



U.S. Department of Transportation  
Federal Highway Administration

# TSMO Program Planning

December 10  
Webinar

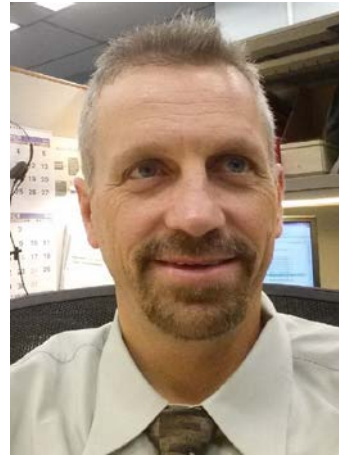


# Agenda

- Welcome and Introductions
- TSMO Program Planning Context, Jim Hunt (FHWA)
- Alabama TSMO Program Plan, Chris Hilyer (ALDOT)
- Minnesota TSMO Program Plan, Brian Kary (MnDOT)
- Maryland TSMO Program Plan, Joey Sagal (MDOT SHA)
- Q&A with Presenters
- Resources Available



# Meet our speakers



**Jim Hunt,**  
FHWA



**Michael Grant,**  
ICF



**Danielle Stanislaus,**  
Emergent Transportation  
Concepts



**Chris Hilyer,**  
Alabama DOT



**Brian Kary,**  
Minnesota DOT



**Joey Sagal,**  
Maryland DOT

# TSMO Program Planning Context

- What is TSMO and what is driving increasing interest in TSMO
- How does TSMO represent a paradigm shift in developing transportation solutions
- Motivation and purpose of TSMO Program Planning



# What is TSMO?

- “[TSMO] means integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects designed to preserve capacity and improve security, safety, and reliability of the transportation system.”

- 23 U.S. Code § 101(a)(30)

- TSMO is actively managing the multimodal transportation network to improve safety, mobility, and reliability outcomes.



# Growing Recognition of the Importance of TSMO

- Increased reliance on information and technology
- Increasing customer needs and expectations
- Growing emphasis on measuring performance
- Reduced financial resources
- Technology also offers opportunities – multiple operations strategies and regional integration of various modes





# TSMO Activities...

- Influence travel demand (how much, when, where)
- Effectively manage the movement of people and goods
- Leverage technology
- Anticipate and respond to planned and unplanned events (incidents, work zones, bad weather, special events)
- Provide travelers with high quality traffic, transit, and weather information
- Ensure that the unique needs of the freight community are considered and included



# Shifting Paradigms

## Operations and Maintenance

## TSMO

Operating Completed  
Projects

Integrated throughout the  
Project Lifecycle

Reactive

Proactive and Reactive

Recurring

Recurring and Non-  
Recurring





# Shifting Paradigms (continued)

## Operations and Maintenance

Average Travel Time, Level of Service

Focus on Highways and Jurisdictions

Moving Cars and Trucks

Individual Strategies

Piecemeal Intelligent Transportation System (ITS) deployment

## TSMO

Travel Time Reliability

Entire Transportation System

Moving People and Goods

Integrated Strategies

Corridor/systems approach to ITS deployment



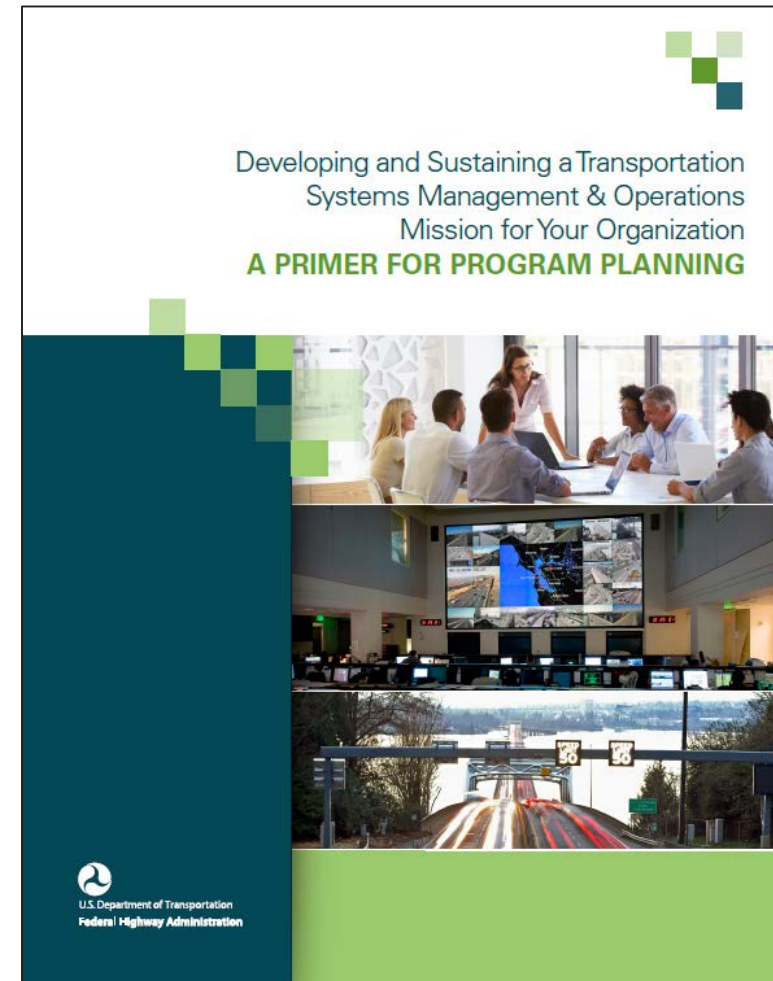
# Why TSMO Program Planning?

- Moves TSMO from an ad hoc set of activities or strategies into a cohesive ***program*** vital to the mission of the agency
- Facilitates ***integration*** and ***mainstreaming*** of TSMO within a transportation organization to support new and evolving roles and responsibilities of these organizations



# FHWA's Primer on TSMO Program Planning

- The Primer provides the rationale for and the key elements of successful TSMO program planning.
- It is intended to help agencies understand:
  - ▶ Why is TSMO program planning important? How can it benefit a transportation agency or region?
  - ▶ What are key elements of effective TSMO program planning, and what steps or activities should be taken?
  - ▶ What would an effective TSMO Program Plan look like?



Source: FHWA

Available at:

<https://ops.fhwa.dot.gov/publications/fhwahop17017/ch1.htm>

# Key Elements of TSMO Program Planning



# Rationale for TSMO Program Planning



- Creating a TSMO Mission

- ▶ Articulates the benefits and importance of TSMO
- ▶ Describes connections between TSMO activities and other agency processes
- ▶ Defines strategic goals of TSMO



- Sustaining and Institutionalizing the TSMO Mission

- ▶ Identifies how TSMO is integrated into key responsibilities of organization(s)
- ▶ Supports organizational decision making and prioritization of investments
- ▶ Identifies staffing and workforce development needs



- Supporting Effective Program Delivery

- ▶ Identifies funding needs and sources, deployment activities, and responsible parties
- ▶ Identifies program and project priorities
- ▶ Identifies performance measures for tracking on-going progress



# Peer Presentations

- Chris Hilyer, ALDOT – TSMO Past, Present, and Future in Alabama
- Brian Kary, MNDOT – TSMO Program Planning in Minnesota
- Joey Sagal, MDOT SHA – Maryland TSMO Strategic Plan and Program







U.S. Department of Transportation  
Federal Highway Administration

Chris Hilyer

Alabama DOT



National Operations Center of Excellence  
TSM&O Program Planning Webinar  
December 10, 2019



# ALABAMA TSM&O

*A CHRONICLE OF THE PAST, PRESENT, & FUTURE*

CHRIS HILYER

STATE TSM&O ADMINISTRATOR

[HILYERC@DOT.STATE.AL.US](mailto:HILYERC@DOT.STATE.AL.US)





# PAST

- REGIONAL ITS ARCHITECTURE(S)
- LOCAL MASTER PLANS
- ISOLATED PROJECT LETTINGS
- NO BUSINESS CASE



# PAST

- STATE ITS ARCHITECTURE
- ITS STRATEGIC BUSINESS PLAN
- SUBLET PROJECTS
- NO BUSINESS CASE
- CENTRALIZED TECHNICAL KNOWLEDGE BASE

Minimum  
Stakeholder  
Participation

ATTRITION, ATTRITION, ATTRITION





# PRESENT — *“Making the Business Case”*

## VISION & OBJECTIVES MEETINGS WITH LEADERSHIP

- LEGISLATION
- GUIDELINES FOR OPERATIONS
- 23-CFR-511 REQUIREMENTS
- CURRENT & FUTURE TRANSPORTATION BILL REQUIREMENTS
- PRIORITY CORRIDORS
- EVERY DAY COUNTS INITIATIVES
- CONTINUOUS SYSTEMS & SOLUTIONS



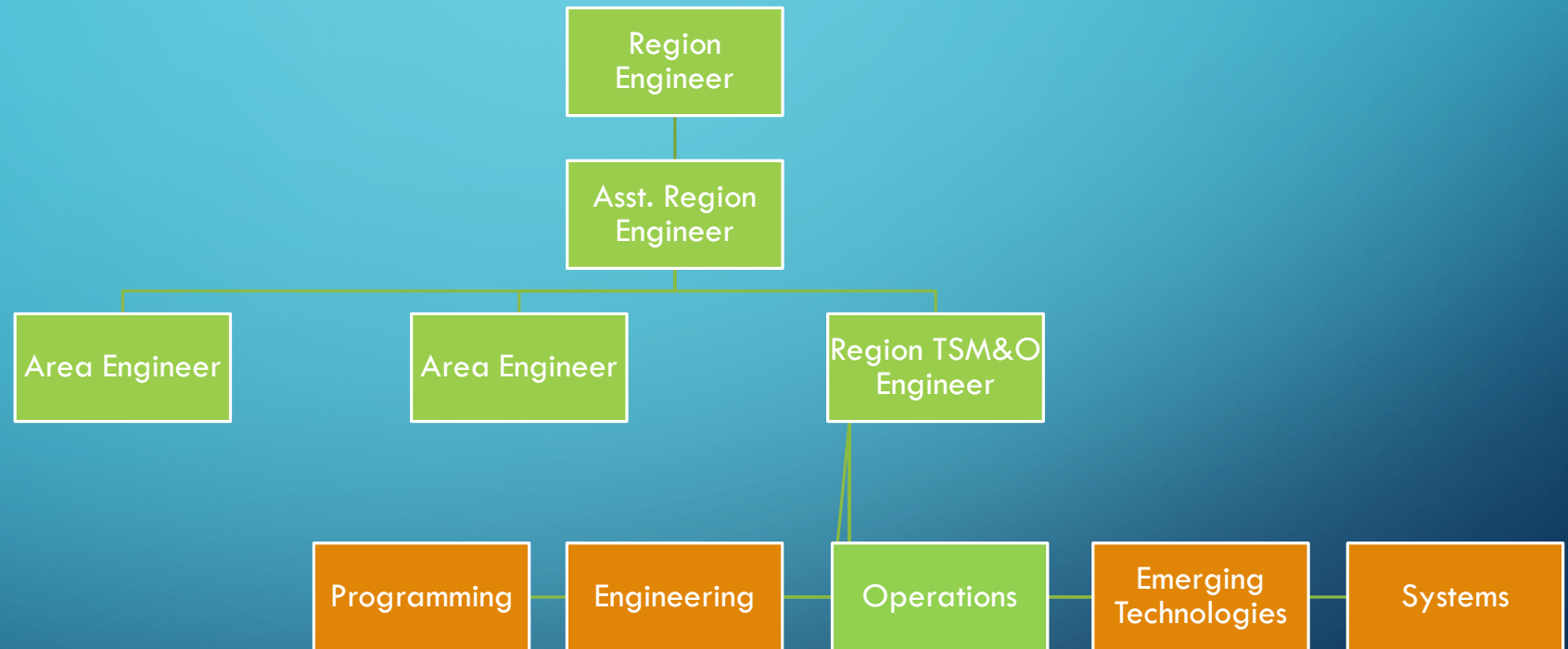
# PRESENT — *“Making the Business Case”*

- VISION & OBJECTIVES MEETINGS WITH LEADERSHIP
- THE NEED FOR A MASTER PLAN
- THE NEED FOR A CHAMPION
- THE NEED FOR REORGANIZATION
- EXECUTIVE BUY-IN





# PRESENT





# PRESENT — *“Making the Business Case”*

- STATEWIDE TSM&O STRATEGIC PLAN
- STATEWIDE TSM&O PROGRAM PLAN
- STATEWIDE TSM&O SERVICE LAYERS
- REGION TSM&O TACTICAL PLANS





# PRESENT — “*Making the Business Case*”

## STATEWIDE TSM&O STRATEGIC PLAN

- WHAT IS TSM&O
- THE BUSINESS CASE FOR TSM&O (*OPPORTUNITY FOR IMPROVEMENT*)
- CAPABILITY MATURITY MODEL
- SURVEYS & WORKSHOPS
- VISION, GOALS, AND OBJECTIVES







# PRESENT — *“Making the Business Case”*

## STATEWIDE TSM&O PROGRAM PLAN

- PROGRAM STRUCTURE
- PROGRAMMATIC PROCESSES
- CONTINUOUS TSM&O PROGRAM SUCCESS
- TSM&O PROGRAM IMPLEMENTATION





# PRESENT — *“Making the Business Case”*

## STATEWIDE TSM&O SERVICE LAYERS

1. ITS & COMMUNICATIONS
2. TRAFFIC SIGNAL MANAGEMENT
3. TRAFFIC MANAGEMENT CENTERS
4. TRAVELER INFORMATION
5. TRAFFIC INCIDENT MANAGEMENT
6. EMERGENCY TRANSPORTATION OPERATIONS
7. WORK ZONE MANAGEMENT
8. ACTIVE TRANSPORTATION AND DEMAND MANAGEMENT
9. EMERGING TECHNOLOGIES





# PRESENT — *“Making the Business Case”*

## REGION TSM&O TACTICAL PLANS

- IMPACTED AREAS
- EXISTING CONDITIONS
- EXISTING SYSTEMS
- CURRENT & FUTURE PLANNED PROJECTS
- STRATEGIES & PRIORITIES
- DEPLOYMENT RECOMMENDATIONS & PROJECT COSTS
- REGION SYSTEMS ENGINEERING ANALYSIS







	ITS & Communications	Traffic Signals	TMC	Traveler Information	TIM	Emergency Transportation Operations	Work Zone Management	Active Transportation & Demand Management	Connected Autonomous Vehicle
Business Processes	<p>Each Service Layer is measured against each CMM Dimension Level 1 - Level 4 annually to realize improvement and next CY focus needs.</p>								
Systems & Technology									
Performance Measurement									
Culture									
Workforce									
Collaboration									



# TOMORROW

- SUSTAINABLE ANNUAL FUNDING
- COLLABORATIVE PARTNERSHIPS
- CULTURE ADVANCEMENT
- INFRASTRUCTURE PREPARATION
- DATA, DATA, DATA



U.S. Department of Transportation  
Federal Highway Administration

# Brian Kary

## Minnesota DOT





# Transportation Systems Management & Operations (TSMO) Program Planning

- TSMO Motivation
- MnDOT's TSMO Program Planning Process
- Summarize the Strategic, Implementation and Business Plans
- New TSMO Funding
- Next Steps





# Why a TSMO Program Plan?

## MnDOT is Already Doing Many TSMO Strategies

### Deliberate

- Highest value
- Cost effective

### Consistent

- Not just when we have time or extra funding

### Proactive

- Anticipates issues
- Planned ahead of time



# Before TSMO was TSMO

- MnDOT staff attended a regional workshop in Milwaukee, WI
- Completed the TSMO Capability Maturity Framework
  - To get to the next level we need a TSMO plan.
- 2015 Statewide ITS Plan
  - Approach A – Fiscally Constrained
  - Approach B – Asset Management Scenario
  - Approach C – Optimization Scenario

# Developing a TSMO Program

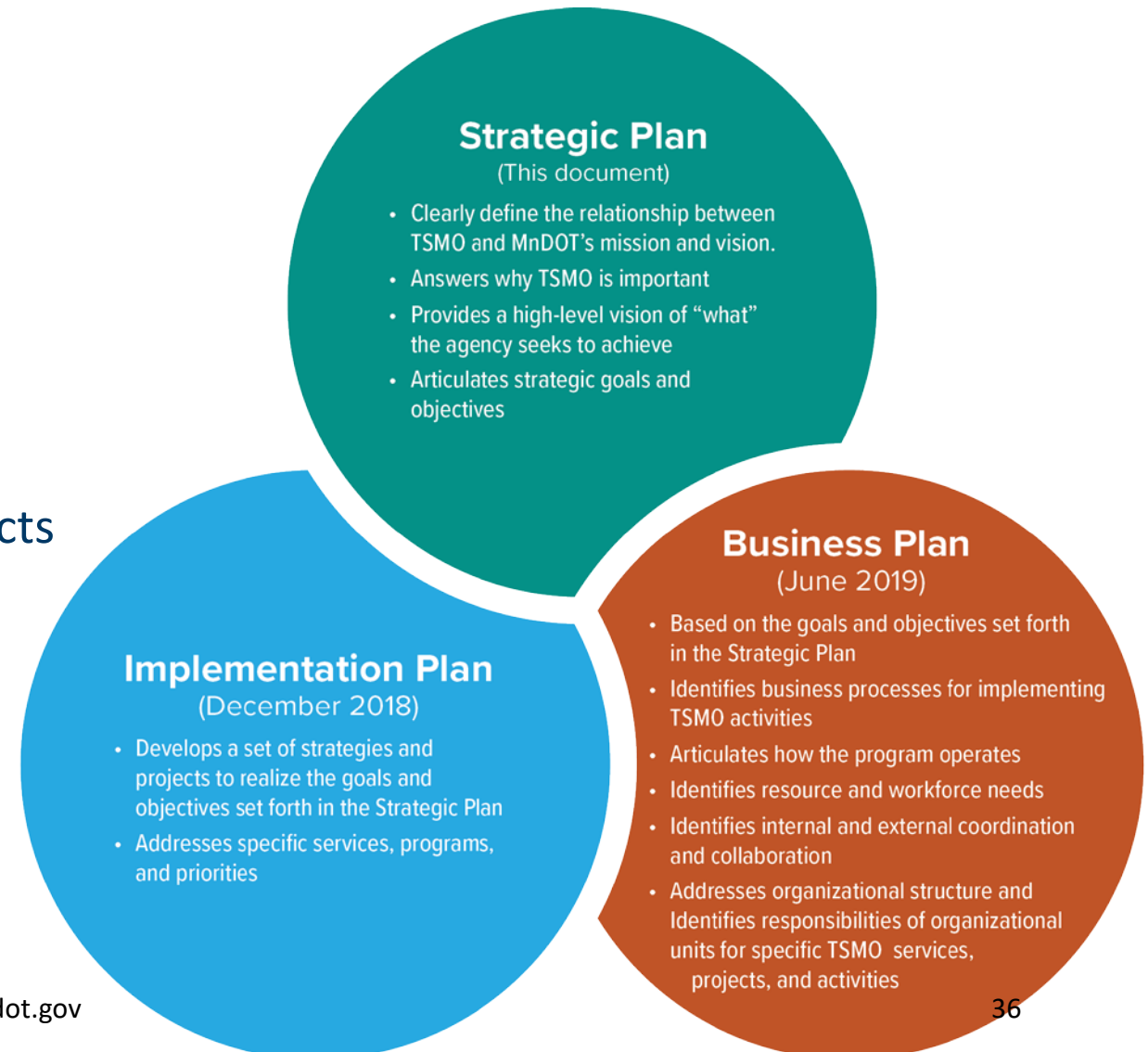
- Created a part-time TSMO Position
- Formed leadership team (from an already existing ITS leadership team)
- Analysis of existing TSMO efforts
- Hired initial consultant
  - Research TSMO alternatives
  - Determine TSMO Direction
  - Develop Scope of Work
- Hired consultant to develop TSMO plan

# Preliminary TSMO Funding

- Statewide ITS System Integrator
- Expanded RTMC coverage area and hours of operations
- Purchased cellular probe data
- Additional Freeway Service Patrol routes
- Streaming video to the public
- Funding to support CAV projects

# MnDOT TSMO Program Planning

- Strategic Plan
  - Justification for TSMO
  - Goals & objectives
- Implementation Plan
  - Recommended strategies/services/projects
- Business Plan
  - Business processes and organization
- All Completed June 2019



## Identify Desired Outcomes

- TSMO Background & Justification
- TSMO Goals
  - Improve Reliability, Mobility, and Efficiency
  - Increase Safety
  - Carefully and Responsibly Manage Transportation Operations Assets
- 16 Objectives





# Improve Reliability, Mobility and Efficiency

1. Reduce Congestion
2. Promote Alternatives to SOV
3. Increase travel time information
4. Reduce the impact of snow and ice
5. Reduce incident clearance times
6. Increase awareness of incidents and alternatives
7. Reduce Construction Activity Delays
8. Reduce Maintenance Activity Delays



# Increase Safety

- 9. Reduce Congestion-Related Crashes
- 10. Reduce Secondary and Work Zone Crashes
- 11. Reduce Worker and Responder Exposure
- 12. Reduce Roadway Departures
- 13. Reduce Intersection Crashes
- 14. Reduce Weather-Related Crashes





# Manage Transportation Operations Assets

15. Fund Life-Cycle Costs of Operating and Maintaining Assets

16. Manage Data

# TSMO Implementation Plan

## Identify Actions to Achieve Outcomes

- District and Office Input
- Scoring criteria
- 34 Prioritized Strategies



# Implementation Plan

## Strategies

1. Update Signal Timing and Coordination
2. Increase MnDOT Usage of 3rd Party Data and Sharing (e.g. Google, WAZE, INRIX, HERE)
3. Develop Regional TIM Programs
4. Implement Low-Cost / High-Benefit Capital Improvements
5. Coordinate Work Zones Across Districts and Routes
6. Expand Snow Fence Use through Research and Increased Use
7. Expand the Coverage of Freeway and Expressway Traffic Management Systems
8. Develop TIM Strategies for Work Zones
9. Utilize Intelligent Work Zone Systems Where Appropriate
10. Expand the Use of Ramp Metering
11. Expand Use of Technology at Weigh Stations for Enforcement

# Implementation Plan

## Strategies

12. Increase TSMO Asset Life Cycle Understanding and Management
13. Implement Signal Timing Updates for Construction Projects
14. Provide Traveler Information on Alternative Modes and Routes
15. Expand and Enhance the Deployment of Road Weather Information Systems
16. Innovative Intersection Technology or Design (e.g. RICWS, roundabouts, RCIs, diverging diamonds, etc.)
17. Expand Dynamic Message Sign (DMS) Use to Include Standard Weather Messages
18. Improve Pedestrian and Bicycle Service at Signals
19. Increase Real-time Tracking of Work Zones and Lane Closures for 511
20. Upgrade Signal Equipment for Communications to Central System
21. Deploy Truck Parking Information for Rest Areas
22. Develop and Implement Pre-planned Alternative Routes for Incidents

# Implementation Plan

## Strategies

- 23. Ensure New Signals are Connected Automated Vehicle (CAV) Ready
- 24. Add Additional MnPASS Lanes in the Twin Cities Metro Area
- 25. Provide Enhanced Enforcement Technology (Speed Enforcement, Red Light Running, MnPASS, etc.)
- 26. Expand and Streamline Road Weather Data
- 27. Utilize Alternate Route Signing for Work Zones
- 28. Expand Dissemination of Travel Times (Work Zones and Geographic Expansion)
- 29. Expand Sharing of Video and Data Between Agencies (Integrated Corridor Management)
- 30. Deploy Transit Signal Priority
- 31. Address Bikes and Pedestrians in Construction Detours
- 32. Improve Work Zone Data for CAV Readiness
- 33. Prepare Systems to Obtain/Use Data from CAVs
- 34. Encourage Work Flexibility for Travel Demand Management

## Manage the Program

- Programmatic Objectives
- Funding, staffing, administration, organization, data, business processes
- 8 Recommendations



## Recommendations

1. Fully Fund TSMO
2. Designate and Fund a State TSMO Coordinator
3. Create Staffing Positions to Support TSMO Strategies
4. Continue and Clarify the Minnesota TSMO Leadership Team
5. Continue and Clarify the Minnesota TSMO Working Group
6. Establish a MnDOT TSMO Organizational Model
7. Define TSMO Performance Measures and a Data Use Plan
8. Institutionalize the TSMO Implementation Planning Process



## New TSMO Funding

- \$700K annual base
- \$Additional \$700K 1X in FY 2020
- Start with prioritized strategies identified in TSMO Implementation Plan & TSMO Business Plan
  - Signal Timing
  - HERE Real Time Probe Data
  - Traffic Incident Management
  - Connect Signals to Central System
  - Video Streaming on 511
  - Statewide TSMO Coordinator

## TSMO Funding Scenarios:

- Full Scenario: \$16.5M
- \$3M Scenario: \$3.3M
- No Funding Scenario: \$0

# Next Steps: TSMO Coordinator

## Statewide TSMO Coordinator (Director)

- Reports to Operations Division
- Support implementation of TSMO strategies
- Helps find funding for TSMO Implementation Plan strategies
- Chairs the TSMO Leadership Team and Working Group
- Works with districts, specialty offices, MG groups, external organizations

# Next Steps: TSMO Leadership Team

## TSMO Leadership Team

- Change to bi-monthly meetings
- Refine membership
- Add external agencies
- Agree on a charter

# Next Steps: TSMO Working Group

## TSMO Working Group

- Change to monthly meetings
- Refine membership to include appropriate specialty offices
- Add external agencies
- Coordinate across functional areas
- May include task forces for specific topics

# Thank you again!

**Brian Kary**

*brian.kary@state.mn.us*

651-234-7020

**Steve Misgen**

*steve.misgen@state.mn.us*

651-234-7835

**Mike Schweyen**

*michael.schweyen@state.mn.us*

651-234-7375

**Ray Starr**

*ray.starr@state.mn.us*

651-234-7050





U.S. Department of Transportation  
Federal Highway Administration

# Joey Sagal

## Maryland DOT



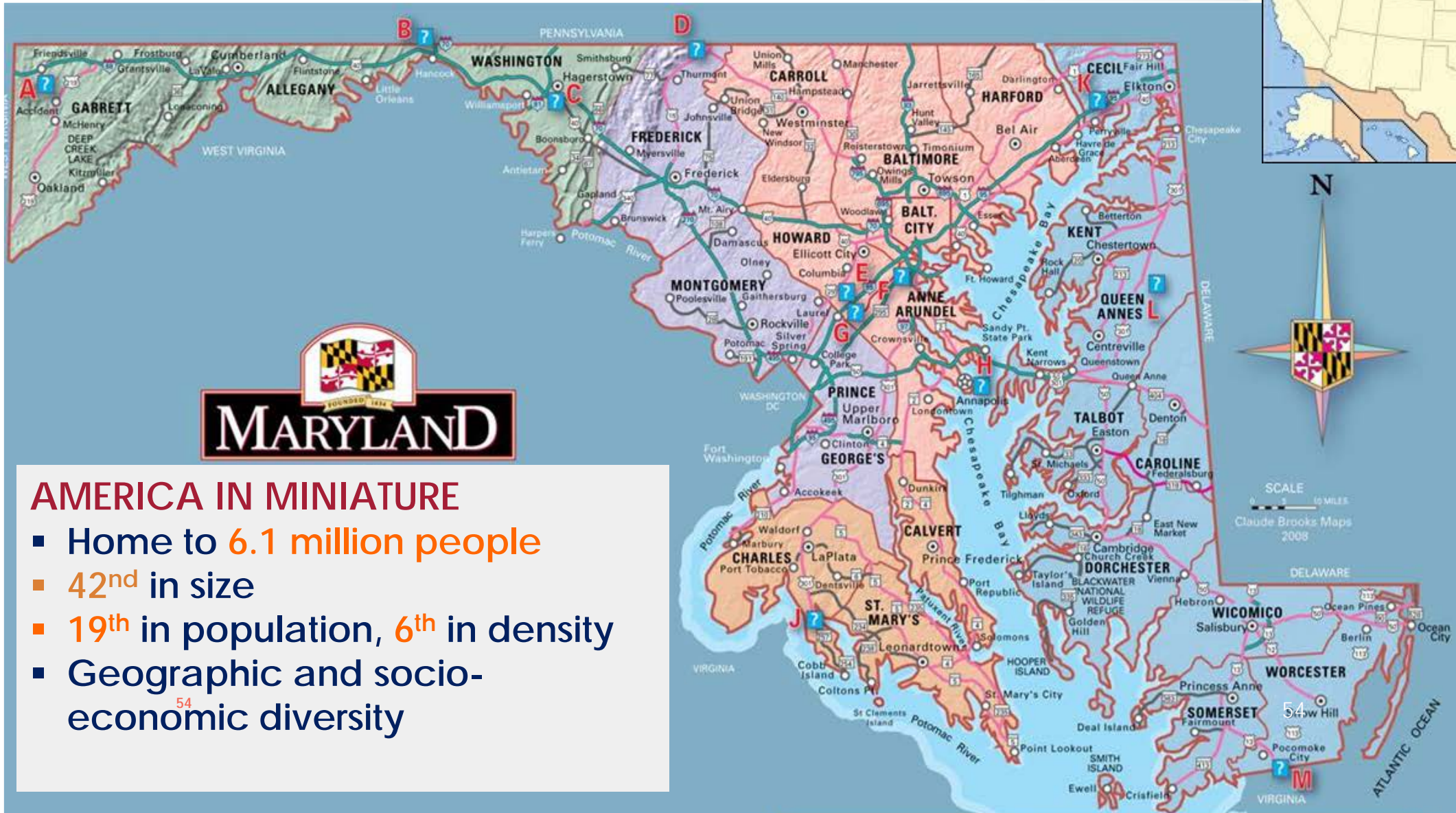


MARYLAND TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS

TSMO Program Planning  
FHWA/NOCoe Webinar

Joey Sagal  
MDOT - State Highway Administration

# ABOUT MARYLAND



# ABOUT MDOT STATE HIGHWAY ADMINISTRATION

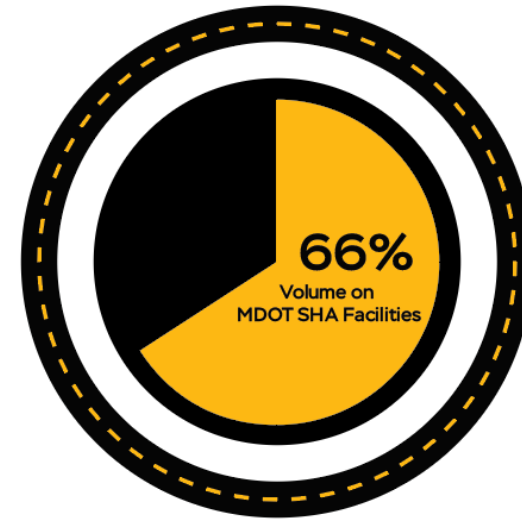
MDOT SHA operates and maintains the numbered, non-toll routes in Maryland

- 17,000 lane-miles and 2,576 bridges

- Customer Focused
- System Efficiency & Reliability Key Drivers
- Freight Movement and Economy
- Performance Management



Maryland  
Roadway Network



Maryland  
Traffic Volume

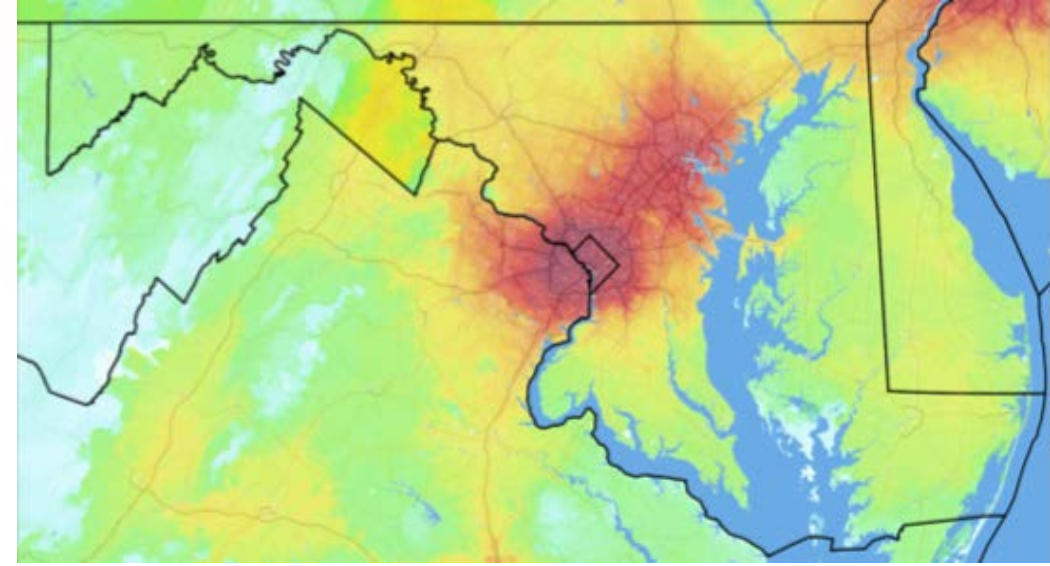
Huge Emphasis on  
**Transportation Systems Management & Operations (TSMO)**

ICM is a KEY COMPONENT for TSMO Implementation



# WHAT ARE CURRENT TRENDS IN MARYLAND?

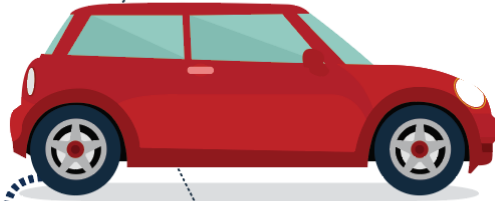
- VMT is at **all time high**
- Nation's **2<sup>ND</sup>** highest commute times
- B-W region is one of the **most congested regions** in US
- Oversaturated conditions leads to **higher unreliability**



Maryland experienced an **ALL-TIME RECORD** number of VMT in 2017.



**60 Billion  
VMT**



**2.9% Increase  
FROM 2016**

# MDOT SHA MOTIVATION

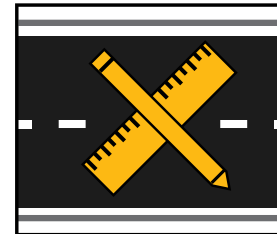
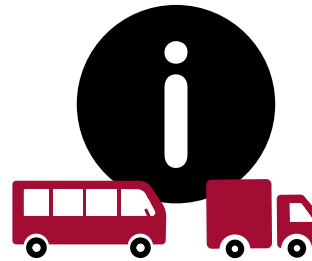
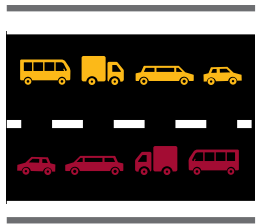
- Focus on Transportation Systems Management & Operations (TSMO)
- System Efficiency & Reliability Key Drivers
- Freight Movement and Economy
- Communicating Performance
- **Customer Focused** & Outcome Oriented
- Support MDOT & Administration goals
  - *MDOT Excellerator*
- Statutory Regulatory Requirements
  - *MAP-21/ FAST Act, MFR, MDOT AR*



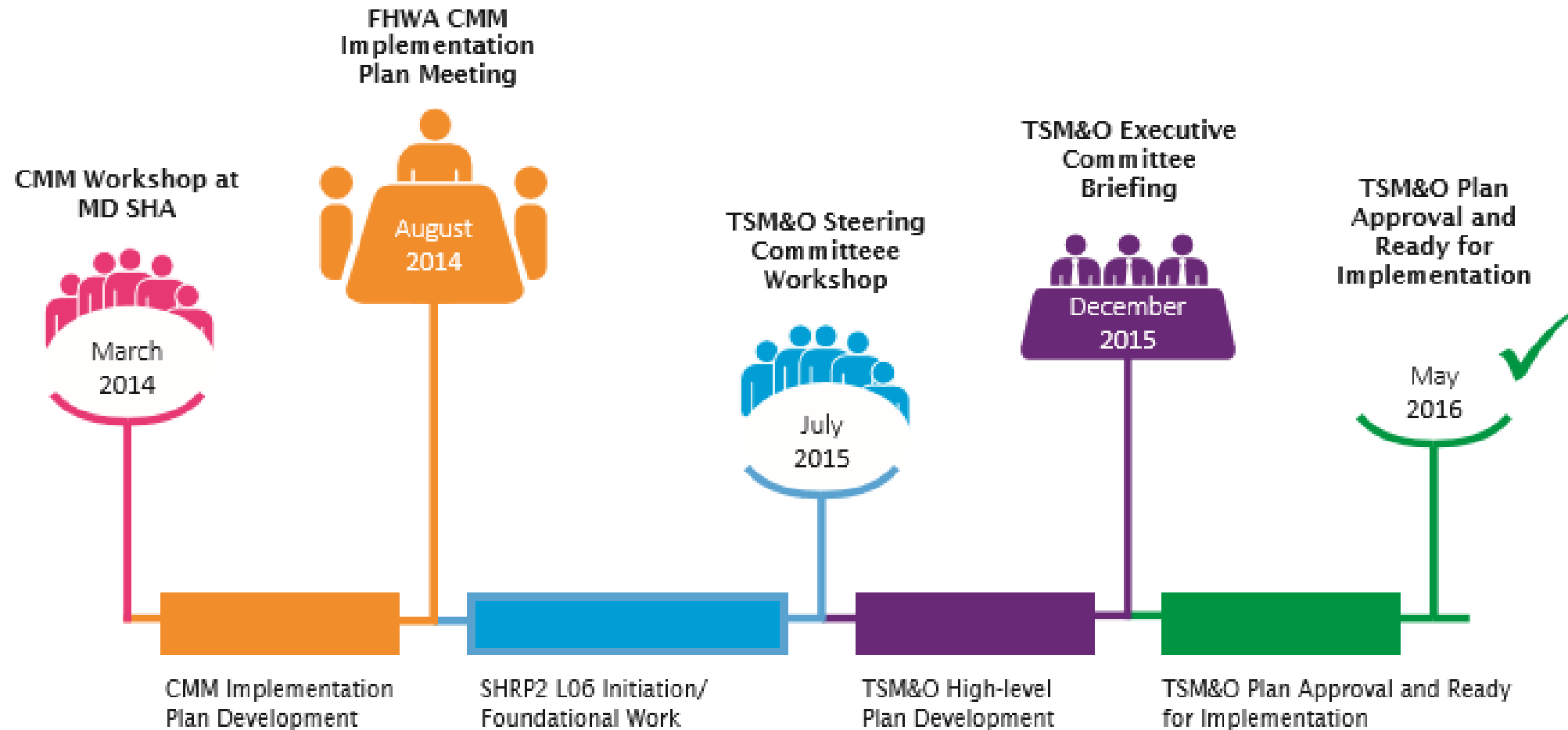


# EXAMPLE TSMO STRATEGIES AND SOLUTIONS

- Work Zone Management
- Traffic Incident Management
- Service Patrols
- Special Event Management
- Road Weather Management
- Transit Management
- Freight Management
- Traffic Signal Coordination
- Traveler Information
- Ramp Management
- Managed Lanes
- Active Traffic Management
- Integrated Corridor Management



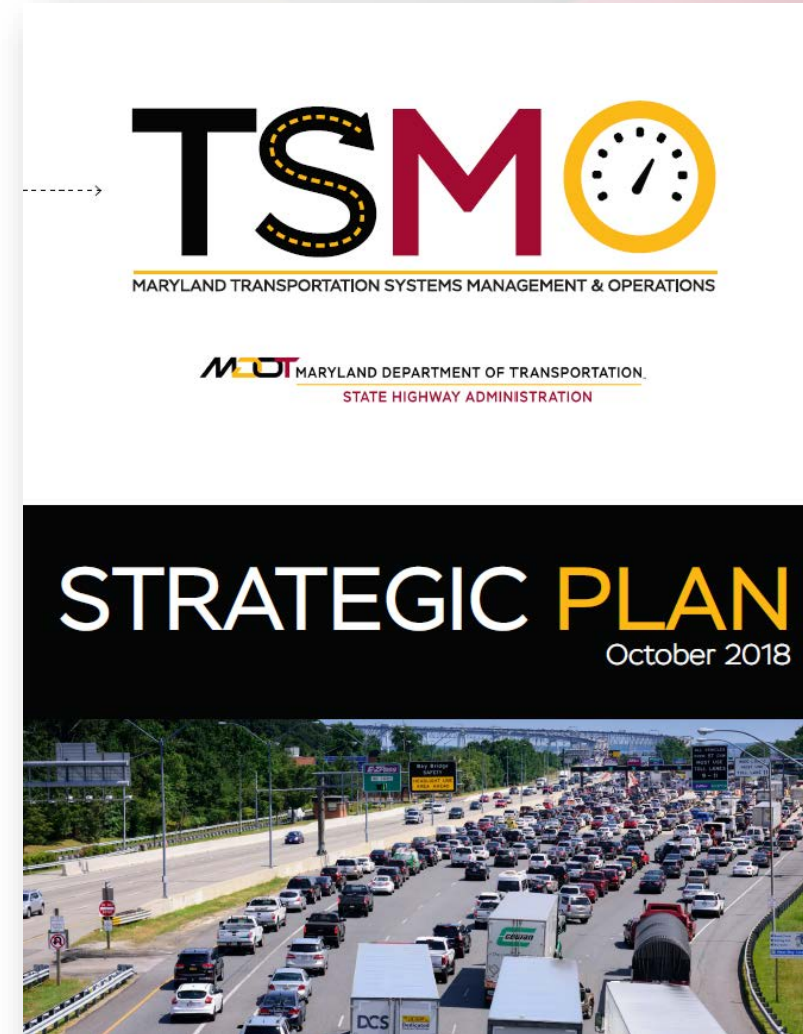
# 2016 MD TSMO PLAN DEVELOPMENT TIMELINE



TSM&O Plan officially adopted in August 2016.  
FHWA CMM Post Evaluation/ Project Wrap-Up Meeting – July 2017

# 2018 MDOT SHA TSMO PROGRAM

- TSMO Program Guided by TSMO Strategic Plan
- TSMO Program Development Started in 2014 with FHWA SHRP2 L06 Assistance
- First TSMO Strategic Implementation Plan Approved in August 2016
- Many 2016 Strategic Plan Action Item Accomplishments
- Rapidly Evolving Environment Necessitated Development of New TSMO Strategic Plan



# 2018 TSMO STRATEGIC PLAN



## Our Vision

A customer-driven leader working to provide safe, efficient, and innovative transportation solutions that meet or exceed customer expectations.



## Our Purpose

Implement a sustainable, organization-wide TSMO Program at MDOT SHA that fully maximizes the ability of Maryland's transportation system to consistently move people and goods.

## GOAL 1



**BUSINESS PROCESSES  
& COLLABORATION**

## GOAL 2



**SYSTEMS & TECHNOLOGY**

## GOAL 3



**DATA, ANALYSIS &  
PERFORMANCE MANAGEMENT**

## GOAL 4



**CUSTOMER EXPERIENCE  
& ENGAGEMENT**

# 2018 TSMO STRATEGIC PLAN



Larry Hogan - Governor • Boyd K. Rutherford L. Governor  
Pete K. Rahn - Secretary • Gregory Slater - Administrator



## Our Vision

A customer-driven leader working to provide safe, efficient, and innovative transportation solutions that meet or exceed customer expectations.



## Our Purpose

Implement a sustainable, organization-wide TSMO Program at MDOT SHA that fully maximizes the ability of Maryland's transportation system to consistently move people and goods.

## GOAL 1

### Business Processes & Collaboration

- Objective 1.1** Incorporate TSMO in MDOT SHA policies, programs and standard practices
- Objective 1.2** Implement and institutionalize a TSMO Master Plan
- Objective 1.3** Promote a culture to TSMO within and outside MDOT SHA at all levels

**Strategy 1.1a**  
Develop TSMO policy and procedures to establish organizational structure and institutional framework

**Strategy 1.2a**  
Develop and maintain a consolidated list of potential TSMO strategies/projects with inputs from CHART, OPPE, OOTS, CHD and Districts

**Strategy 1.3a**  
Identify staffing resources for various MDOT Offices and Districts to support the TSMO Program

**Strategy 1.1b**  
Align TSMO strategies to existing business processes/practices at all MDOT SHA Offices/Districts and program areas

**Strategy 1.2b**  
Develop and implement business processes and technologies to maintain and mainstream the TSMO Master plan

**Strategy 1.3b**  
Develop relevant TSMO education and training resources for MDOT Offices and District staff at all levels of organization

**Strategy 1.1c**  
Include TSMO projects/strategies in the traditional planning, project development and programming process

**Strategy 1.2c**  
Develop a business case to secure dedicated funding to implement TSMO strategies/projects

**Strategy 1.3c**  
Develop TSMO education, communication and outreach resources to raise TSMO awareness with MDOT TBUs, MPOs, FHWA, local agencies, other partners and stakeholders

**Strategy 1.1d**  
Develop project development protocols/processes for various types of TSMO strategies/projects

**Strategy 1.2d**  
Leverage other program scopes and funding opportunities to implement TSMO strategies/projects

**Strategy 1.3d**  
Continue participation in research and collaboration efforts to advance TSMO practices through TRB, FHWA, AASHTO, ITS America, University Research Centers etc.

## GOAL 2

### Systems & Technology

- Objective 2.1** Develop and implement Advanced Traffic Management Systems (ATMS) with Active Traffic Management (ATM) capabilities
- Objective 2.2** Develop Integrated Corridor Management (ICM) capabilities for multimodal passenger and freight movement
- Objective 2.3** Develop and apply technological foundations for Connected and Automated Vehicles (CAV)

**Strategy 2.1a**  
Launch the first set of TSMO Active Traffic Management (ATM) capabilities as part of the I-270 Innovative Congestion Management Project

**Strategy 2.2a**  
Use the existing I-95 ICM Concept of Operations to identify opportunities for freeway and arterial management integrated operations

**Strategy 2.3a**  
Align and coordinate TSMO Planning efforts with the MDOT SHA CAV Strategic Action Plan implementation

**Strategy 2.1b**  
Complete an assessment of MDOT and MDOT SHA communications assets and incorporate enhancements into future projects

**Strategy 2.2b**  
Bring operations data regarding various transportation modes into a single platform in order to develop a Common Operating Picture (COP)

**Strategy 2.3b**  
Implement CAV technology deployment pilots on MDOT transportation infrastructure and develop a Maryland owned traffic management and CAV testing facility

**Strategy 2.1c**  
Implement integrated traffic management projects including Traffic Relief Program (TRP) projects like I-695 TSMO and Smart Signals projects

**Strategy 2.2c**  
Identify opportunities to improve coordinated transportation management including highway, transit, and freight operations

**Strategy 2.3c**  
Collaborate with private sector and research community for CAV testing on MDOT infrastructure (roadways and facilities)

**Strategy 2.1d**  
Develop Asset Management Systems for ITS devices and TSMO infrastructure

**Strategy 2.2d**  
Implement a Decision Support System that incorporates real-time data from existing systems and develops appropriate response strategies

## GOAL 3

### Data, Analysis & Performance Management

- Objective 3.1** Implement a comprehensive data driven performance management program to support TSMO
- Objective 3.2** Advance data governance, analysis and modeling capabilities to inform planning, operational and TSMO decisions

**Strategy 3.1a**  
Monitor corridor and system level performance of Maryland highways and arterials from a mobility, reliability and access standpoint

**Strategy 3.2a**  
Formalize a data governance plan that supports the MDOT SHA Program

**Strategy 3.1b**  
Advance communication and visualization tools to assess performance, progress, benefits and challenges

**Strategy 3.2b**  
Advance data analysis, methods and application tools to support TSMO decision-making at strategic, tactical and operational levels

**Strategy 3.1c**  
Monitor work zone performance measures at a project, corridor and system level to improve work zone management

**Strategy 3.2c**  
Advance travel and traffic modeling applications to support multi-modal passenger and freight related TSMO strategies and projects

**Strategy 3.1d**  
Develop next generation customer facing performance measures using big data innovations and advanced technologies

**Strategy 3.2d**  
Develop and mainstream methods and tools that incorporate travel time reliability, accessibility, life cycle planning and project development prioritization

## GOAL 4

### Customer Experience & Engagement

- Objective 4.1** Provide reliable and accessible real-time modal choice information to our customers
- Objective 4.2** Raise awareness of TSMO and its general understanding by the traveling public

**Strategy 4.1a**  
Continue to improve CHART's capabilities for providing traffic information to regional integrated transportation data collection and distribution systems

**Strategy 4.2a**  
Develop education and outreach tools, including use of public-facing websites, social media applications etc.

**Strategy 4.1b**  
Launch a One-MDOT traveler information application in partnership with other MDOT TBUs

**Strategy 4.2b**  
Conduct market research to determine customer level of satisfaction with MDOT SHA TSMO Program implementation

**Strategy 4.1c**  
Work in partnership with private-sector information providers, to share data on real-time operational conditions on the transportation network

**Strategy 4.2c**  
Develop user groups, focus groups and charters to foster continued engagement with customers on various TSMO focus areas

**Strategy 4.1d**  
Collaborate with other modes, MPOs, local agencies, major employers and businesses for active travel demand management including incentivization of travel choices and Mobility on Demand services

**Strategy 4.2d**  
Develop tools and interfaces to seek customer perspectives and inputs

## List of Acronyms

AASHTO: American Association of State Highway and Transportation Officials  
ATM: Active Traffic Management  
ATMS: Advanced Traffic Management System  
CAV: Connected and Automated Vehicle  
CHART: Coordinated Highways Action Response Team  
FHWA: Federal Highway Administration  
ICM: Integrated Corridor Management

## ITS: Intelligent Transportation Systems

MDOT SHA: Maryland Department of Transportation State Highway Administration  
MDOT TBU: Maryland Department of Transportation Business Unit  
MPO: Metropolitan Planning Organization  
OHD: Office of Highway Development  
OOTS: Office of Traffic and Safety  
OPPE: Office of Planning and Preliminary Engineering

Version 2.0 dated 10/10/2018

**MDOT SHA TSMO Definition:** An integrated approach to programmatic optimization of planning, engineering, operations, and maintenance in implementing new and existing multi-modal systems, services, and projects to preserve capacity and improve the security, safety, and reliability of our transportation system.



# ONGOING TSMO INITIATIVES

## CHART



Cleared more than **30,000 incidents** and assisted approximately **42,000 stranded motorists**.

## CAPITAL IMPROVEMENTS



**11 Mobility Projects Completed in 2016** mainly at intersections, as well as a new interchange on MD 5 and widening along MD 355

**Projects Under Construction Include:**  
I-695 from US-40 to MD 144  
Widening of US 29 (Seneca Dr to MD 175)  
MD 404 (Completed Nov 2017)

**Projects Initiated in 2016:**  
I-270 Innovative Congestion Management

## SIGNAL SYSTEMS



**306 signals reviewed.**  
202 of those signals were retimed.

## PARK-AND-RIDE LOTS



Provided a savings of more than **101 Million Annual VMT**

Allow more than **6,700 motorists** on a given weekday to connect to transit or ride with other commuters at **106 locations, operated in 20 counties**

## PEDESTRIAN



Construction of **9 miles of new sidewalk**

## ADA IMPROVEMENTS



**More than 80%** of sidewalks are now ADA compliant

Accessible Pedestrian Signals:  
**5% increase statewide**

## BICYCLE



**Approximately 88 miles** of marked bike lanes and **6 miles** of marked shared use bike lane

## HOV LANES



HOV lanes on I-270 and US 50

I-270 HOV lanes save as much as **20 minutes** of travel time in the AM and **25 minutes** in the PM peak hour

## FREIGHT



**Projects Completed in 2016:**  
4 new virtual weigh stations and improvements and 8 at-grade railroad crossings

**Ongoing Initiatives:**  
A new National Highway Freight Network, Maryland Strategic Goods Movement Plan, Maryland Freight Story Map

**In progress:**  
Design underway to provide 10 additional truck parking spaces on I-70 WB at South Mountain

## TSM&O Initiatives



Currently implementing 2016 Transportation Systems Management and Operations (TSM&O) Strategic Plan. Initiatives include developing sample corridors for TSM&O, and a developing data supported system for performance reporting.

## Nationwide Research Initiatives



**7 projects** are being implemented to advance mobility performance management, state-of-the-art modeling tools, and innovations for transportation planning and operations.

## Connected and Automated Vehicles



Committees have been established and research is being performed related to the implementation of policies for connected vehicles and automated vehicles.

2016 Annual User Savings

**\$1.6+ Billion**

CHART/ TSM&O  
**\$1500 Million**

Capital Projects  
**\$29 Million**

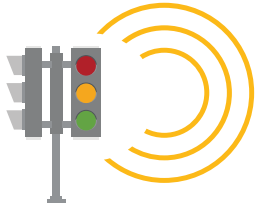
Signals & Multimodal Strategies  
**\$84 Million**



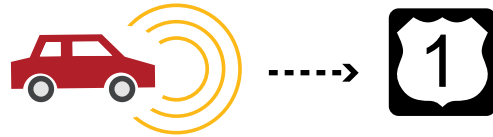
# MAXIMIZING THE SYSTEM WITH TSMO



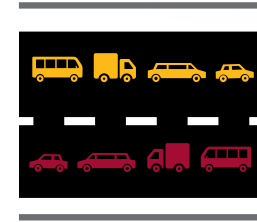
## MAXIMIZING SYSTEM PERFORMANCE



SMART SIGNALS



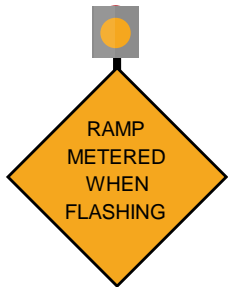
INTEGRATED CORRIDOR MANAGEMENT



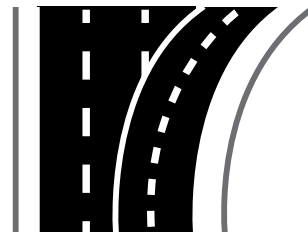
MANAGED LANES



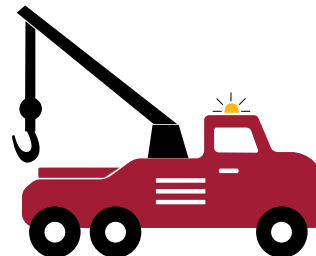
HARD SHOULDER RUNNING



RAMP METERING



JUNCTION CONTROL



INCIDENT MANAGEMENT



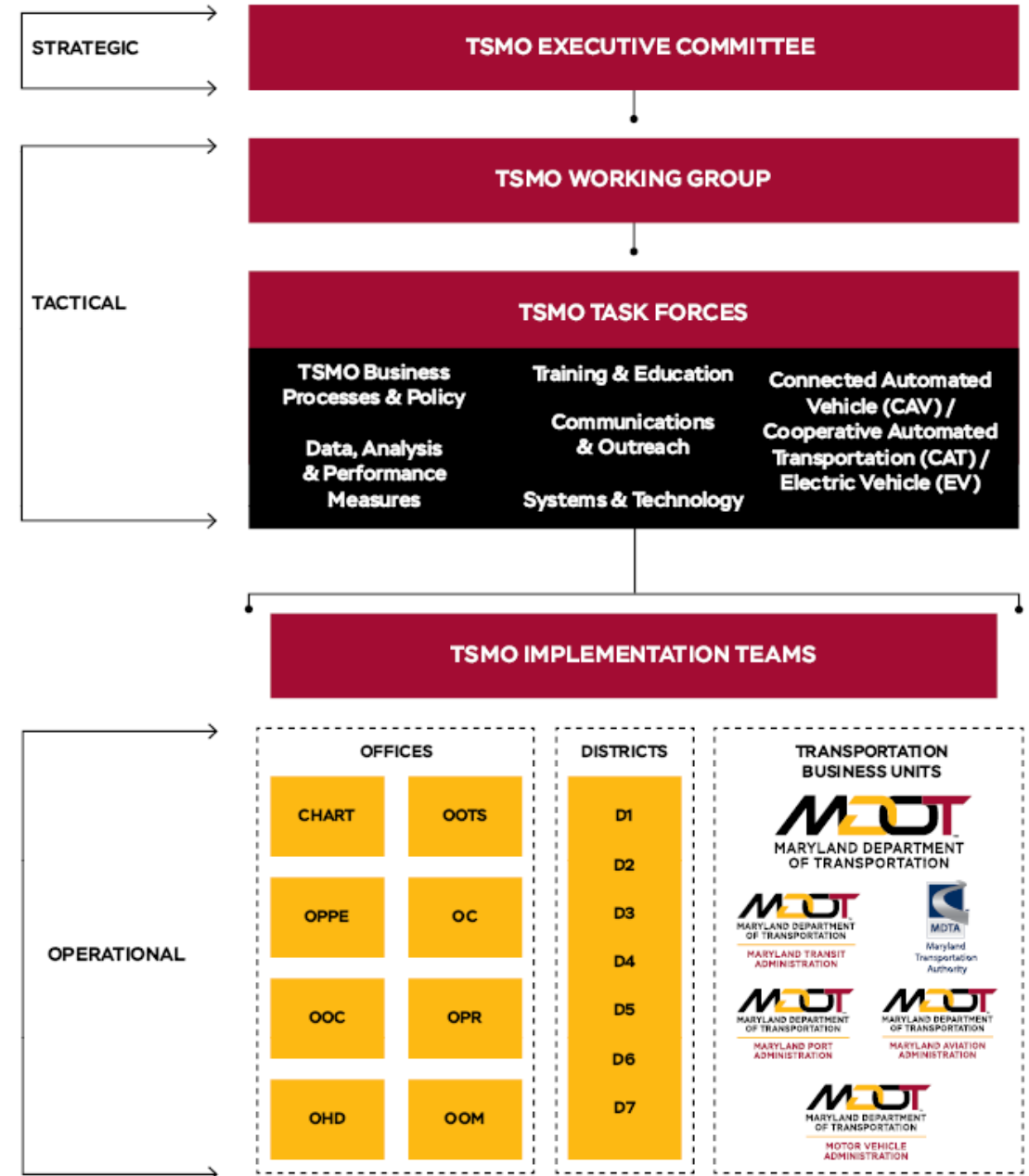
TRAVELER INFORMATION

# TSMO ORGANIZATION STRUCTURE

**TSMO Executive Committee** provides overall governance and strategic level guidance

MDOT SHA created a TSMO Deputy Director position in the Office of CHART and ITS Development to oversee MDOT SHA TSMO Program implementation.

## DECISION PARADIGM

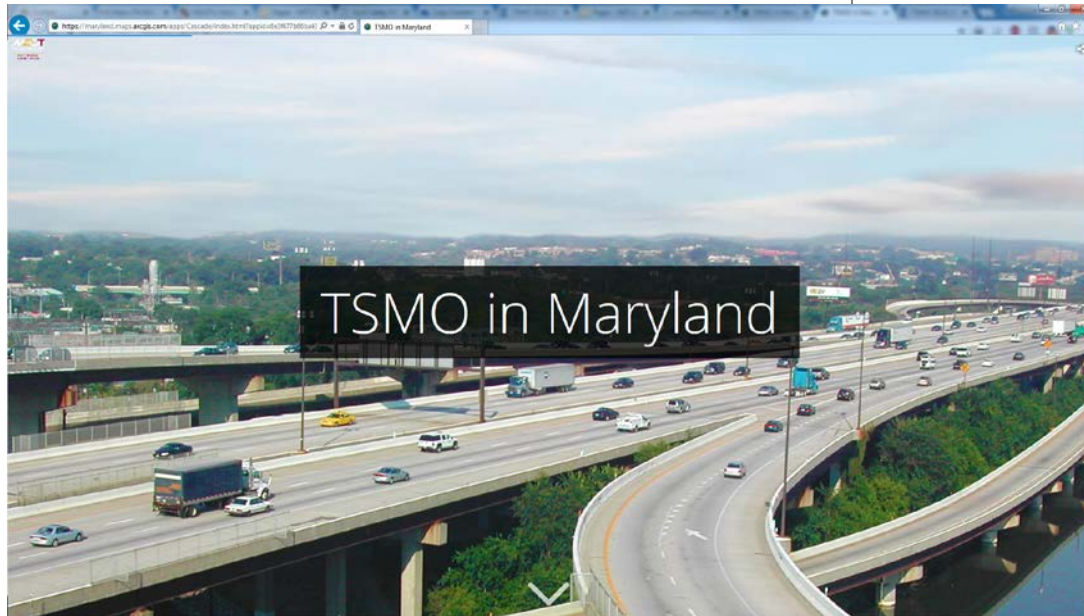


# TSMO ORGANIZATION STRUCTURE

- **TSMO Working Group and Task Forces**
  - Responsibilities
    - Identify and execute specific actions, deliverables, and resources
    - Provides multi-Office collaborative oversight of Task Forces on:
      - **Training & Education**
      - **Systems & Technology**
      - **Data, Analysis, & Performance Measures**
      - **Communications & Outreach**
      - **CAV / CAT / EV**
      - **Freight & Multimodal**
  - Coordinate implementation of specific actions and projects at the operations level

# TSMO AWARENESS, EDUCATION, TRAINING / COMMUNICATIONS & OUTREACH

- Website on SHA Internet Page
- Video
- Story Map



# TSMO AWARENESS, EDUCATION, TRAINING / COMMUNICATIONS & OUTREACH

- **Roadshow**

- 6-9 month effort to take TSMO to the field
- 2 hour Exec / mid-manager level, 2-4 hour Town Hall presentation/discussion/Q&A

- **TSMO Internal Education**

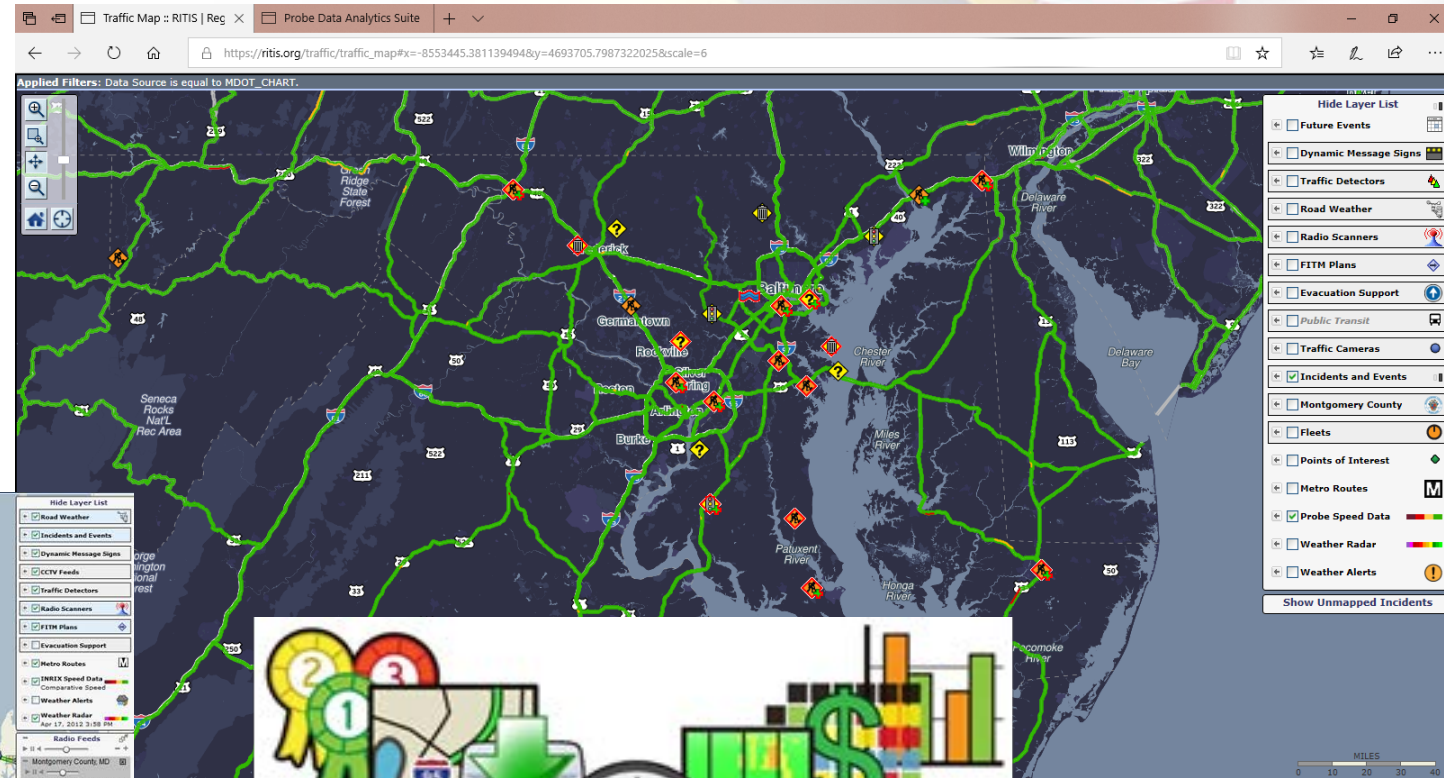
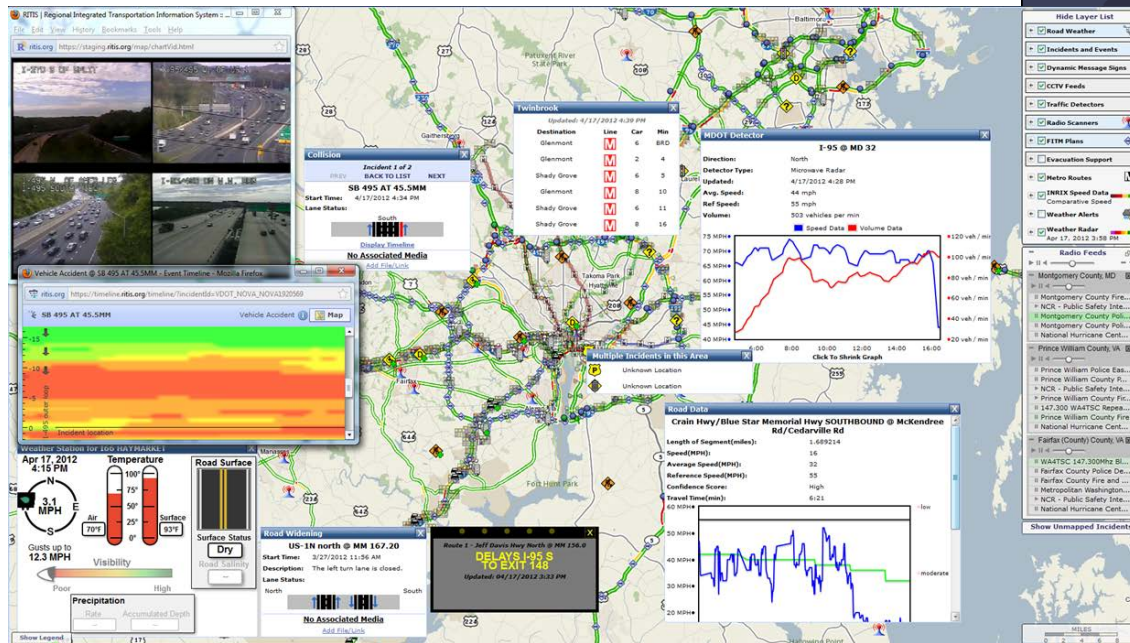
- Getting basic level TSMO 101 agency wide
  - GETP
  - CITE as a resource
  - LTAP

- TBU, MPO, FHWA and other agency Collaboration



# MARYLAND USE OF DATA TECHNOLOGY IN MOBILITY REALM

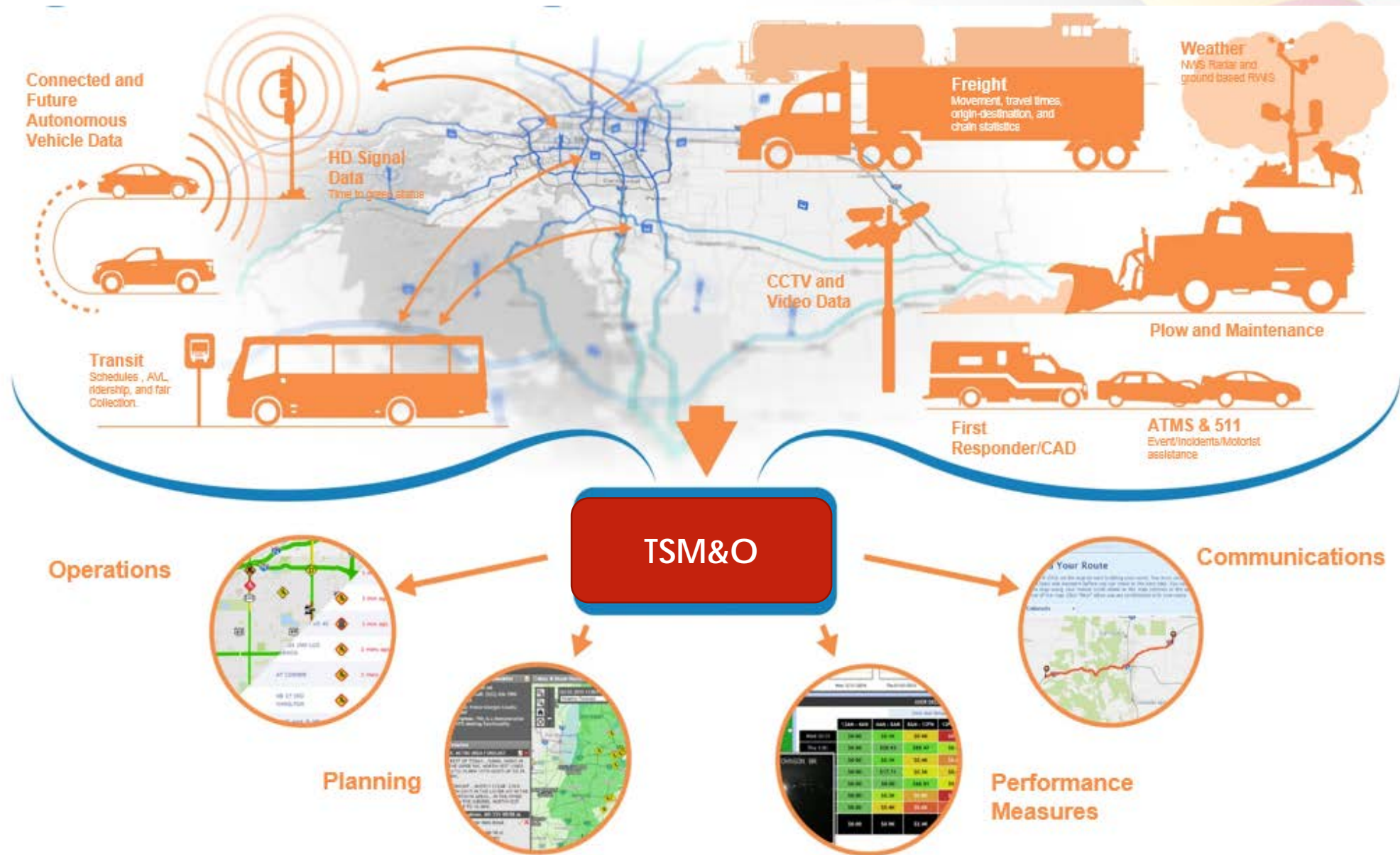
- Real time applications
- Archived data applications
- Combination of in-house tools and university of maryland CATT lab suite of tools (RITIS)



9:00 AM	9:15 AM	9:30 AM	9:45 AM	10:00 AM	10:15 AM	10:30 AM	10:45 AM	11:00 AM	11:15 AM	11:30 AM
100	100	97.43	93.92	98.01	96.49	97.13	97.78	94.27	97.54	98.01
100	100	100	93.94	100	99.64	99.39	100	89.82	96.24	93.7
13.45	13.37	15.7	14.77	17.08	15.67	18.42	33.45	55.32	94.97	89.24
18.79	18.46	15.41	13.14	18.83	17.11	17.21	32.85	29.43	83.27	89.33
19.08	20.52	21.36	18.61	19.48	21.83	29.45	88.3	83.2	80.78	94.51
35.5	35.77	31.92	37.05	48.85	53.46	65.77	63.33	52.82	96.77	94.74
38.21	40.77	30.9	49.23	62.31	62.33	75.64	75.26	63.46	92.82	96.67
57.82	54.1	49.1	46.54	76.28	100	100	97.69	91.79	100	100
68.89	45.97	42.78	60.97	77.92	100	99.17	95.69	95.42	100	98.61



# THE ROAD AHEAD IN A CONNECTED/ AUTOMATED FUTURE



# CONTACT INFORMATION

**Joey Sagal, Director**

Office of Transportation Mobility & Operations

Maryland Department of Transportation

State Highway Administration

410-582-5605

[JSagal@mdot.maryland.gov](mailto:JSagal@mdot.maryland.gov)



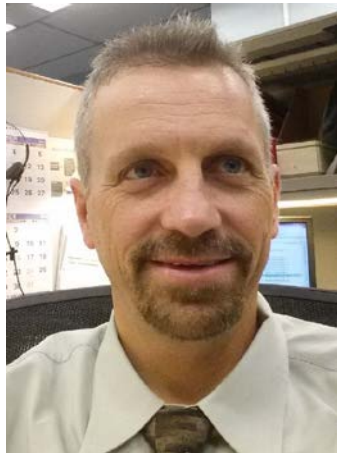
U.S. Department of Transportation  
Federal Highway Administration

# Q&A

## Panel Discussion



# Questions & Answers for our Panel



**Jim Hunt,**  
FHWA



**Chris Hilyer,**  
Alabama DOT



**Brian Kary,**  
Minnesota DOT



**Joey Sagal,**  
Maryland DOT







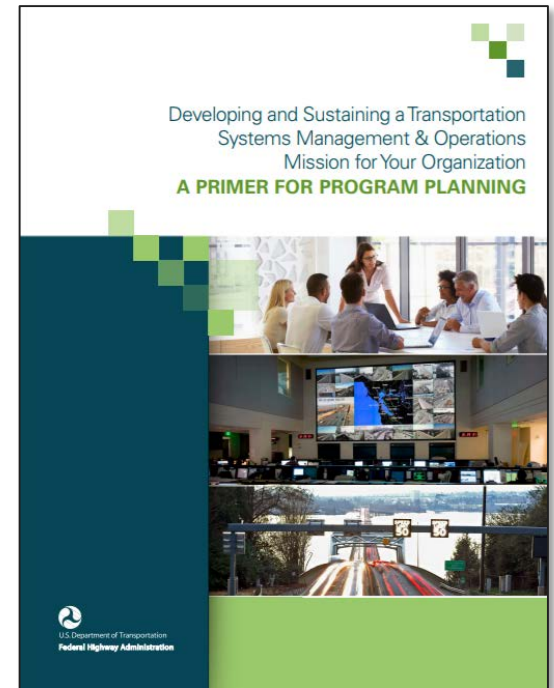
U.S. Department of Transportation  
Federal Highway Administration

# Closing



# Resources

- FHWA Organizing and Planning for Operations Website
  - ▶ <https://ops.fhwa.dot.gov/plan4ops/index.htm>
- FHWA TSMO Website
  - ▶ <https://ops.fhwa.dot.gov/tsmo/index.htm>
- National Operations Center of Excellence
  - ▶ <https://transportationops.org/>
- FHWA TSMO Program Planning Primer
  - ▶ <https://ops.fhwa.dot.gov/publications/fhwahop17017/index.htm>
- TSMO Fact Sheets
  - ▶ [https://ops.fhwa.dot.gov/plan4ops/focus\\_areas/integrating/tsmo\\_factsheets.htm](https://ops.fhwa.dot.gov/plan4ops/focus_areas/integrating/tsmo_factsheets.htm)





# Technical Assistance

FHWA has availability to conduct a one-day **TSMO Program Planning Workshop**

If your agency is interested in hosting, contact Jim Hunt  
([Jim.Hunt@dot.gov](mailto:Jim.Hunt@dot.gov), 202-680-2679)



# Thank you for attending!

