UNITED STATES
DEPARTMENT OF TRANSPORTATION

Mobility Applications for Connected Vehicle Data: Policy Workshop

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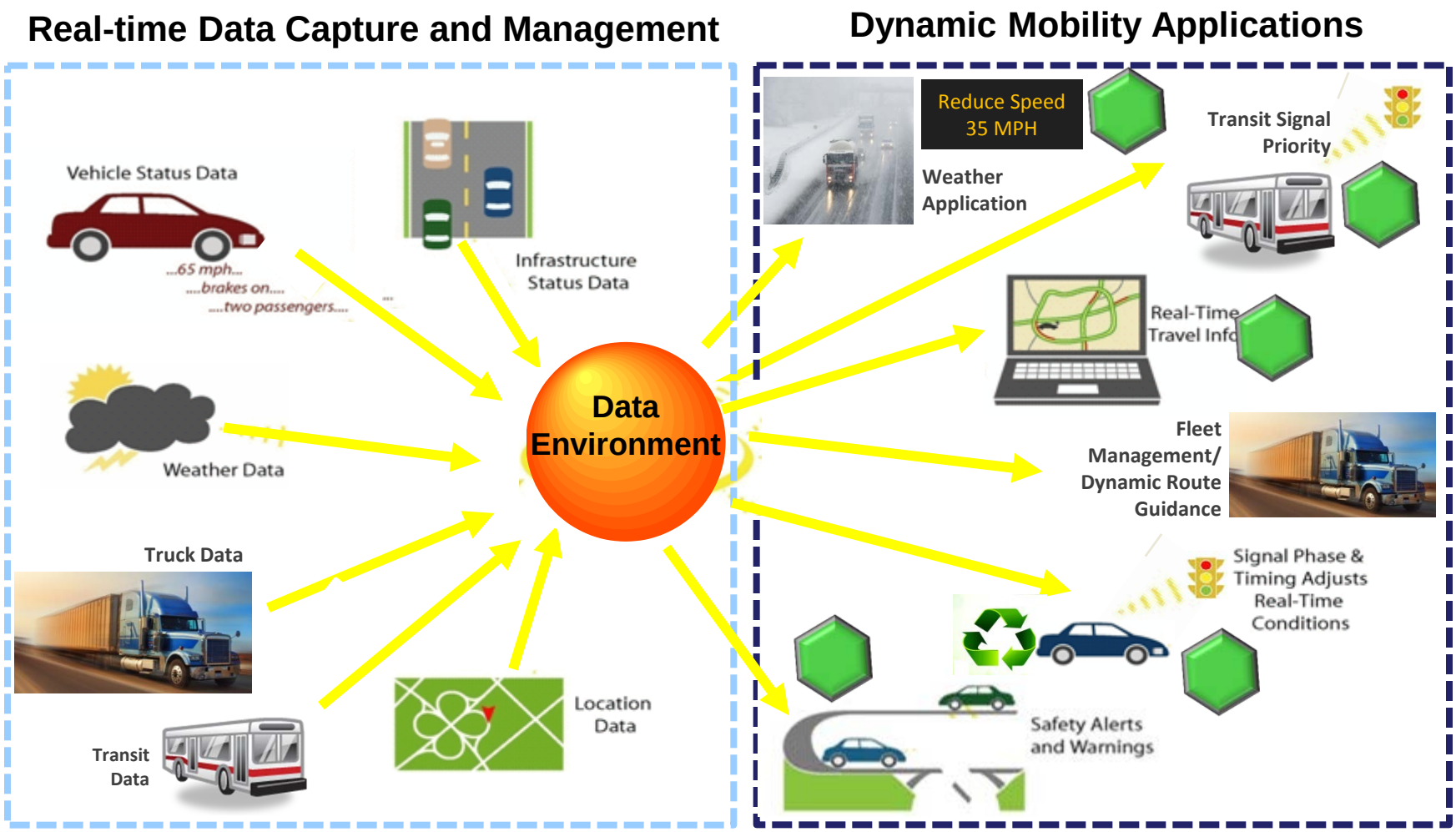
Overview

- Mobility Program and High-Priority Applications
- SAE J2735 Basic Safety Message (BSM) Fundamentals
- Current Mobility-Related BSM Assessment
- Next Steps in BSM Assessment

Mobility Program



High-Priority Dynamic Mobility Applications

"INFLO" Application Bundle

- Coordinated Adaptive Cruise Control
- Speed Harmonization
- Queue Warning

"M-ISIG" Application Bundle

- Intelligent Traffic Signal System
- Transit Signal Priority
- Mobile Accessible Pedestrian Signal System

"R.E.S.C.U.M.E" Application Bundle

- Emergency Communications and Evacuation
- Incident Scene Pre-Arrival Staging Guidance for Emergency Responders
- Incidents Scene Work Zone Alerts for Drivers and Workers

High-Priority Dynamic Mobility Applications (2 of 2)

"IDTO" Application Bundle

- Transit Connection Protection
- Dynamic Transit Operations
- Dynamic Ridesharing

"FRATIS" Application Bundle

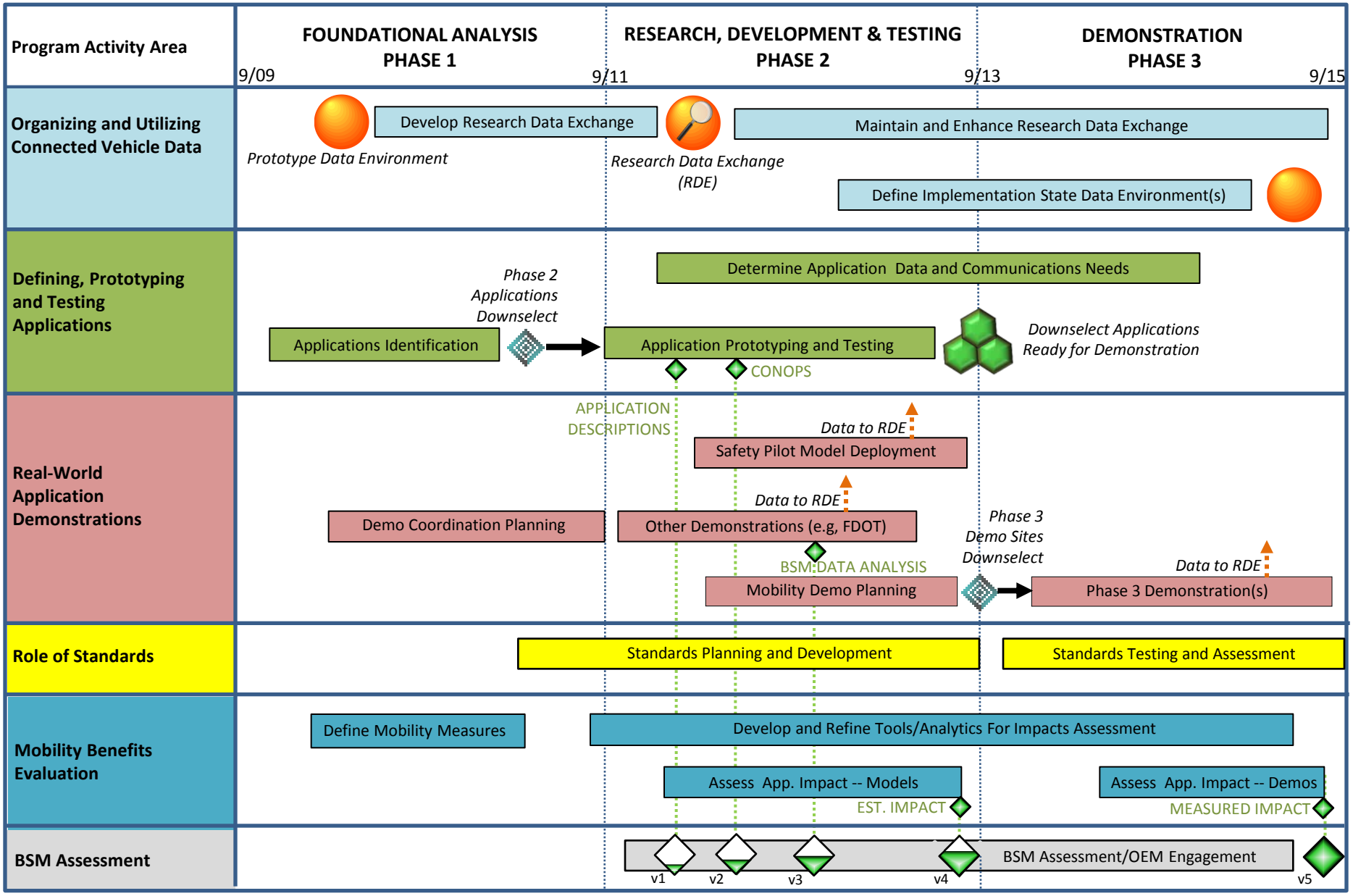
- Freight Traveler Information

"EnableATIS" Application Bundle

- Traveler Information

- Next Generation Integrated Corridor Management

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



DCM/DMA Integrated Roadmap v0.5 (1/24/2012)

Basic Safety Message (BSM) Fundamentals

- Connected V2V safety applications are built around the SAE J2735 BSM, which has two parts
  - BSM Part 1:
    - Contains the core data elements (vehicle size, position, speed, heading acceleration, brake system status)
    - Transmitted approximately 10x per second
  - BSM Part 2:
    - Added to part 1 depending upon events (e.g., ABS activated)
    - Contains a variable set of data elements drawn from many optional data elements (availability by vehicle model varies)
    - Transmitted less frequently
  - No on-vehicle BSM storage of BSM data
  - The BSM is transmitted over DSRC (range ~1,000 meters)

- **The BSM is tailored for low latency, localized broadcast required by V2V safety applications**

Mobility Programs: BSM Assessment Activity

- Assess the extent to which the BSM supports or enables mobility applications
  - To what degree is a DSRC-based BSM Part 1 message critical to realizing transformative benefits from mobility applications?
  - What key elements of BSM Part 2 or other vehicle-based data might be needed? Where and how often?
  - Can other messages tailored for cellular communication augment a DSRC-based BSM?
  - As we add data from mobile devices and fixed sensors, how much improvement do we see in application effectiveness?

Role of BSM Part 1 Via DSRC In Support of Mobility Applications

- **BSM Part 1 via DSRC provides the vehicle data needed to support a few mobility applications that require low latency and localized broadcast exchange**
  - Cooperative Adaptive Cruise Control
  - Queue Warning

- These applications will likely be successful wherever DSRC-capable roadside infrastructure (RSEs) is deployed
  - Key intersections
  - Major interchanges

Key Elements of BSM Part 2 Needed for Mobility Applications

- **BSM Parts 1 and 2 via DSRC provides the vehicle data needed to support some localized mobility applications**

MOBILITY APPLICATIONS (where roadside units deployed)	KEY PART 2 DATA ELEMENTS TO SUPPLEMENT PART 1 DATA
▪ Cooperative Adaptive Cruise Control ▪ Speed Harmonization ▪ Queue Warning ▪ Transit Signal Priority ▪ Incident Scene Work Alerts ▪ Emergency Road-Weather Conditions (Diagnosis/Prediction)	▪ Weather Data (with examples) ▫ Ambient Temperature ▫ Ambient Air Pressure ▫ Traction Control Status ▫ Wiper Status ▪ Vehicle Data (with examples) ▫ Exterior Lights Status ▫ Type ▫ Antilock Brake System Status

- **HOWEVER: DSRC link burdened by redundant Part 2 elements**

Using Cellular Messages to Augment BSM for Mobility Applications

- Most mobility applications do not require BSMs 10 times per second
- Many applications require data captured over a wide area, not just localized data near a roadside unit (storage and/or wide-area communications needed)
- Possible Approach:
  - Vehicles transmit BSM Part 1 plus key Part 2 elements less frequently
  - Transmit via DSRC when available, Cellular otherwise

- **Augmenting BSM with key Part 2 elements via Cellular provides the vehicle data needed to support nearly all mobility applications**

- Cooperative Adaptive Cruise Control
- Speed Harmonization
- Queue Warning
- Intelligent Traffic Signal System
- Transit Signal Priority
- Mobile Accessible Pedestrian Signal System
- Emergency Communications and Evacuation
- Incident Scene Pre-Arrival Staging Guidance for Emergency Responders
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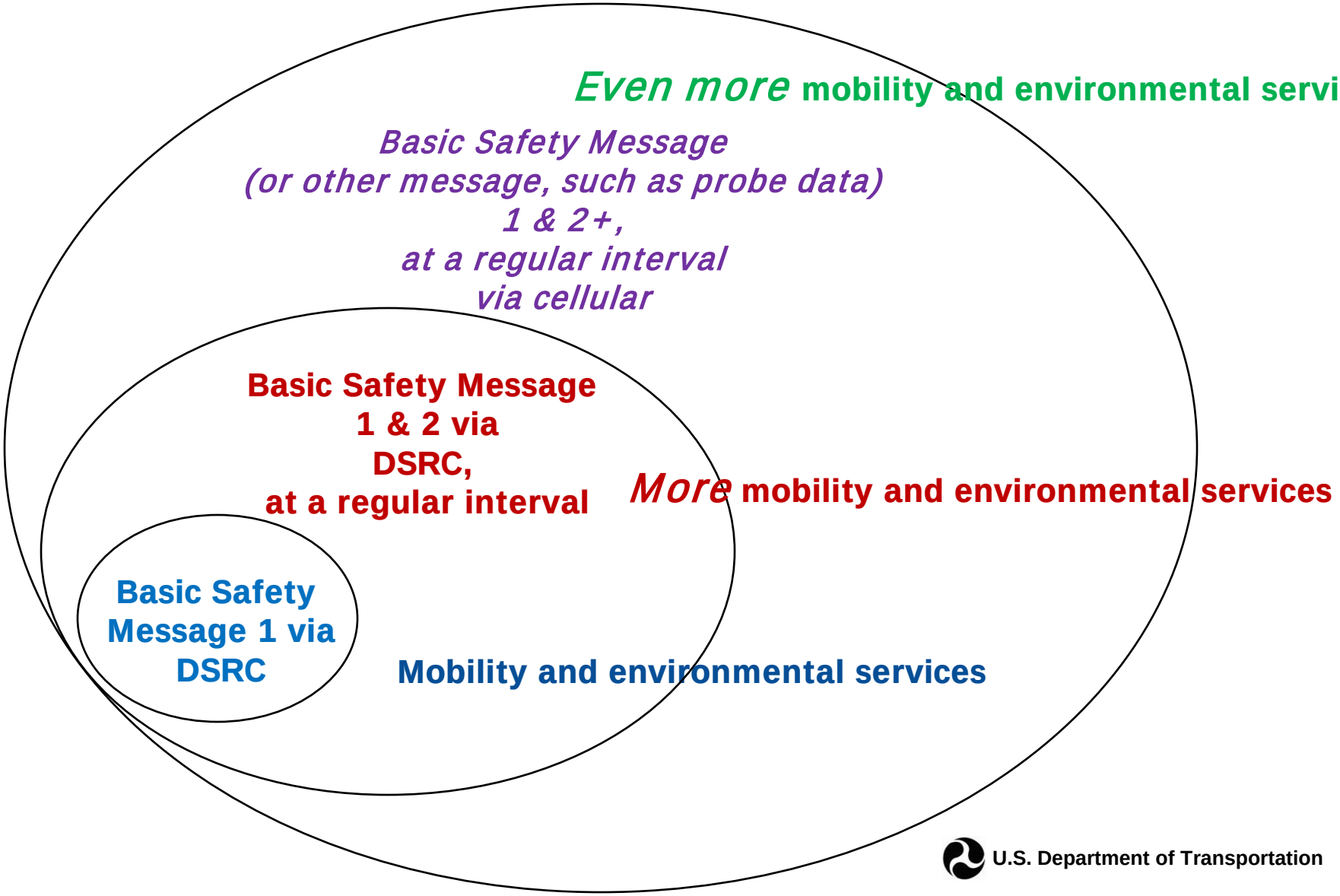
Data and Communications Question



Summary of Initial Assessment: BSM and Mobility Applications

- The Mobility Program (DCM/DMA) is currently engaged in a research program intended to identify:
  - Key Part 2 and other vehicle-based data elements required by high-priority mobility applications
    - Required frequency and latency
    - Likelihood of OEMs to make this data available publicly
  - Requirements for data storage on vehicles
  - Identify potential targeted use of triggers to reduce data redundancy
  - In conjunction with the safety/policy program, identify business and financial models to support deployment
  - Examine vehicle data needs in light of additional data from mobile devices and fixed sensors

Mobility Program: Schedule of BSM-Related Next Steps

- Updates to BSM Role Assessment Research
  - May 2012: Application ConOps Update
  - September 2012: BSM Data Analysis Update
  - May 2013: Impacts Assessment Update

- Specific Stakeholder Engagement to Date
  - OEM Engagement – through VIIC
  - AASHTO Engagement – through Pooled Fund Study/AASHTO Working Group
  - Policy Workshop Presentation

- Specific BSM Data Analysis
  - Obtaining Safety Pilot Model Deployment Data
  - Will Conduct Mobility-related Technology Testing

What's Next and Contacts

- DMA Application Concepts of Operations Coming Soon
- Data Capture and Management Research Data Exchange

MOBILITY Workshop, May 24, Washington, DC

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- Many FHWA, FTA, and FMCSA staff supporting the programs.