	2011-09-01	2011-10-31	The 03MobileSightings data set includes two hour sample raw mobile sightings data. Mobile sightings data logs the interaction of AirSage mobile device with the wireless network, and is the basis for generating vehicle origination/destination matrices. Each time a mobile device interacts with the network,	0	0.0 Bytes	0	0	0	Please select a project

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EXPLORE DATA

Data Environments

Leesburg VA Vehicle Awaren

Data Sets

All

Data Environments >> Leesburg VA Vehicle Awareness Device

Leesburg VA Vehicle Awareness Device

Description: The files in this data environment were produced by the Vehicle Awareness Device (VAD) installed on one test vehicle over a two month period. Activities included numerous repetitive trips in and around Leesburg VA and one long road trip from Ann Arbor, MI to Leesburg, VA by way of eastern Indiana. The VAD installed in the test car is identical to the VADs installed in over 2800 vehicles participating in the Safety Pilot Model Demonstration in Ann Arbor, MI.

Start Date: 2012-10-18 **End Date:** 2012-12-19

Total data sets: 3

Jump to metadata files

Data Sets

3 items found, displaying all items.

Title	Start Date	End Date	Description	Data Files	Total Size	Total File Downloads	Number Comments	Research Projects	Link to Research Project
Leesburg VAD data in pcap format	2012-10-18	2012-12-19	These data files come from a VAD installed in one test vehicle driven in the Leesburg VA area during the period from October 18 through December 19 2012. The file names denote the year, date, and start time of the data collection. The data files are in pcap (compressed binary) format.	144	294.0 MB	0	0	0	Please select a Project
Sample formats for VAD Data	2012-10-22	2012-10-22	These data files come from a VAD installed in one test vehicle driven in the Leesburg VA area during one trip on October 22, 2012. The original pcap format is included, as well as seven different ways the data could be presented.	7	11.8 MB	0	0	0	Please select a Project
VAD data in csv format	2012-10-18	2012-12-19	These data files come from a VAD installed in one test vehicle driven in the Leesburg VA area during the period from October 18 through December 19 2012. The file names denote the year, date, and start time of the data collection. The data have been converted from pcap (compressed binary) format to a csv (comma separated value) format.	144	228.3 MB	0	0	1	Please select a Project

3 items found, displaying all items.

Data Environment Meta Files

2 items found, displaying all items.

Title	File Type	Total Size	Download Count	Data Environment
Leesburg VAD Metadata documentation	doc	246.0 KB	[illegible]	Leesburg VA Vehicle Awareness Device

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EXPLORE DATA

Data Environments

Leesburg VA Vehicle Awaren

Data Sets

Sample formats for VAD Data

Data Environments >> Leesburg VA Vehicle Awareness Device

Sample formats for VAD Data

Description: These data files come from a VAD installed in one test vehicle driven in the Leesburg VA area during one trip on October 22, 2012. The original pcap format is included, as well as seven different ways the data could be presented.

Start Date: 2012-10-22 **End Date:** 2012-10-22

Total data files: 7

Tags for this data set:

All roads | Arterial | Freeway | Leesburg | Less than 1 min. | Onboard Equipment (OBE) | Vehicle location

View metadata files | Leave a comment

Data Files

8 items found, displaying all items.

Title	File Type	Total Size	Data Set	Download Count
green dot tx_ota 2012102222334 truncated	kml	14.0 KB	Sample formats for VAD Data	11
tx_ota basic 802 frames truncated	txt	326.5 KB	Sample formats for VAD Data	8
tx_ota truncated	csv	231.5 KB	Sample formats for VAD Data	8
tx_ota truncated	pcap	353.1 KB	Sample formats for VAD Data	5
tx_ota wireshark c file truncated	c	946.4 KB	Sample formats for VAD Data	5
tx_ota wireshark complete truncated	xml	1.9 MB	Sample formats for VAD Data	6
tx_ota wireshark hex ascii truncated	txt	900.6 KB	Sample formats for VAD Data	5
tx_ota wireshark verbose truncated	txt	439.6 KB	Sample formats for VAD Data	6

8 items found, displaying all items.

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tx_ota truncated - Notepad

File Edit Format View Help


```
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wlan.fc.frag,wlan.fc.retry,wlan.fc.pwrmgt,wlan.fc.moredata,wlan.fc.protected,wlan.fc.order,wlan.duration,wlan.da,wlan.sa,wlan.bssid,wlan.frag,wlan.seq,tex
t,wlan.qos.tid,wlan.qos.priority,wlan.qos.bit4,wlan.qos.ack,wlan.qos.amsdupresent,wlan.qos.txop_dur_req,llc,llc.dsap,llc.dsap.ig,llc.ssap,llc.ssap.cr,llc.
control,llc.control.u_modifier_cmd,llc.control.ftype,llc.oui,llc.type,wsmpv2,wsmpv2.version,wsmpv2.psid,text,wsmpv2.exten.power_id,wsmpv2.exten.power_len,
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way.lon,j2735.accelSet4way.lat,j2735.accelSet4way.vert,j2735.accelSet4way.yaw,j2735.brakeSystemStatus,j2735.size,j2735.width,j2735.length,j2735.safetyExt,
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Data, Flags:
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13,42,-76,0,1,176,488,1,1,1,1,2012,10,22,22,34,14100,-775669697,391086253,1,3,00:20:3f:eb:e0:00:00:28,1,1,0,1,0,0,0,0,4
"Frame 2: 272 bytes on wire (2176 bits), 272 bytes captured (2176
bits)",20,34:14.2,0,1350945254,0.058463,0.058463,0.058463,2,272,272,0,0,wlan:llc:wsmpv2:bsm,"IEEE 802.11 QoS Data, Flags:
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172),2,32,,4,1,21,,16,,6,,15,1,172,0x81,224,,1,,2,1,2,,0x02,0,1,0,,0,32,134,0x0000fcdde897d974,,,QoS Control,bsm,1,2,1,2,0x913b1a2a,0x1a2a,,1,391085994,-
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0,0x03,0x000000,0x88dc,WSMP IEEE 1609.3r2010 PSID: (32) (TX Power: 21) (Data Rate: 6 Mb/s) (Channel:
172),2,32,,4,1,21,,16,,6,,15,1,172,0x81,225,,1,,2,1,2,,0x02,0,1,0,,0,32,135,0x0000fcdde8995fa7,,,QoS Control,bsm,1,2,1,3,0x913b1a2a,0x1a2a,,1,391086032,-
775669133,691,4294967295,57734,23753,0x7f,ff:ef:ff:f1:28:ff:9b,-17,-15,40,-101,0,1,176,488,1,1,1,1,2012,10,22,22,34,14300,-
775669858,391086317,1,3,00:30:3f:e1:d0:01:00:3c,1,1,0,1,0,0,0,0,4
"Frame 4: 273 bytes on wire (2184 bits), 273 bytes captured (2184
bits)",20,34:14.4,0,1350945254,0.099734,0.099734,0.258146,4,273,273,0,0,wlan:llc:wsmpv2:bsm,"IEEE 802.11 QoS Data, Flags:
.......",0x28,0x0088,0,2,8,0x00,0x00,0,0,0,0,0,0,0,ff:ff:ff:ff:ff:ff,5a:9e:01:20:82:12,ff:ff:ff:ff:ff:ff,0,0,,0,0,0,0x00,0,0,llc,0xaa,0,0xaa,0,0x0003,0x0
0,0x03,0x000000,0x88dc,WSMP IEEE 1609.3r2010 PSID: (32) (TX Power: 21) (Data Rate: 6 Mb/s) (Channel:
172),2,32,,4,1,21,,16,,6,,15,1,172,0x81,225,,1,,2,1,2,,0x02,0,1,0,,0,32,135,0x0000fcdde89ae65e,,,QoS Control,bsm,1,2,1,4,0x913b1a2a,0x1a2a,,1,391086064,-
775669213,691,4294967295,57734,23753,0x7f,ff:ef:ff:f1:28:ff:9b,-17,-15,40,-101,0,1,176,488,1,1,1,1,2012,10,22,22,34,14400,-
775669858,391086317,1,3,00:30:3f:e1:d0:01:00:3c,1,1,0,1,0,0,0,0,4
"Frame 5: 344 bytes on wire (2752 bits), 344 bytes captured (2752
bits)",20,34:14.5,0,1350945255,0.100655,0.100655,0.358801,5,344,344,0,0,wlan:llc:wsmpv2:bsm,"IEEE 802.11 QoS Data, Flags:
.......",0x28,0x0088,0,2,8,0x00,0x00,0,0,0,0,0,0,0,ff:ff:ff:ff:ff:ff,5a:9e:01:20:82:12,ff:ff:ff:ff:ff:ff,0,0,,0,0,0,0x00,0,0,llc,0xaa,0,0xaa,0,0x0003,0x0
0,0x03,0x000000,0x88dc,WSMP IEEE 1609.3r2010 PSID: (32) (TX Power: 21) (Data Rate: 6 Mb/s) (Channel:
172),2,32,,4,1,21,,16,,6,,15,1,172,0x81,296,,1,,2,1,3,03:00:03:45:d6:8d:5f:3f:84:8e:9b:01:12:00:00:02:94:00:00:01:0e:20:bb:6d:00:df:29:2a:60:c2:18:01:02:2
0:00:04:10:92:67:10:01:4a:00:00:00:01:02:9b:6a:91:56:64:68:19:46:52:38:2c:4f:9c:fd:05:06:24:6f:9e:e8:ed:99:a5:95:68:63:61:e7:9f:5a:c1:8a,0x02,0,1,0,,0,32,
135,0x0000fcdde89c6d20,,,QoS Control,bsm,1,2,1,5,0x913b1a2a,0x1a2a,,1,391086097,-775669294,692,4294967295,57732,23726,0x7f,ff:e4:ff:ef:27:ff:91,-28,-
17,39,-111,0,1,176,488,1,1,1,1,2012,10,22,22,34,14500,-775670018,391086377,1,3,00:3f:3f:d7:d0:02:00:50,1,1,0,1,0,0,0,0,4
"Frame 6: 273 bytes on wire (2184 bits), 273 bytes captured (2184
bits)",20,34:14.6,0,1350945255,0.100033,0.100033,0.458834,6,273,273,0,0,wlan:llc:wsmpv2:bsm,"IEEE 802.11 QoS Data, Flags:
```

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Leesburg Metadata documentation [Read-Only] [Compatibility Mode] - Microsoft Word

Vehicle Awareness Device Data from Leesburg, Virginia

Identification Information

Citation

Citation Information

Originator: USDOT Research and Innovative Technology Administration (RITA)
Publication Date: 20130131
Title: Leesburg Vehicle Awareness Device Data
Edition: Version 1
Geospatial Data Presentation Form: Latitude and longitude
Publication Information
Publication Place: Washington, D.C.
Publisher: U.S. Department of Transportation's (USDOT) Intelligent Transportation Systems (ITS) Joint Program Office (JPO)
Online Linkage: https://www.its-rde.net/

Description

Abstract The files in this data environment were produced using the Vehicle Awareness Device (VAD) installed on one test vehicle over a two month period. The VAD installed in the test car is identical to the VADs installed in over 2800 vehicles participating in the Safety Pilot Model Demonstration conducted from August 2012 through August 2013 by the National Highway Traffic Safety Administration (NHTSA) in Ann Arbor, Michigan.

Activities included numerous repetitive trips by one individual in and around Leesburg, Virginia and one long road trip from Ann Arbor, Michigan to Leesburg, Virginia by way of eastern Indiana. No Personally Identifiable Information (PII) is included in the files. Data records for trip beginnings and endings were deleted to prevent possible determination of PII by analysis of these data files

Page: 1 of 22 | Words: 7,411

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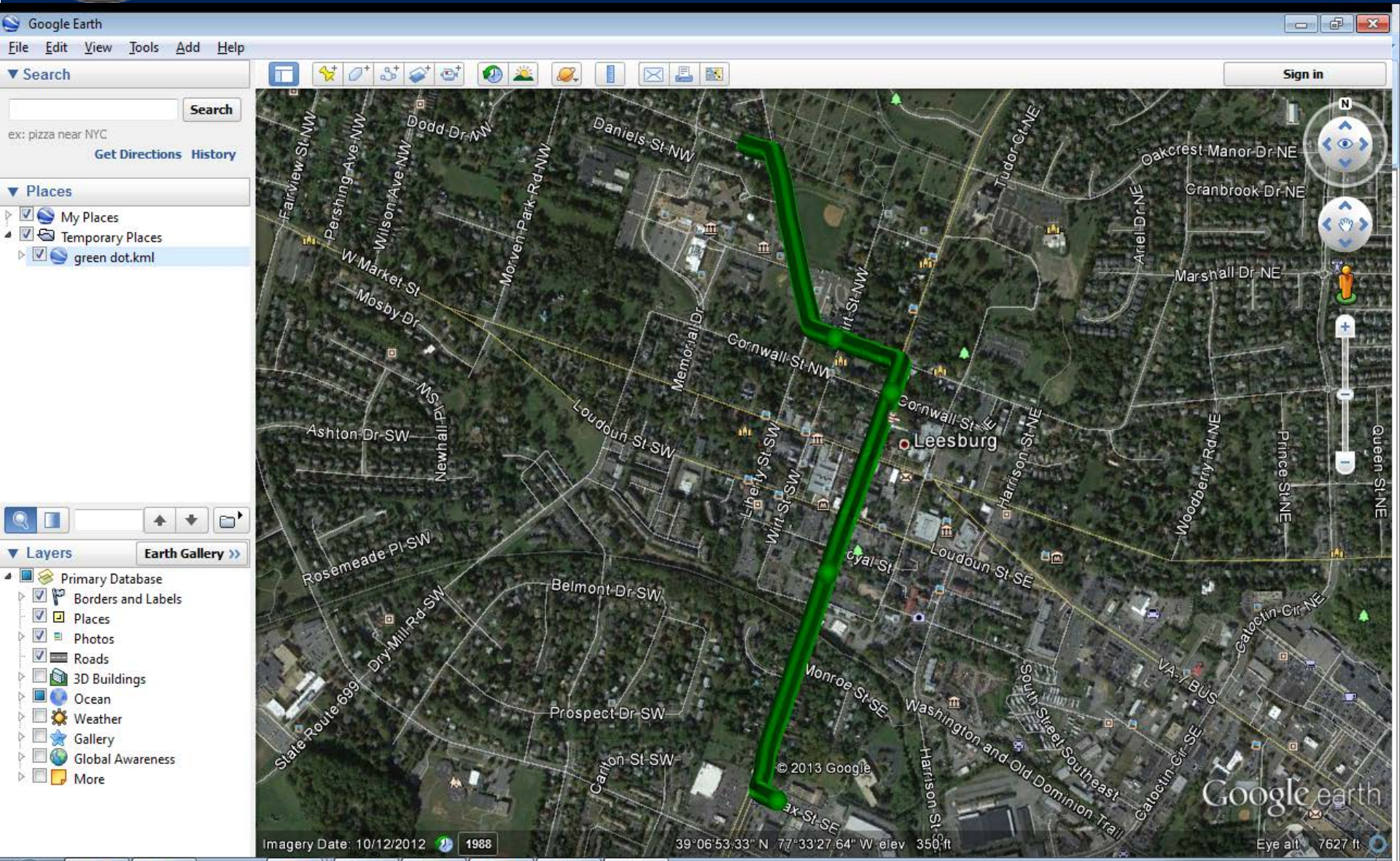

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RDE Data Files

Page | Safety | Tools

RESEARCH DATA EXCHANGE

Home | Data | About | gmchale

Back to list of research projects | Edit this research project

View Research Project

Project Owner:	Gene McHale
Research project name:	Sample Research Project
Research project description:	This is a sample research project. A research project on the RDE is a mechanism for researchers to share information on research they are conducting that is supported by data available on the RDE. This area would provide a description of the research project.
Research project RDE relevance:	This area would describe how the research project is using the RDE. Once a researcher creates a research project on the RDE, he or she can associate individual RDE data sets with the research project.
Additional Resources:	This area would allow a researcher to include a URL link for further information on his or her research project or program.
Date Created:	2/12/13
Project Status:	PLANNED
Data Sources:	**Leesburg VA Vehicle Awareness Device** [x] VAD data in csv format

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RESEARCH DATA EXCHANGE

Home | Data | About | gmchale

Frequently Asked Questions

Research Data Exchange (RDE)

1. What is the Research Data Exchange?
2. What is the USDOT Data Capture and Management Program?
3. How do the different levels of data collections on the RDE relate to each other?

Data Arrangement

4. What is a Data Environment?
5. What is a Data Set?
6. What is a Data File?
7. What is a tag?

Registration

8. Why should I register?

Data Specific

9. Why can't I download data or access a research project?
10. What kind of documentation is provided on data available in the RDE?
11. What is the difference between "Explore Data" and "Search Data" on the Data pull-down menu?
12. What can I do if I see mistakes in a data file?
13. How can I comment on data sets?
14. What do I do if I have data that I want to offer to the RDE?

Research Topics

15. What is a research project?
16. How do I register my research project?
17. How should I reference data obtained from the RDE in my research work?
18. Where can I find out more about Connected Vehicle research?

1. **What is the Research Data Exchange?**
The Research Data Exchange is a core element of the USDOT's Data Capture and Management Program. The Research Data Exchange is intended to support research, analysis, application development, and testing. As a research tool, it does not directly support operations of traffic management or other operational systems. However the concepts and lessons learned from the project will be useful in developing operational systems exploiting concepts of mobile communications and connected vehicles.

2. **What is the USDOT Data Capture and Management Program?**
The USDOT Data Capture and Management Program is part of a broader research program on connected vehicle technologies. The vision of this broader program is to expedite development and deployment of wireless technologies in vehicles, infrastructure, and mobile devices to improve safety, mobility, and environmental impacts of our surface transportation system. One role of the Data Capture and Management Program is to make research data accessible to the broad transportation community to facilitate application development and testing. The Research Data Exchange is the tool developed to access this research data.

3. **How do the different levels of data collections on the RDE relate to each other?**
Each major collection of related data from a single location and obtained under the same contract or agreement is called a data environment. Within each data environment are multiple data sets. Each data set contains a certain type of data, such as highway detector data or traffic signal timing data or weather data. Within each data set are one or more data files that contain data for a certain time period and/or local area. All files within a data set have the same data element contents and the same format. Individual data files may be downloaded by registered users. Documentation or metadata files may be found at the data environment or data set level.

4. **What is a Data Environment?**
A data environment is a logical collection or grouping of data sets which were obtained under the same contract or agreement. All the data environments on the RDE are described by metadata documents.

5. **What is a Data Set?**
A data set contains a certain type of data, such as highway detector data or traffic signal timing data or weather data. There are two data set types, archive and real-time. An archive data set contains at least one data file and might contain a metadata document describing the data set. No real-time data set is currently available from the RDE. Once the real-time data feed is available the RDE users will be able to use the sample RDE API application to stream the data into the desired destination.

https://www.its-rde.net/faq#varTypes

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RESEARCH DATA EXCHANGE

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Email: gene.mchale@dot.gov

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RDE Release 1 Data Environments

Title	Start	End	Data Sets	Total Size
FDOT Orlando ITS World Congress	9/1/2010	10/22/2010	2	974.0 MB
Leesburg VA Vehicle Awareness Device	10/18/2012	12/19/2012	3	534.0 MB
NCAR 2009	4/6/2009	4/22/2009	8	825.8 MB
NCAR 2010	1/28/2010	3/29/2010	8	465.8 MB
Pasadena	9/1/2011	10/31/2011	37	347.9 GB
Portland	9/15/2011	11/15/2011	15	987.9 MB
San Diego	1/1/2010	12/31/2010	14	24.1 GB
Seattle	5/1/2011	10/31/2011	12	23.9 GB
Vehicle Infrastructure Initiative Proof of Concept	8/21/2008	8/29/2008	9	1.1 GB

DCM Program Progress Against Objectives: Develop and Deploy Relevant Data Environments

- **OBJECTIVE**: Develop data environments that enable integration of data from multiple sources for use in transportation management and performance measurement

- **PROGRESS TO DATE**: *Eight Data Environments Deployed on the RDE*
  - The DCM program has demonstrated it is possible to assemble multiple integrated data environments to support research
  - Developed guidelines for consistent meta-data
  - Diverse data can be combined and organized in a logical way

- **WHAT'S STILL NEEDED**: *Explore Integrated Real-Time Data Environments*
  - Move beyond archival environments of pre-connected vehicle/traveler data
  - Create integrated data environments focused on competing alternative capture protocols and communications media to address key research questions
  - Support real-time data provisioning for application prototypes

U.S. Department of Transportation
Research Data Exchange

RDE Website: www.its-rde.net

DCM Program Progress Against Objectives: Eliminate Technical and Institutional Barriers

- **OBJECTIVE**: Reduce costs of data management and eliminate technical and institutional barriers to the capture, management, and sharing of data

- **PROGRESS TO DATE**: *Promising Innovations Identified*
  - Cloud-based data management structures and federated data are practical elements of the RDE implementation strategy
  - Crowdsourcing may be key in making broadly implementable data capture possible
  - Dynamic Interrogative Data Capture (DIDC) concept has potential to reduce data-to-information ratio by two orders of magnitude versus fixed element, fixed interval capture and communication protocols
  - Institutional issues surfaced but not resolved (e.g., governance, privacy, IP)

- **WHAT'S STILL NEEDED**: *Test Innovations and Address Institutional Barriers*
  - Systematic assessment of innovations (e.g., DIDC) and projected costs
  - Practical solutions to institutional barriers

DCM Program Progress Against Objectives: Determine Infrastructure, Costs, Benefits

- **OBJECTIVE**: Determine required infrastructure for transformative applications implementation, along with associated costs and benefits

- **PROGRESS TO DATE**: *Foundational Research Completed*
  - Completed research on data management practices and technologies
  - Joint DCM+DMA assessment of potential Basic Safety Message (BSM) role by application bundle completed
  - Mapped BSM data elements to anticipated mobility application needs

- **WHAT'S STILL NEEDED**: *Targeted Field Testing*
  - Cross-cutting research to assess alternatives focusing on regulatory BSM message via DSRC and other market-driven messages via wide-area communications (cellular)
  - Systematic evaluation of costs and benefits of alternative approaches
  - Assess private and public sector roles

What We've Learned Regarding Cross-Cutting Data and Communications Needs

DMAs: **INFLO – M-ISIG – R.E.S.C.U.M.E** **IDTO – EnableATIS -- FRATIS**

Data/Comm Needs:

TACTICAL	STRATEGIC
LOCAL	WIDE AREA
LOW LATENCY	HIGH LATENCY
FIXED CONTENT	DYNAMIC CONTENT
REGULATORY	MARKET-DRIVEN

- **BSM Part 1 Via DSRC Not Sufficient For All DMAs Data Needs**
  - Basic Safety Message (BSM) helpful for some tactical, low-latency DMAs
  - A wide-area message, e.g., the Basic Mobility Message (BMM), may be able to address other data needs, but has intrinsically different characteristics
- **BSM Messaging Can Be Regulated, but BMM Likely Market-Driven**
  - No regulatory authority at NHTSA beyond safety application needs
  - Business model must accompany a BMM (or surrogate) solution, multiple contenders
- **Need to Evaluate Alternative Message Protocols and Communications Media**
  - Are these alternatives better than a "do nothing" case?

Near-Term DCM Focus: Cross-Cutting Tests and Sharing Data

- **Initiate Cross-Cutting Tests**
  - Examine technical feasibility of messaging concepts, e.g., dual-mode devices
  - Characterize fundamental data and communications options
  - Engage private sector data and information providers as well as OEMs
- **Identify Practical Policy Solutions, Support NHTSA 2013 Decision**
  - Consider mechanisms to create or influence data-to-information market
  - Clarify public sector and private sector role in operational system
  - Provide input to NHTSA regarding BSM and mobility apps
- **Continue to Share Data Through the Research Data Exchange**
  - Allow users to create projects and collaborate
  - Create real-time feeds of connected vehicle/traveler data
  - Begin to integrate connected vehicle/traveler data with concurrent sensor data

Data Capture and Management: The Road to Deployment

- The Research Data Exchange supports research related to applications enabled by new forms of data

- The RDE does not *itself* represent a prototype operational data environment, however, research supported by the RDE
  - Identifies and characterizes the minimum data set and data characteristics required to realize each application
  - Reveals implications for related standards, IPR, data ownership, and privacy issues
  - Provides lessons learned in terms of balancing data federation and centralization for operational deployments

- Well-formed and described minimum data sets and characteristics can be used to guide the integration of applications into legacy data systems

- In Phase 3 our goal is to demonstrate how new forms of data from wirelessly connected vehicles and data can be incorporated into deployed systems supporting new applications

For more information …

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