MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

TSMO

MARYLAND TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS

NYSDOT TSMO Program Plan Workshop
Albany, NY
November 7, 2018

Joey Sagal
MDOT State Highway Administration

ABOUT MARYLAND

AMERICA IN MINIATURE

- Home to **6.1 million people**
- **42nd** in size
- **19th** in population, **6th** in density
- Geographic and socio-economic diversity

ABOUT MARYLAND DOT (MDOT)

MDOT comprises of six business units and an Authority

- The Secretary's Office
- State Highway Administration
- Maryland Transit Administration
- Motor Vehicle Administration
- Maryland Port Administration
- Maryland Aviation Administration
- *Maryland Transportation Authority*

**Unique multi-modal organizational framework for integrated transportation solutions**

MDOT Excellerator drives the agency with ten tangible results and performance measures with ONE MDOT Approach

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

17%
MDOT SHA Lane Miles

Maryland Roadway Network

66%
Volume on MDOT SHA Facilities
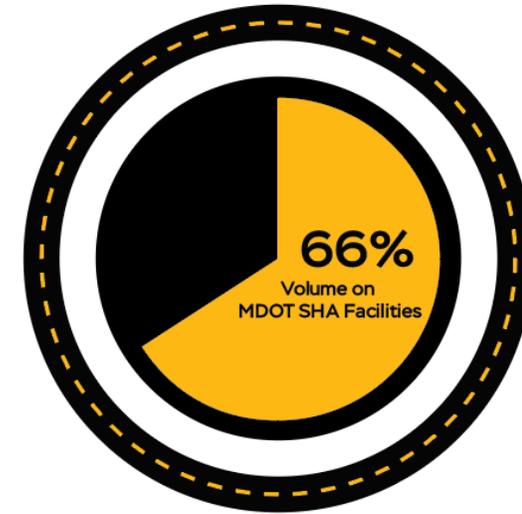
Maryland Traffic Volume

Huge Emphasis on
Transportation Systems Management & Operations (TSMO)

ICM is a KEY COMPONENT for TSMO Implementation

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WHAT ARE CURRENT TRENDS IN MARYLAND?

- VMT is at all time high
- Nation's 2ND highest commute times
- B-W region is one of the most congested regions in US
- Oversaturated conditions leads to higher unreliability
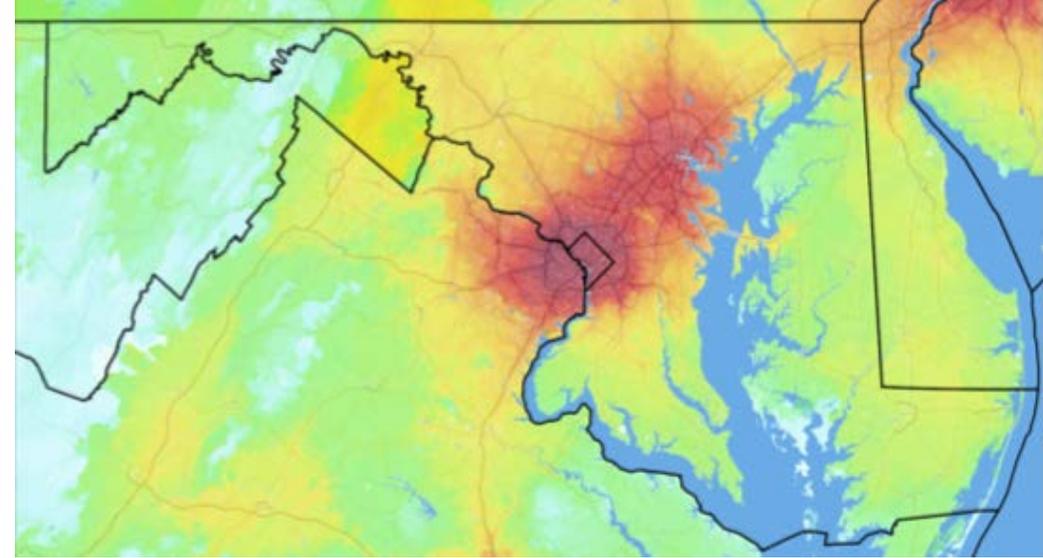
Maryland experienced an
ALL-TIME RECORD
number of VMT in 2017.

60 Billion
VMT

2.9% Increase
FROM 2016

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ADMINISTRATION
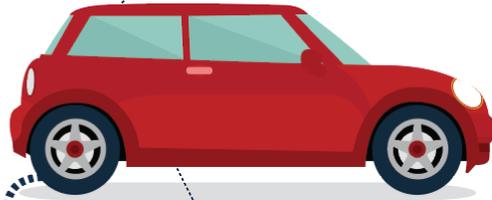
ONGOING MAJOR INITIATIVES WITH ICM OPPORTUNITIES

- **MDOT SHA TSMO Strategic Plan**

- **CHART Traffic Ops Strategies**

- **Traffic Relief Plan Projects**
  - P3 Initiatives (I-495/ I-270) ETLs
  - I-270 ICM Project
  - I-695 TSMO Project
  - Smart Signal Corridors

- **MDOT CAV Initiatives**

WHAT IS TSMO?

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."

Or put another way:

"The intent of TSMO is to effectively manage and operate existing facilities and systems to maximize their full service potential. TSMO strategies aim to optimize capacity that is limited by recurring and non-recurring congestion."

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MDOT SHA MOTIVATION

- **Focus on Transportation Systems Management & Operations (TSMO)**
- System Efficiency & Reliability Key Driver
- 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
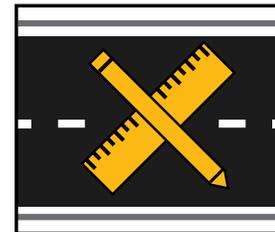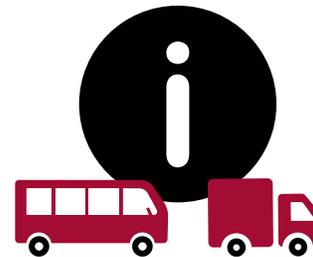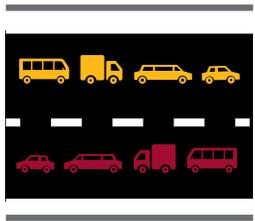
MD TSMO PLAN BACKGROUND

- MDOT SHA received FHWA SHRP2 L06 Implementation Assistance to "Organize for Reliability"

- CMM workshops facilitated TSM&O related conversations internally and externally.

- Outcome of the L06 project is the **SHA TSM&O Strategic Implementation Plan**

Capability Maturity Model

- **COLLABORATION** — Relationships with public safety agencies, local governments, metropolitan planning organization, and the private sector.
- **IMPROVED TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS EFFECTIVENESS**
- **ORGANIZATION & WORKFORCE** — Organizational structure and staff capacity, development, and retention.
- **BUSINESS PROCESS** — Formal scoping, planning, programming, and budgeting.
- **CULTURE** — Technical understanding, leadership, policy commitment, outreach, and program authority.
- **SYSTEMS & TECHNOLOGY** — Systems architecture, standards, interoperability, standardization, and documentation.
- **PERFORMANCE MEASUREMENT** — Measure definition, data acquisition, analysis, and utilization.

Source: FHWA/ AASHTO

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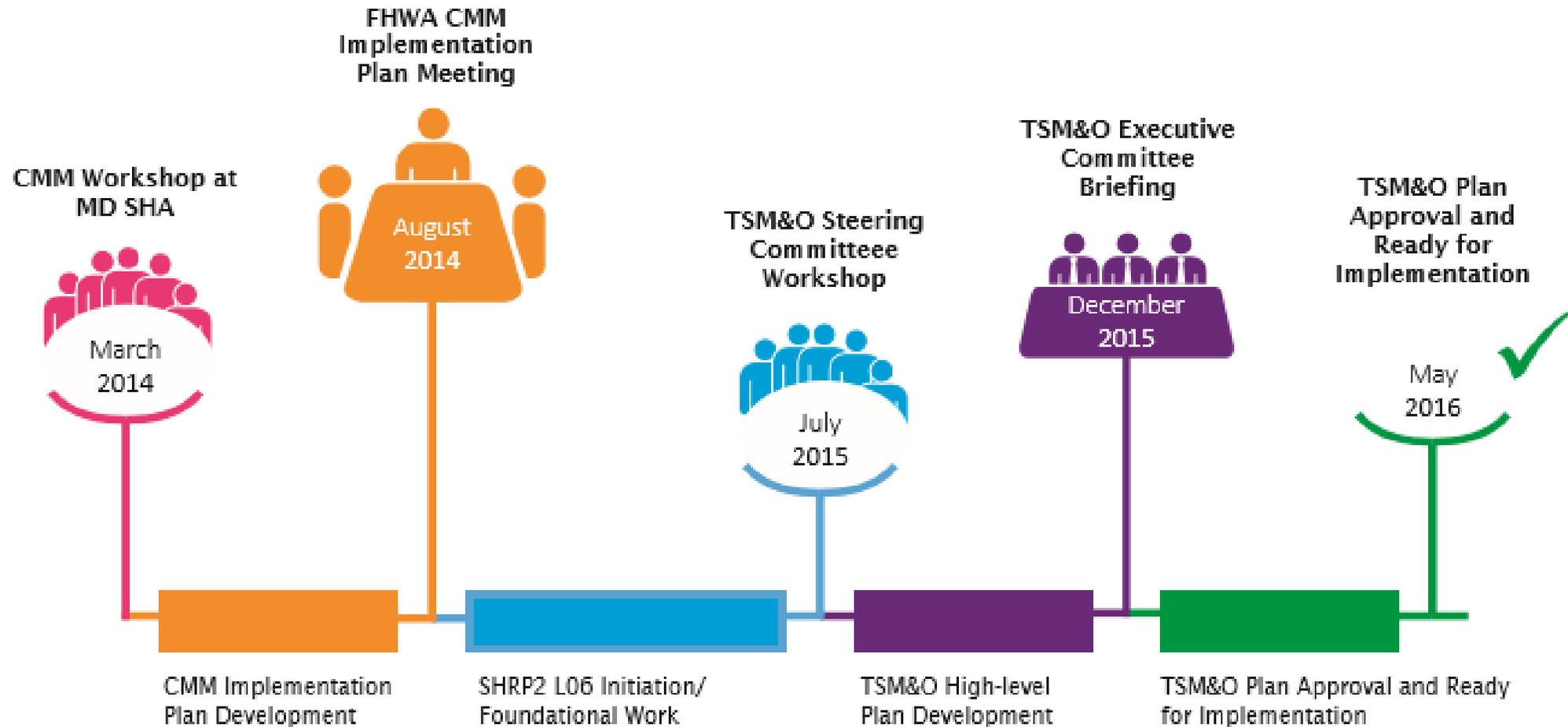
TSM&O Plan officially adopted in August 2016.
FHWA CMM Post Evaluation/ Project Wrap-Up Meeting – July 2017

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
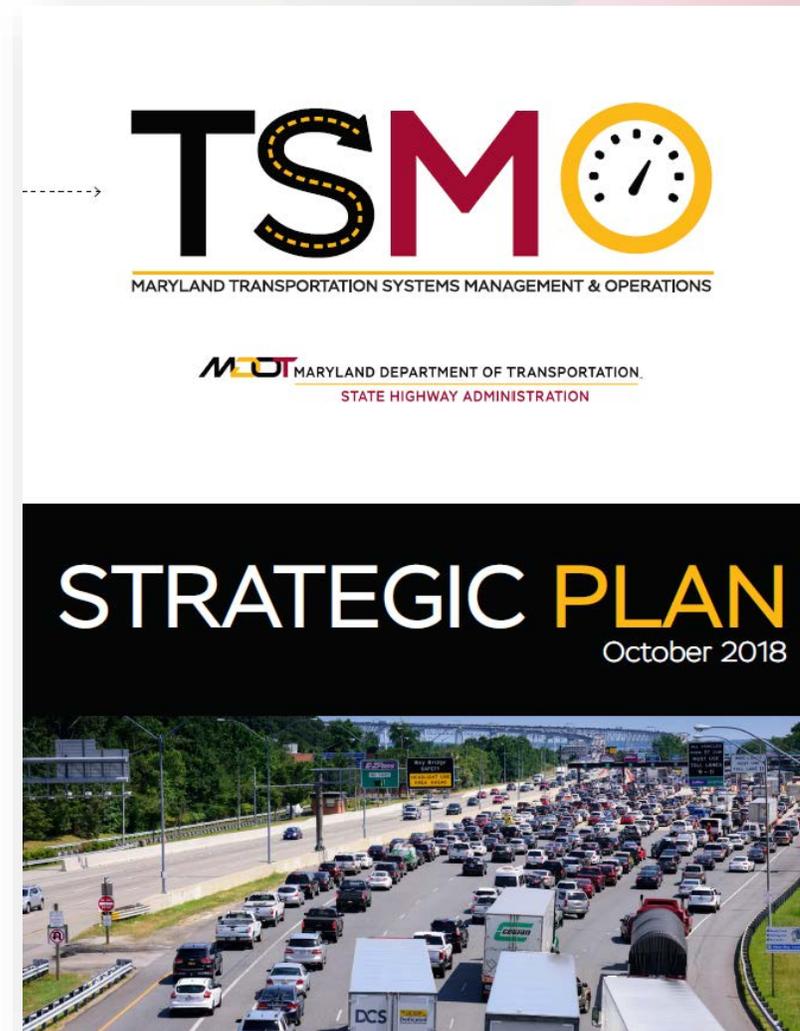
2018 TSMO STRATEGIC PLAN

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 maximize the ability of Maryland's transportation system to consistently move people and goods.

GOAL 1
TSM&O

BUSINESS PROCESSES & COLLABORATION

GOAL 2

SYSTEMS & TECHNOLOGY

GOAL 3

DATA, ANALYSIS & PERFORMANCE MANAGEMENT

GOAL 4

CUSTOMER EXPERIENCE & ENGAGEMENT

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2018 TSMO STRATEGIC PLAN

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TSMO
MARYLAND TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS

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

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GOAL 1
Business Processes & Collaboration

Objective 1.1
Incorporate TSMO in MDOT SHA policies, programs and standard practices

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

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

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

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

Objective 1.2
Implement and institutionalize a TSMO Master Plan

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

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

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

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

Objective 1.3
Promote a culture to mainstream TSMO within and outside MDOT SHA at all levels

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

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

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 1.3d
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

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

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

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

Objective 2.2
Develop Integrated Corridor Management (ICM) capabilities for multimodal passenger and freight movement

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

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

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

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

Objective 2.3
Develop and apply technological foundations for Connected and Automated Vehicles (CAV)

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

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

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

GOAL 3
Data, Analysis & Performance Management

Objective 3.1
Implement a comprehensive data driven performance management program to support TSMO

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

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

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

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

Objective 3.2
Advance data governance, analysis and modeling capabilities to inform planning, operational and TSMO decisions

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

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

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

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

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

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

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

Strategy 4.1d
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

Objective 4.2
Raise awareness of TSMO and its general understanding by the traveling public

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

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

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

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

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.

MDOT MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

Version 2.0 dated 10/10/2018

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

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MDOT SHA CHART PROGRAM

Coordinated **H**ighways **A**ction **R**esponse **T**eam

Improving mobility and safety for the users of Maryland's highways through the application of ITS technology and interagency teamwork

- Traffic & Roadway Monitoring
- Incident Management
- Travelers Information
- Traffic Management
- Emergency & Weather Management
- Statewide Radio Communications
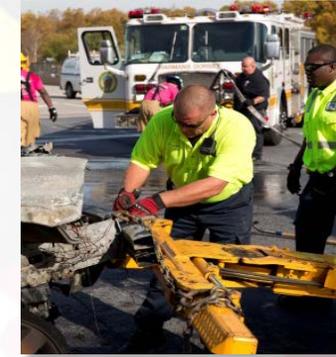
ANNUAL BENEFITS

- Annual User Cost Savings: Over **$1.5 Billion**
- Reduction in Delay: 44 Million vehicle/hours
- Average Incident Duration: 24 minutes
- Provides over 70,000 Total Responses (*incidents & assists*)

MAXIMIZING THE SYSTEM WITH TSMO

MAXIMIZING SYSTEM PERFORMANCE
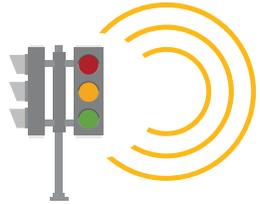
SMART SIGNALS

INTEGRATED CORRIDOR MANAGEMENT
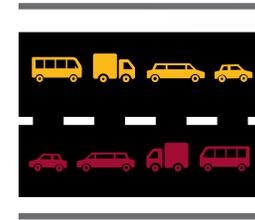
MANAGED LANES

HARD SHOULDER RUNNING
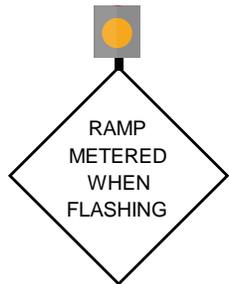
RAMP METERING
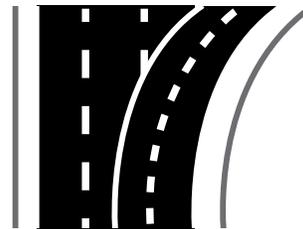
JUNCTION CONTROL
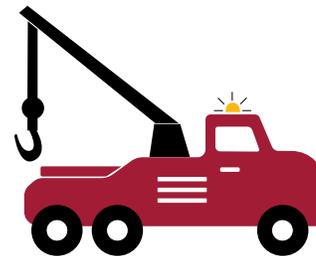
INCIDENT MANAGEMENT
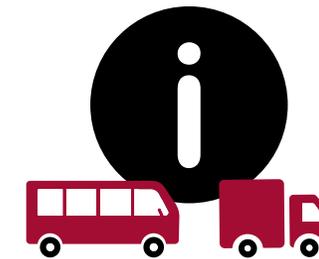
TRAVELER INFORMATION

MAXIMIZING THE SYSTEM WITH TSMO

INVOLVEMENT THROUGHOUT THE PROCESS
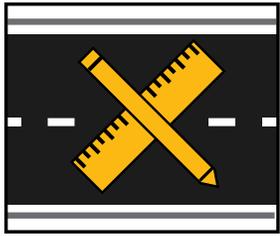
DESIGN

PLANNING

CONSTRUCTION

INNOVATION TO PROVIDE MAXIMUM VALUE

DATA DRIVEN APPROACHES FOR DECISION MAKING
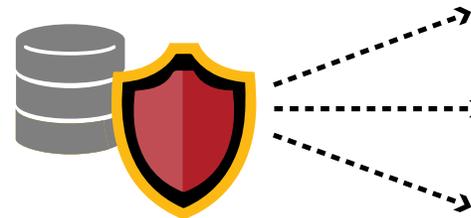
CAV INCORPORATION

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.
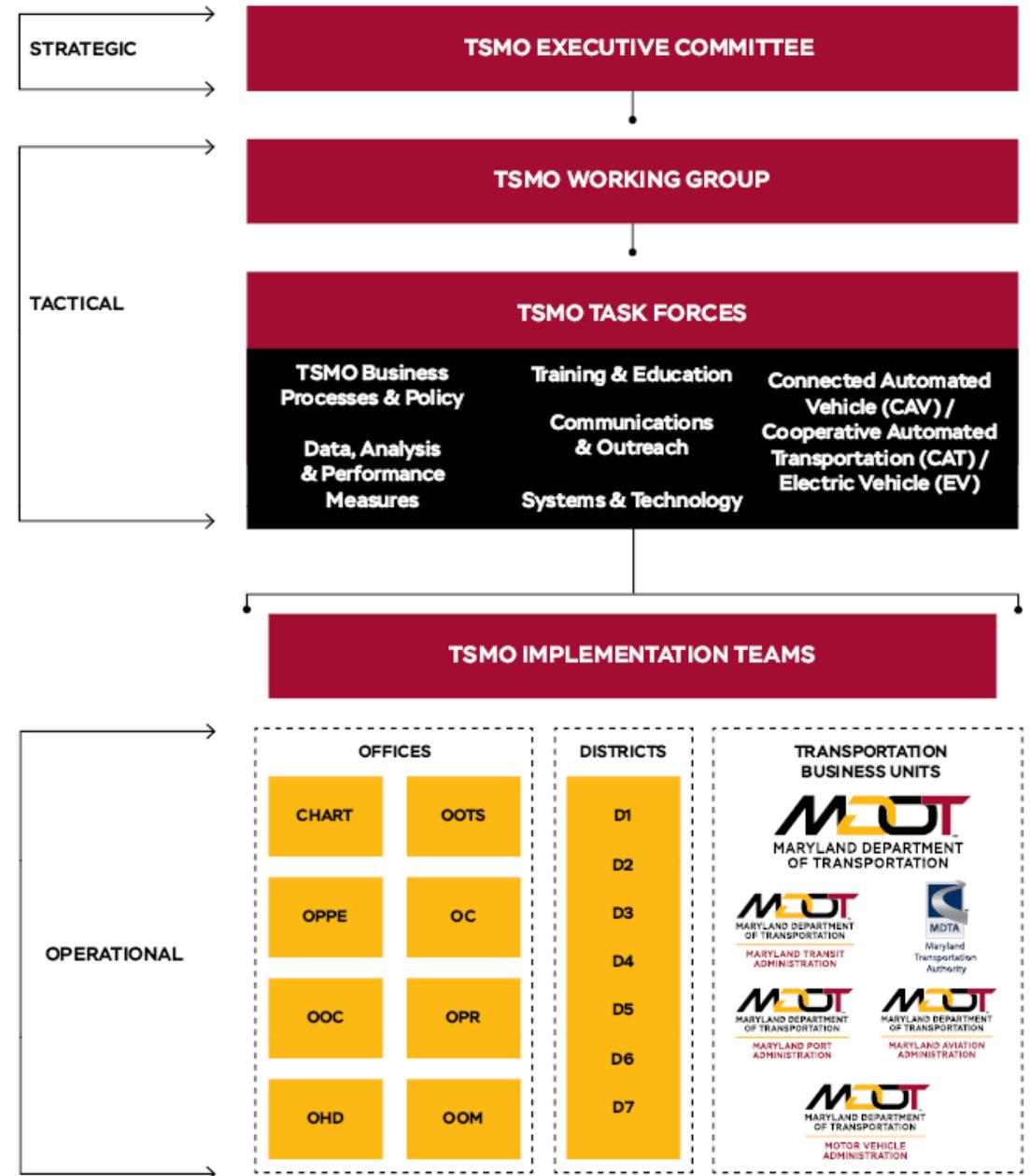
TSMO ORGANIZATION STRUCTURE

- **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)

SYSTEMS DEPLOYMENT APPROACHES

- **Implement Active Traffic Management Infrastructure**

- **Implement Multimodal and Demand Management Strategies**
  - Implement real-time traveler information systems at P&R facilities and transit stations
  - Smart Truck Parking Systems
  - Enhancing bike routes and bike infrastructure
  - Incentivize travel choices

- **Build on existing parterships and institutional arrangements**

CUSTOMER FOCUSED PERFORMANCE MEASURES

- Accessibility/Connectivity

- Reliability (Segment Level/ Trip Reliability)

- Market Segments (businesses, commodity flows)

- Freight Fluidity (supply chains)

- Economic Indicators

Fluctuations in Demand

Crashes

Inclement Weather

Work Zones

Poorly Timed Traffic Signals
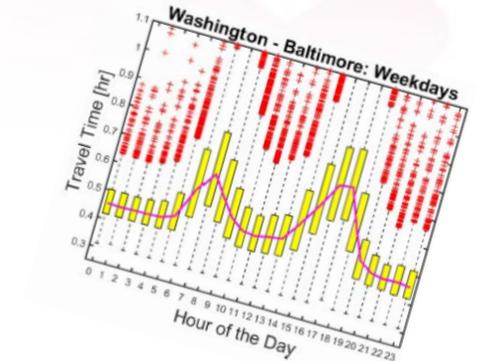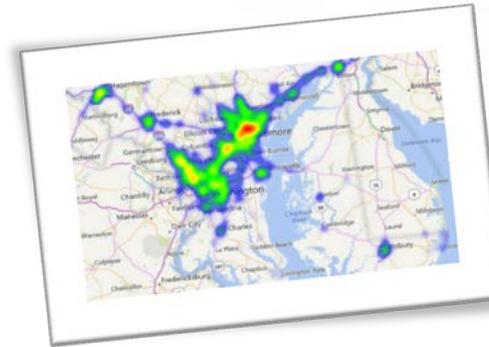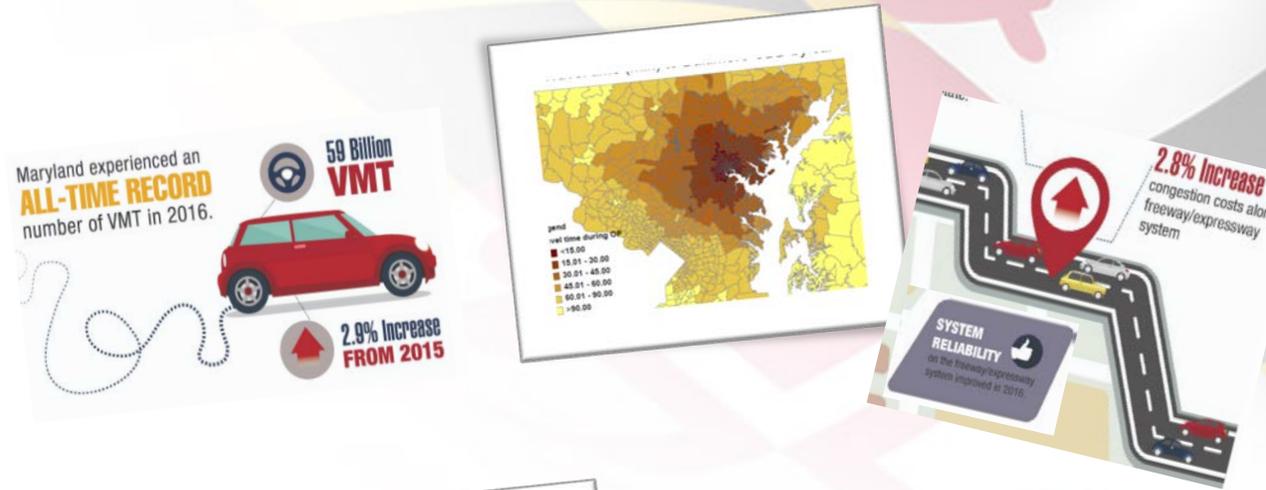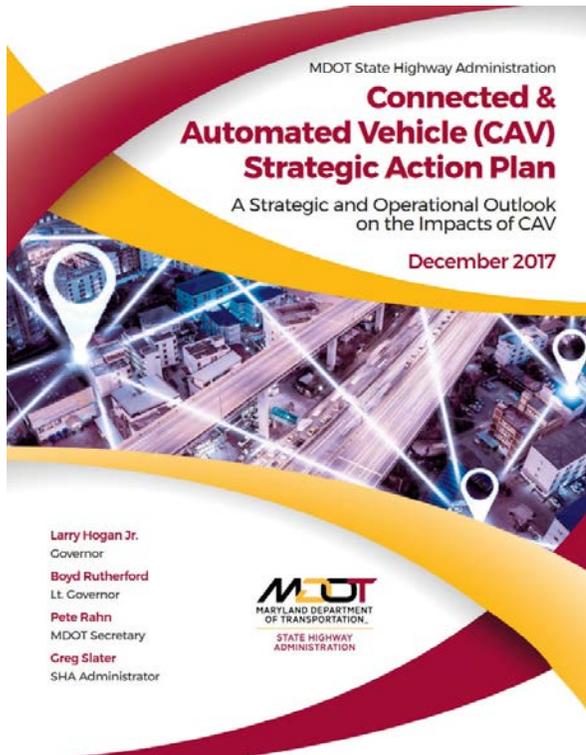
MDOT CONNECTED AUTOMATED VEHICLE (CAV) INITIATIVES

- MDOT is developing a CAV Vision for all of Maryland
- MDOT SHA published a CAV Strategic Action Plan.
- MDOT SHA CAV communications and outreach
- Private sector solicitations for piloting CAV technology through the Expression of Interest
- Pilot Deployments on US 1

✓ Adaptive Signal Control

✓ ITS Devices for incident management

✓ DSRC Pilot Deployment for CAV testing
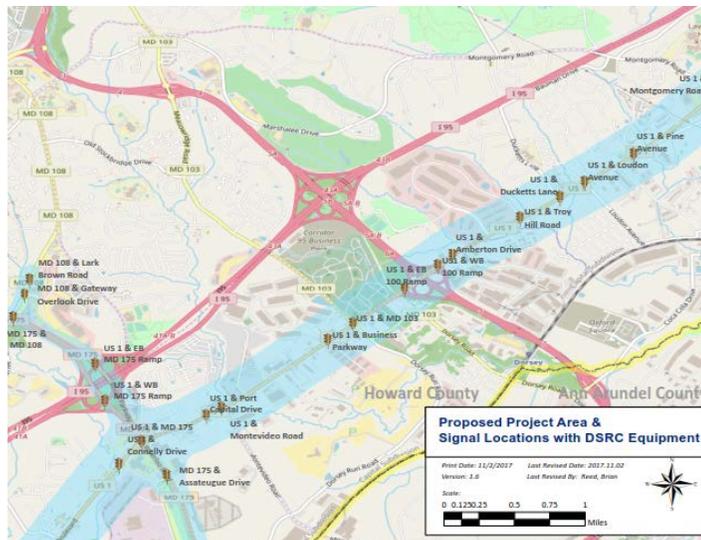
THE ROAD AHEAD IN A CONNECTED/ AUTOMATED FUTURE
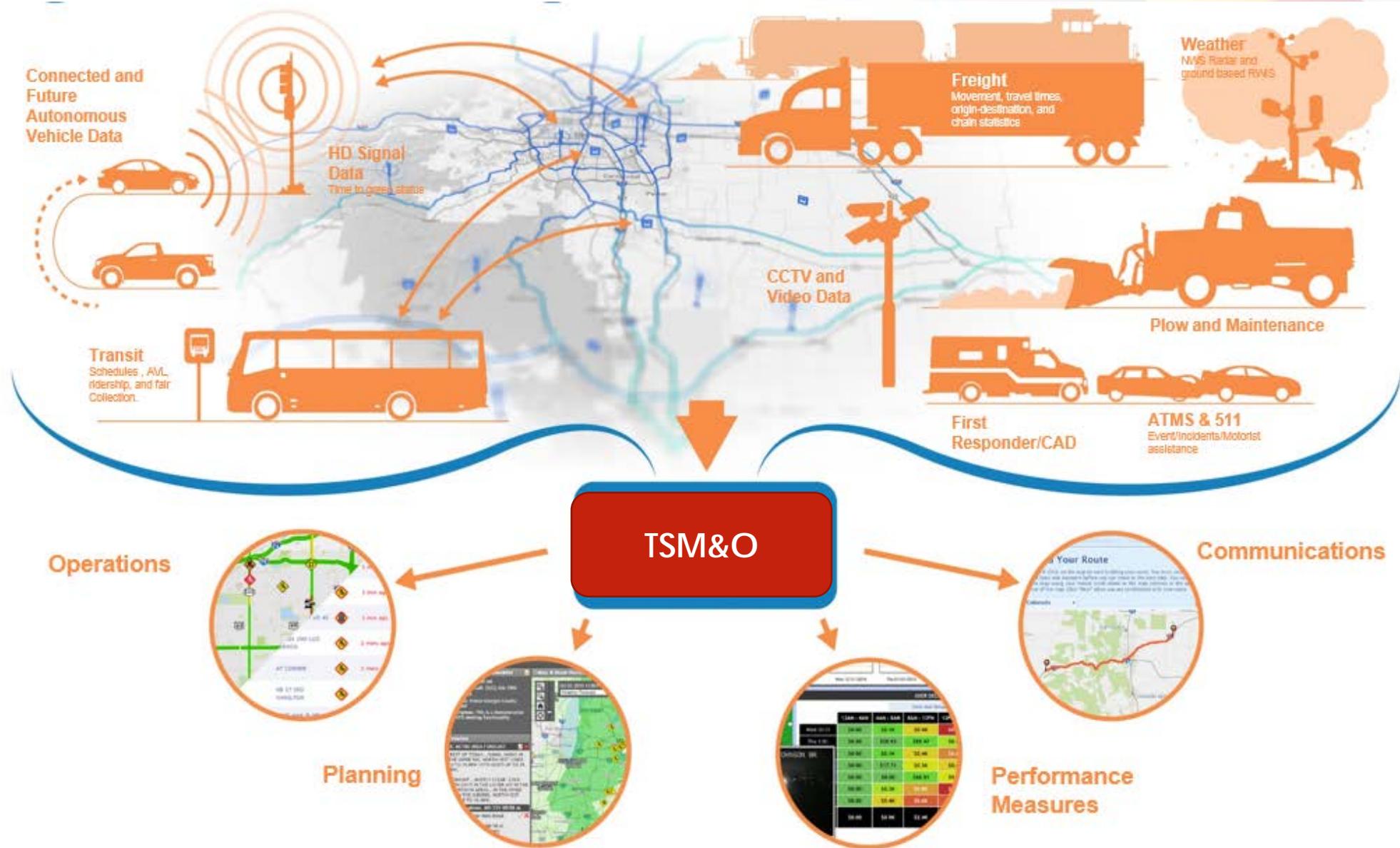
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