MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

INTEGRATED CORRIDOR MANAGEMENT IN MARYLAND

National Operation Center of Excellence (NOCoE) Webinar

October 16, 2018

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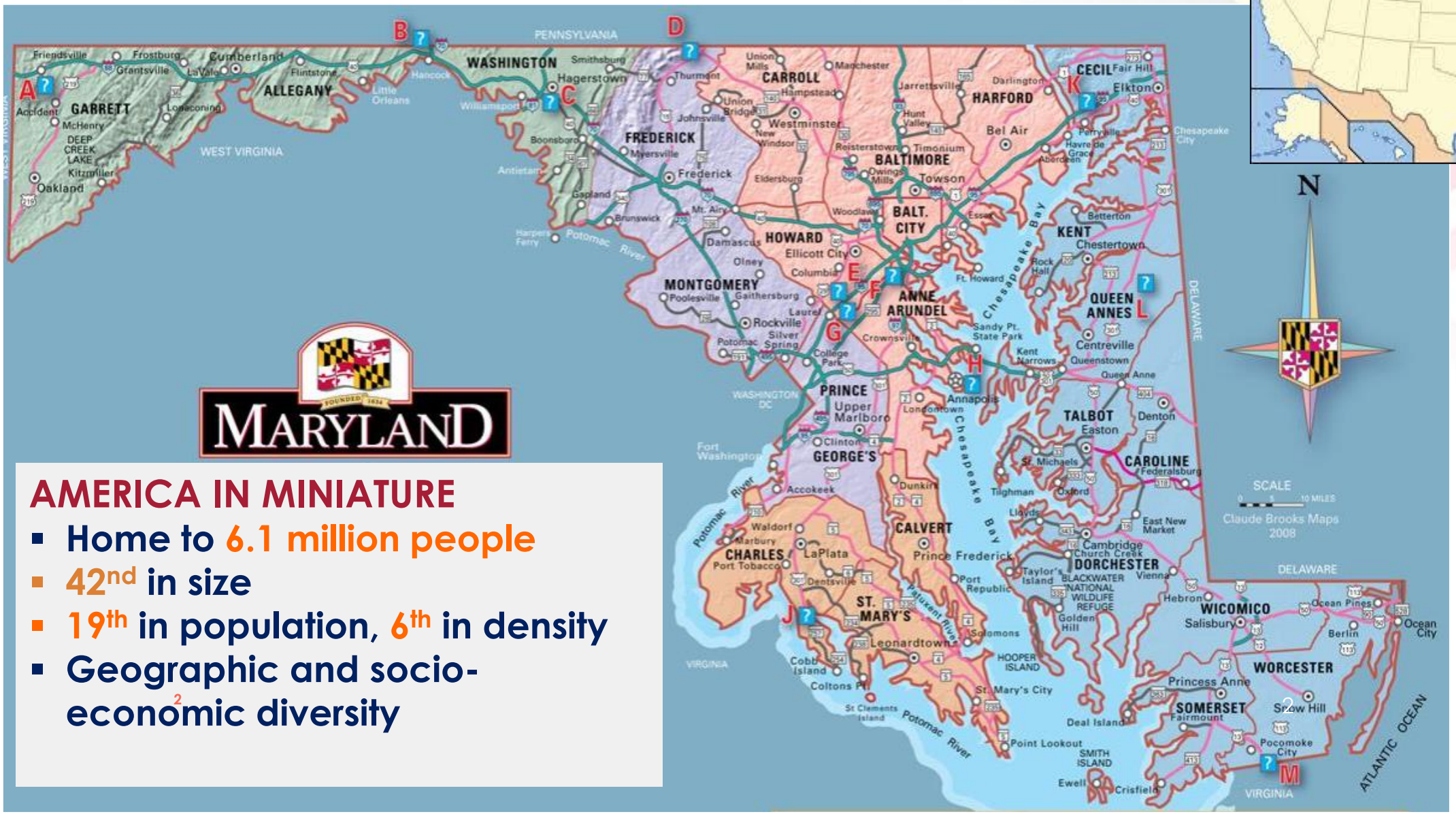
ABOUT MARYLAND



AMERICA IN MINIATURE

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

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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 MARYLAND DEPARTMENT OF TRANSPORTATION
EXCELLERATOR

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

MDOT MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

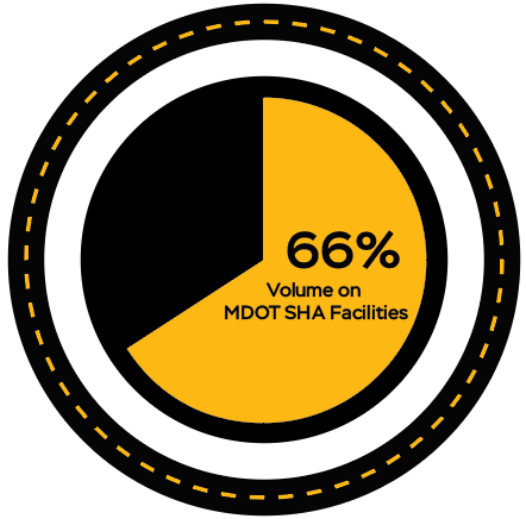
ABOUT MDOT STATE HIGHWAY ADMINISTRATION

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

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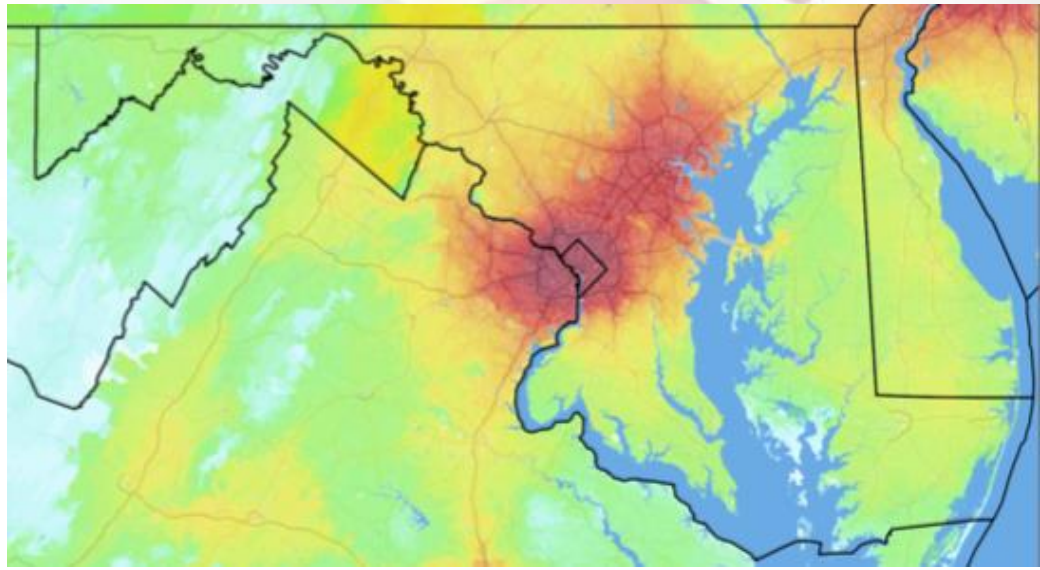
WHAT ARE CURRENT TRENDS IN MARYLAND?

- 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



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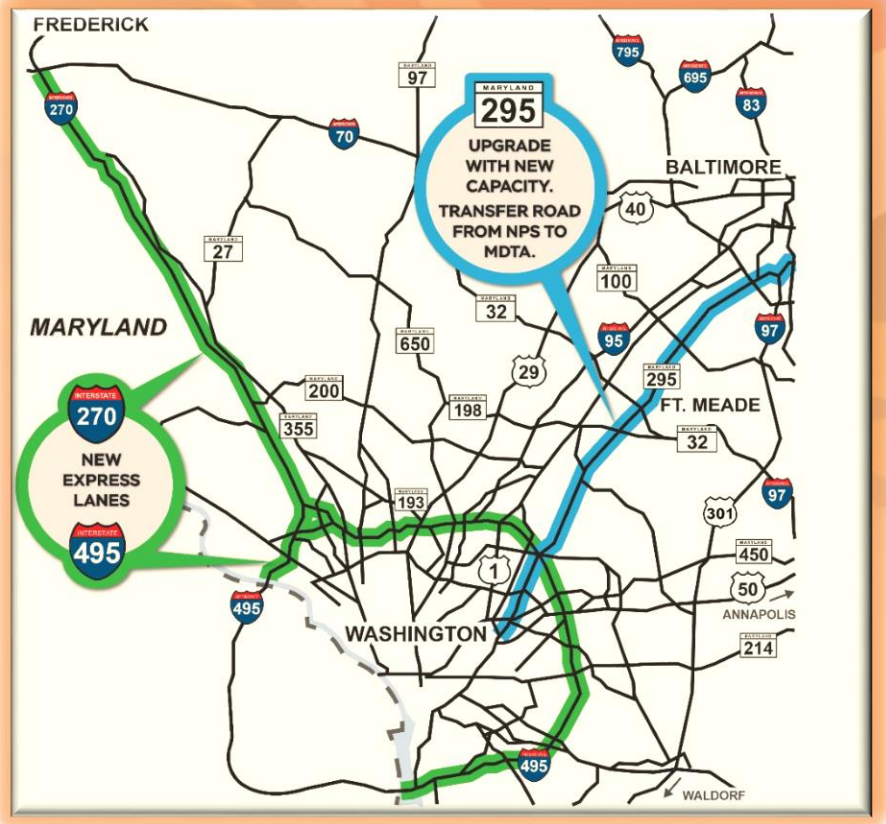
ONGOING MAJOR INITIATIVES WITH ICM OPPORTUNITIES

- **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**



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MDOT SHA TSMO PROGRAM

- **Integrated approach for planning, engineering operations, and maintenance to improve the security, safety, and reliability of our transportation system.**
- Provides Vision, Purpose, Goals, Objectives and Strategies

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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ONGOING TSMO INITIATIVES THAT ENABLES ICM

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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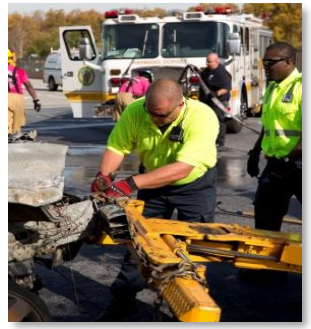
MDOT SHA CHART PROGRAM

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 User Cost Savings: Over **$1.5 Billion**
- Average Incident Duration: 24 minutes
- Provides over 70,000 Total Responses

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MARYLAND ICM FRAMEWORK

Integrated *. . combining or coordinating separate agencies so as to provide a harmonious, interrelated "whole" . . .*

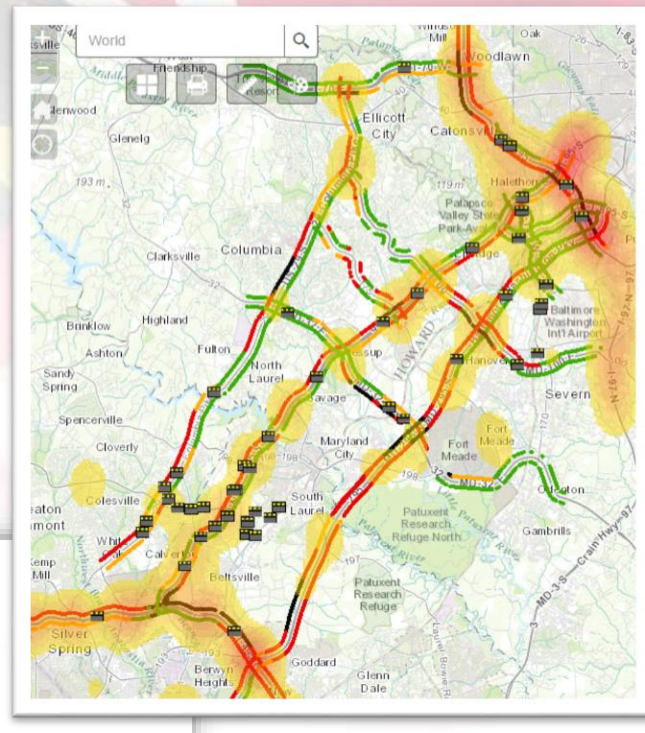
Corridor *. . a travel shed of trips anchored by one or more highway, arterial, or rail line*

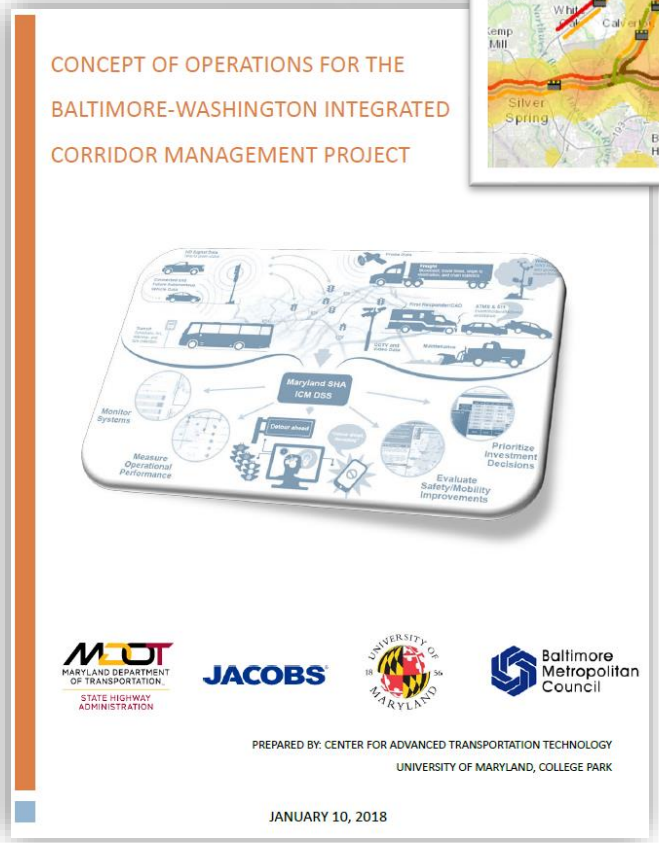
Management *. . jointly managing all the travel therein in order to achieve defined objectives*

Source: FHWA

MARYLAND ICM PILOTS

- MDOT SHA received FHWA grants to develop ConOps on
  - I-270 Corridor (2008)
  - I-95 Corridor (2018)
- Pilots Provided Framework for mainstreaming ICM
- ICM seen as a key to TSMO success





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ICM GOALS

- Improve mobility, throughput, and travel reliability
- Improve safety and incident response
- Disseminate reliable, real-time information
- Promote multi-modalism and demand management
- Promote economic vitality

Objectives and performance measures for each goal

INTEGRATION

Institutional

Operational

Technical

CAPACITY: Active Traffic Management

DEMAND: Active Travel Management

Integrated Corridor Management

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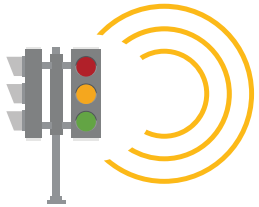
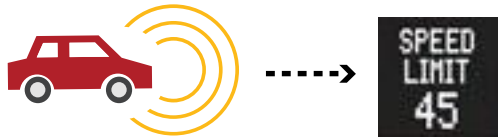
ICM - CAPACITY MANAGEMENT

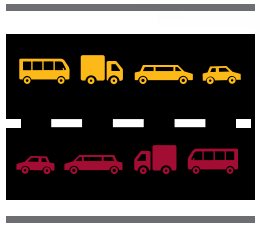
TSMO
MARYLAND TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS



SMART SIGNALS

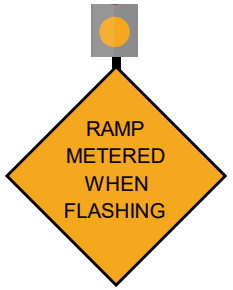


SPEED HARMONIZATION



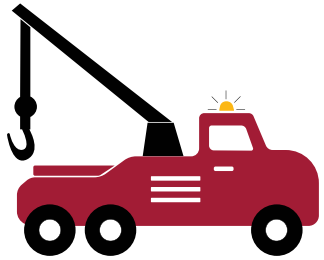
MANAGED LANES

HARD SHOULDER RUNNING

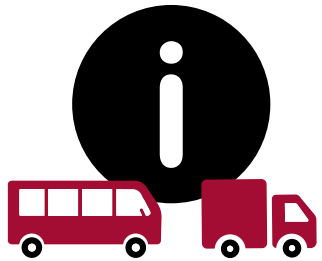


RAMP METERING

JUNCTION CONTROL



INCIDENT MANAGEMENT



TRAVELER INFORMATION

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ICM - DEMAND MANAGEMENT

SHORT TERM

- Provide real-time multimodal traveler information
- Promote car-pooling, park and ride infrastructure
- Reducing transit headways
- Modifying parking policies and fees
- Incentivize trip-making/ modal choices (gamification, rewards)
- Employer Collaboration - Telework/ Flex-work
- Freight Delivery Scheduling

LONG TERM

- Land use policies and zoning (with local lead)
- Non-motorized transportation infrastructure
- Formalize ride-sharing/ ride-hailing industry partnerships
- Invest in CAV infrastructure for shared autonomous vehicles
- Alternative urban freight delivery models

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ICM - HIGH LEVEL DESIGN

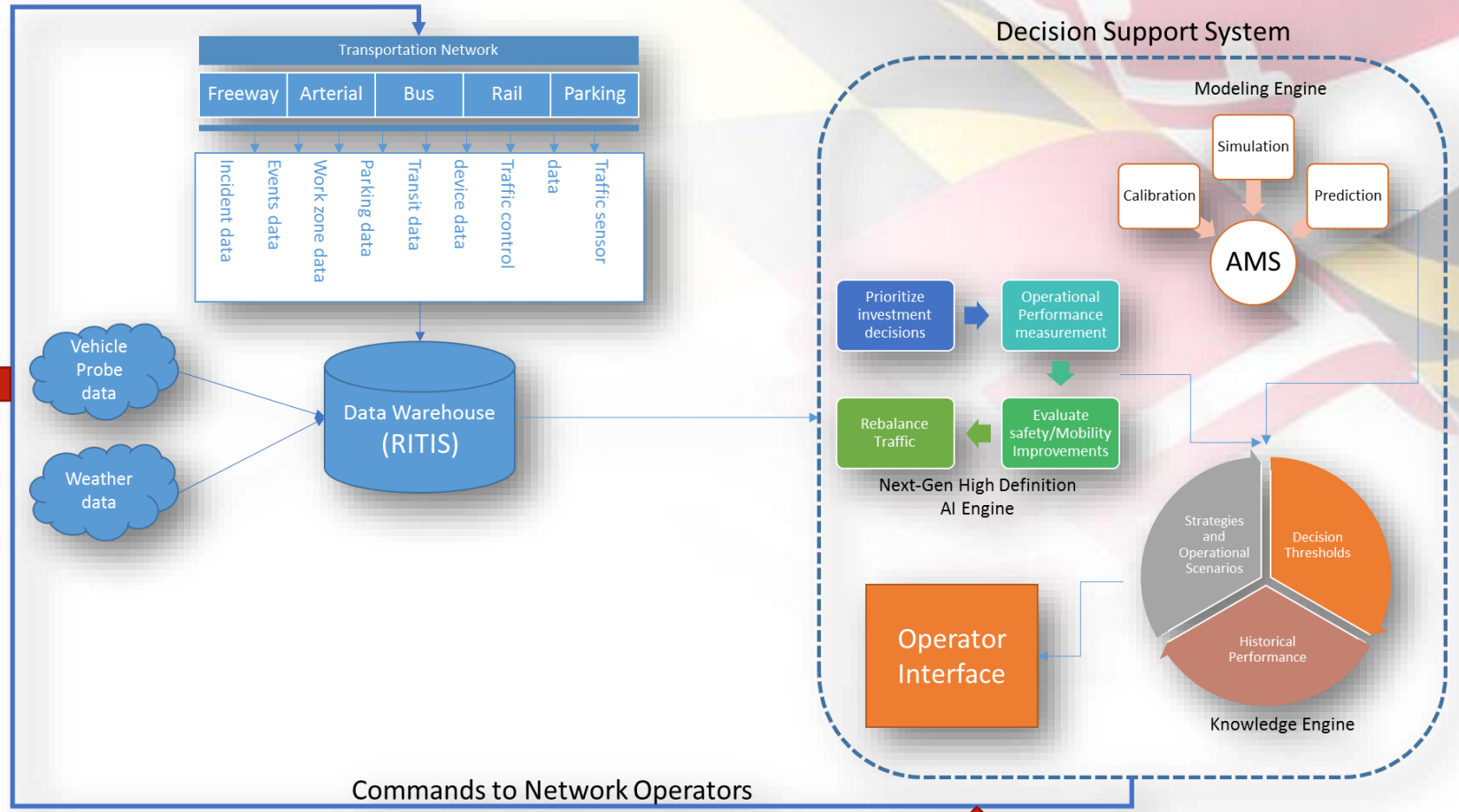
Public website

API and XML feed

Social media

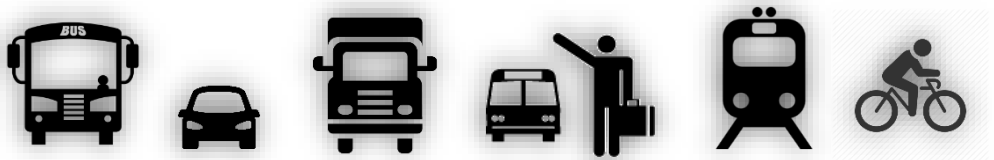
Mobile app

Interactive Voice Response



Application developers

Media



Travelers

Transportation Management Agencies

Virtual ICM Traffic Management Center

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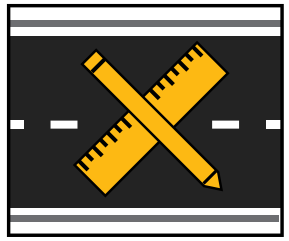
ICM – CONTINUOUS IMPROVEMENT CYCLE

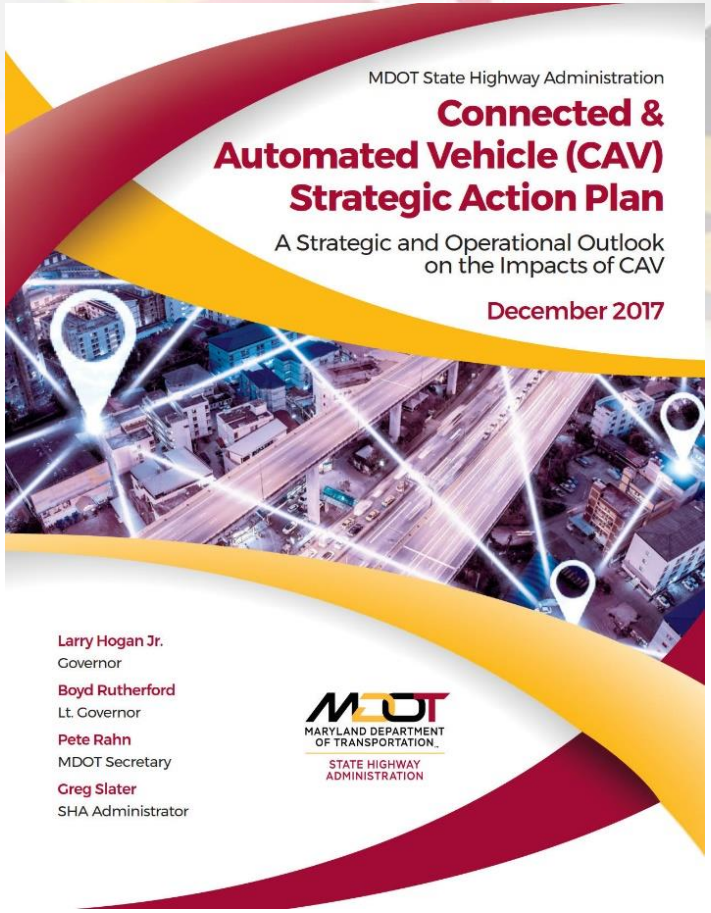
INVOLVEMENT THROUGHOUT THE PROCESS



DESIGN

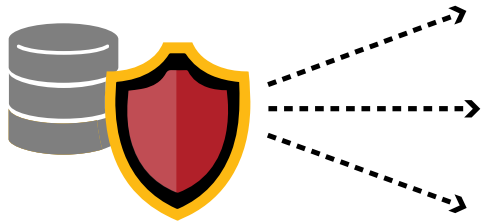
PLANNING

CONSTRUCTION



INNOVATION TO PROVIDE MAXIMUM VALUE

DATA DRIVEN APPROACHES FOR DECISION MAKING



CAV INCORPORTATION

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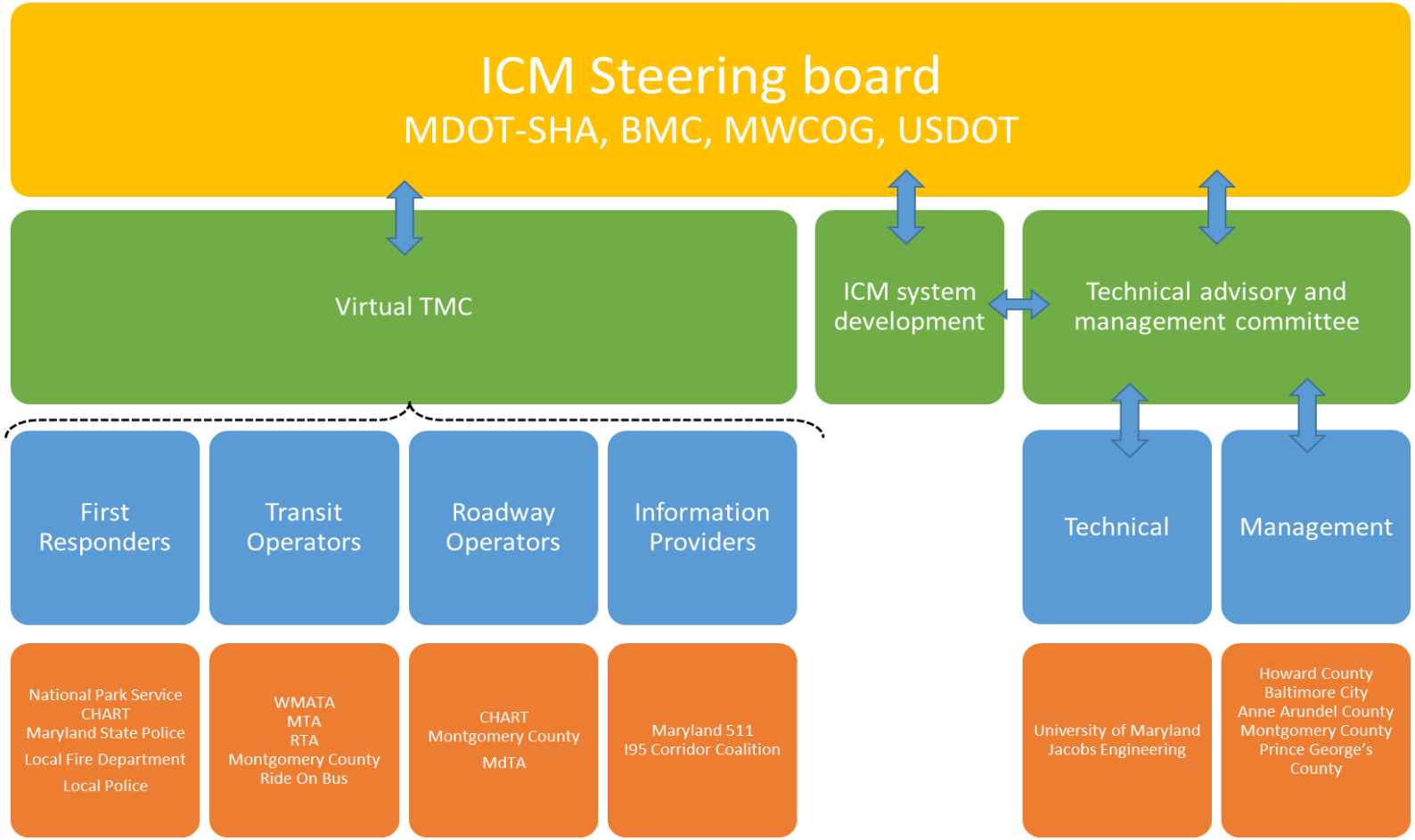
ICM INSTITUTIONAL FRAMEWORK

- **Partners and Stakeholders** Collaboration is critical for ICM Success
- Build upon existing CHART **Institutional Arrangements & Agreements**
- **Formalization of Roles and Responsibilities** for Operational Scenarios



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OPERATIONAL SCENARIOS

The objective of operational scenarios is to allow **all stakeholders to clearly identify their expected role.**

Operational Scenarios:

- describes a **sequence of events and activities carried out by the user, the system and the environment**,
- specifies what triggers the sequence, who or what performs each step, when communications occur and to whom or what [e.g., a log file], and what information is being communicated.

The scenarios cover all:

- **Normal conditions**
- **Failure events**
- **Anomalies**
- **Stress conditions**
- **Maintenance**
- **Exceptions**

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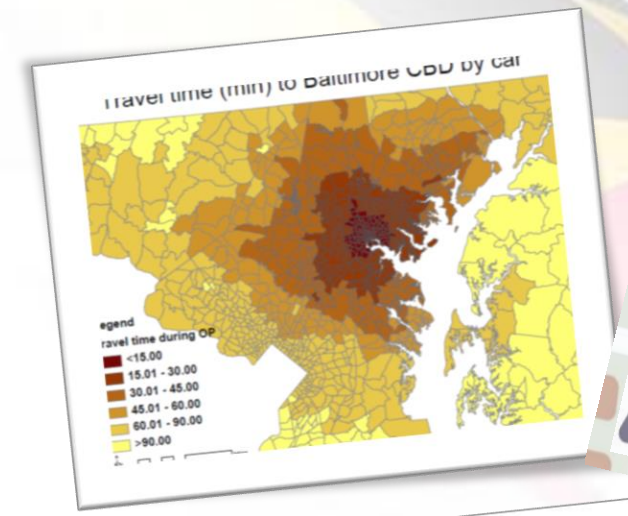
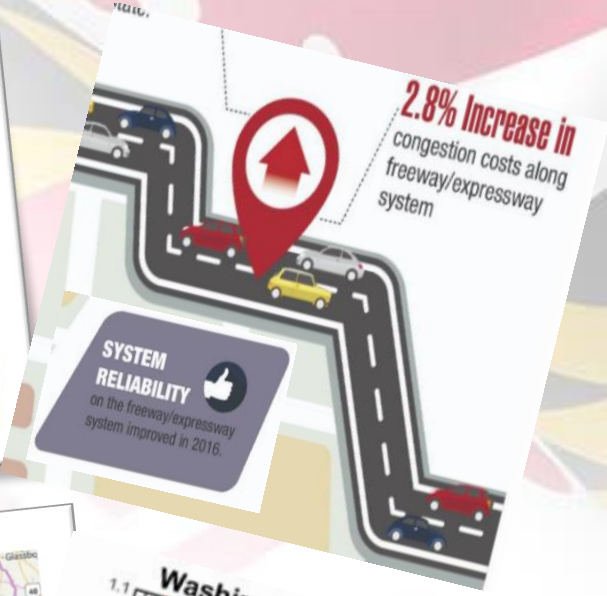
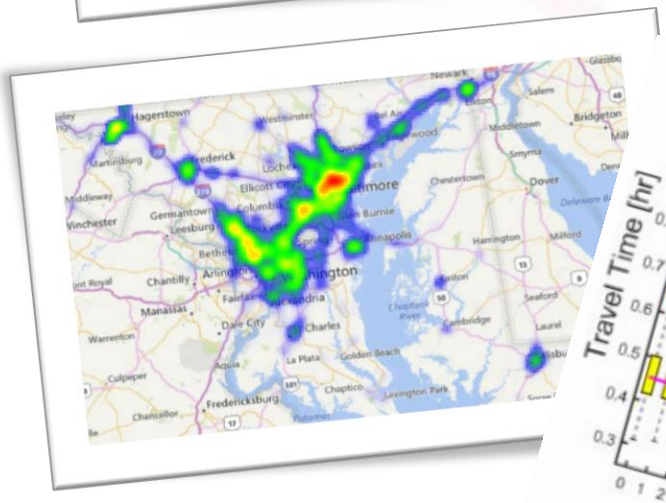
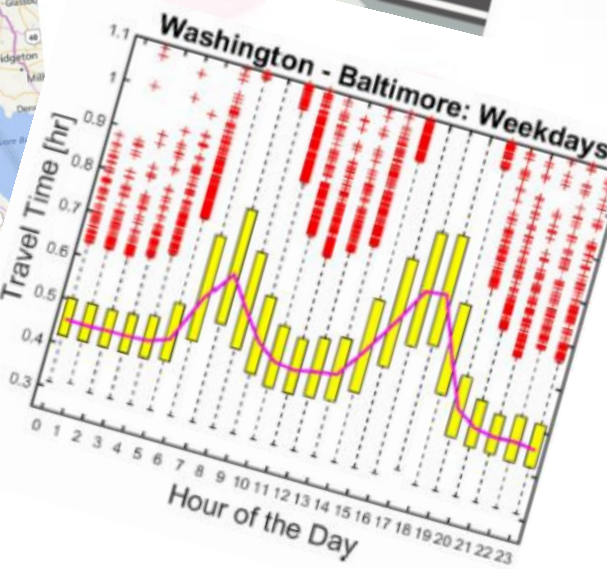
ICM PERFORMANCE MEASURES

- Accessibility/Connectivity
- Reliability (Segment Level/ Trip Reliability)
- Market Segments (businesses, commodity flows)
- Freight Fluidity (supply chains)
- Economic Metrics









Fluctuations in Demand

Crashes

Inclement Weather

Work Zones

Poorly Timed Traffic Signals

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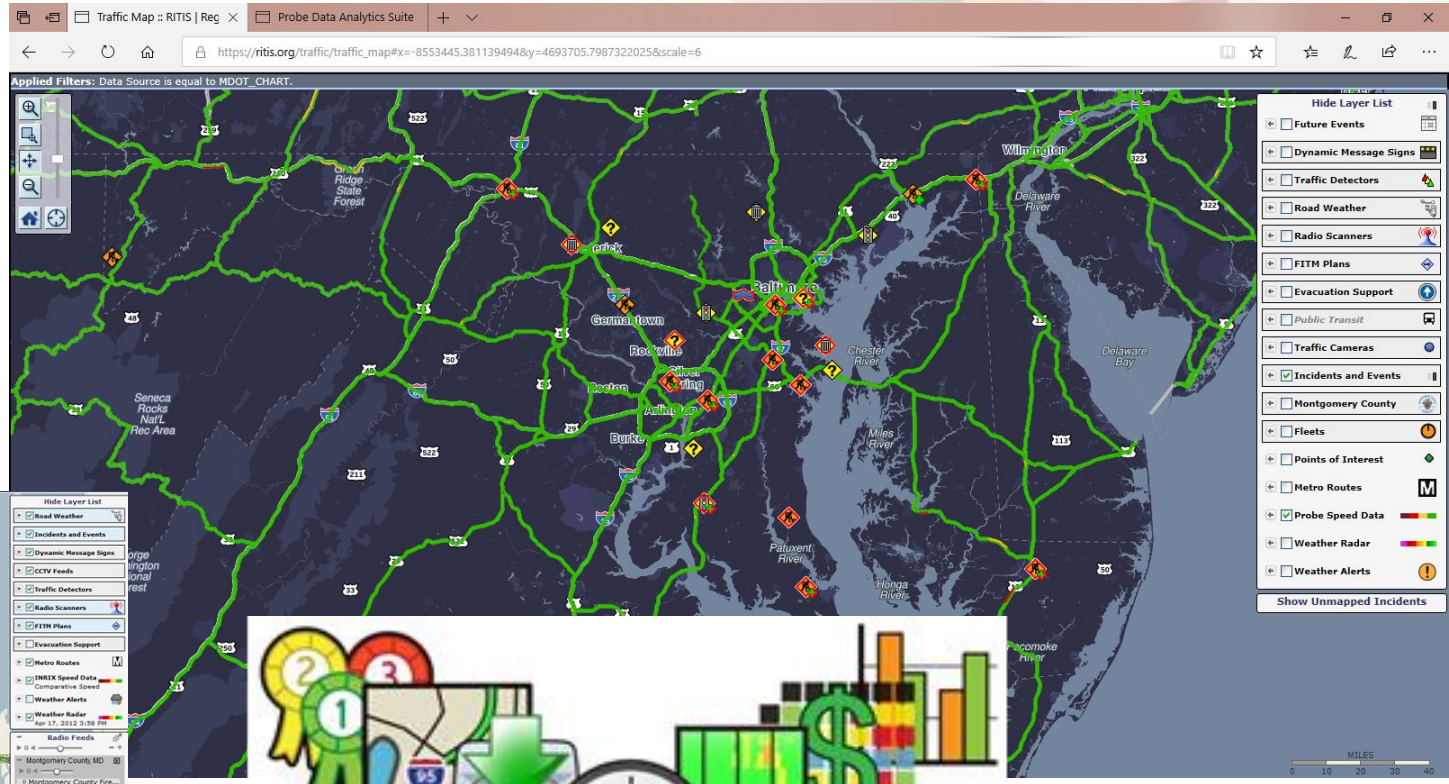
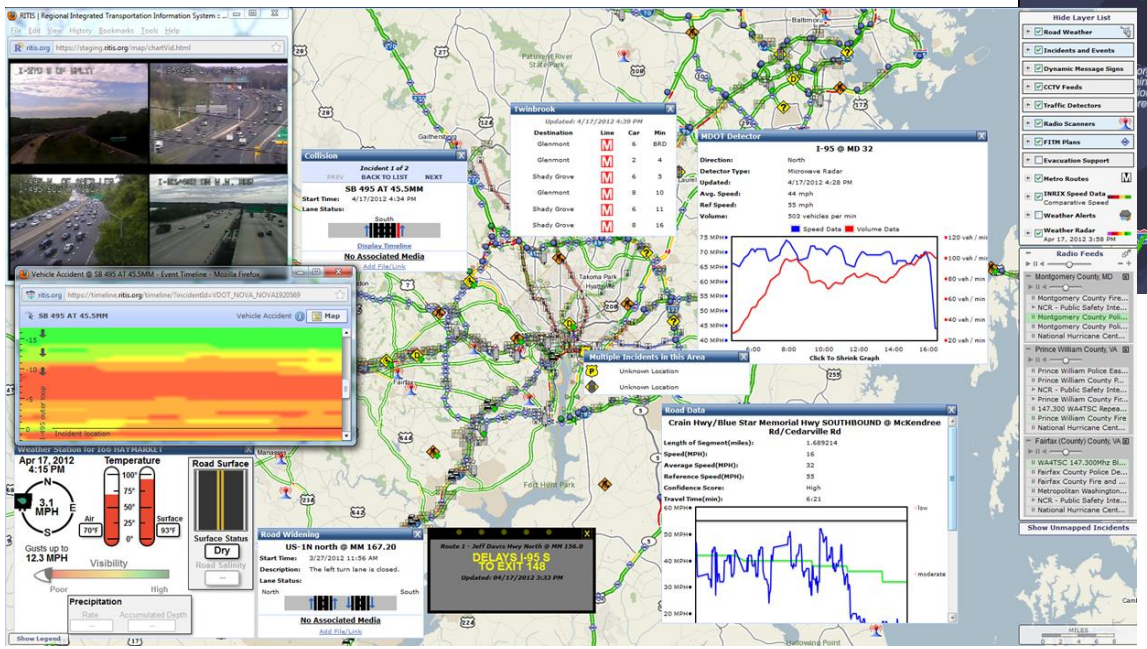
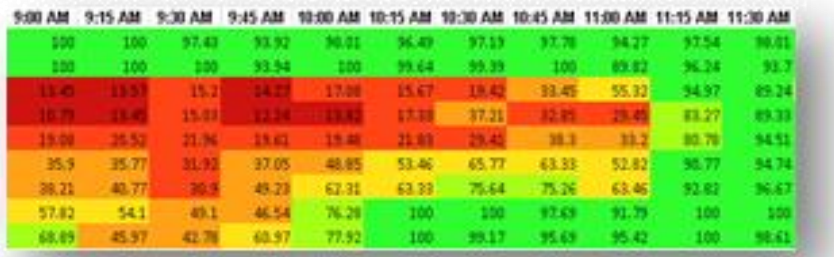
DATA TECHNOLOGY TO SUPPORT ICM

- Real time applications
- Archived data applications
- Combination of in-house tools and UMD CATT lab suite of tools (RITIS)
- **MDOT Common Operating Picture**







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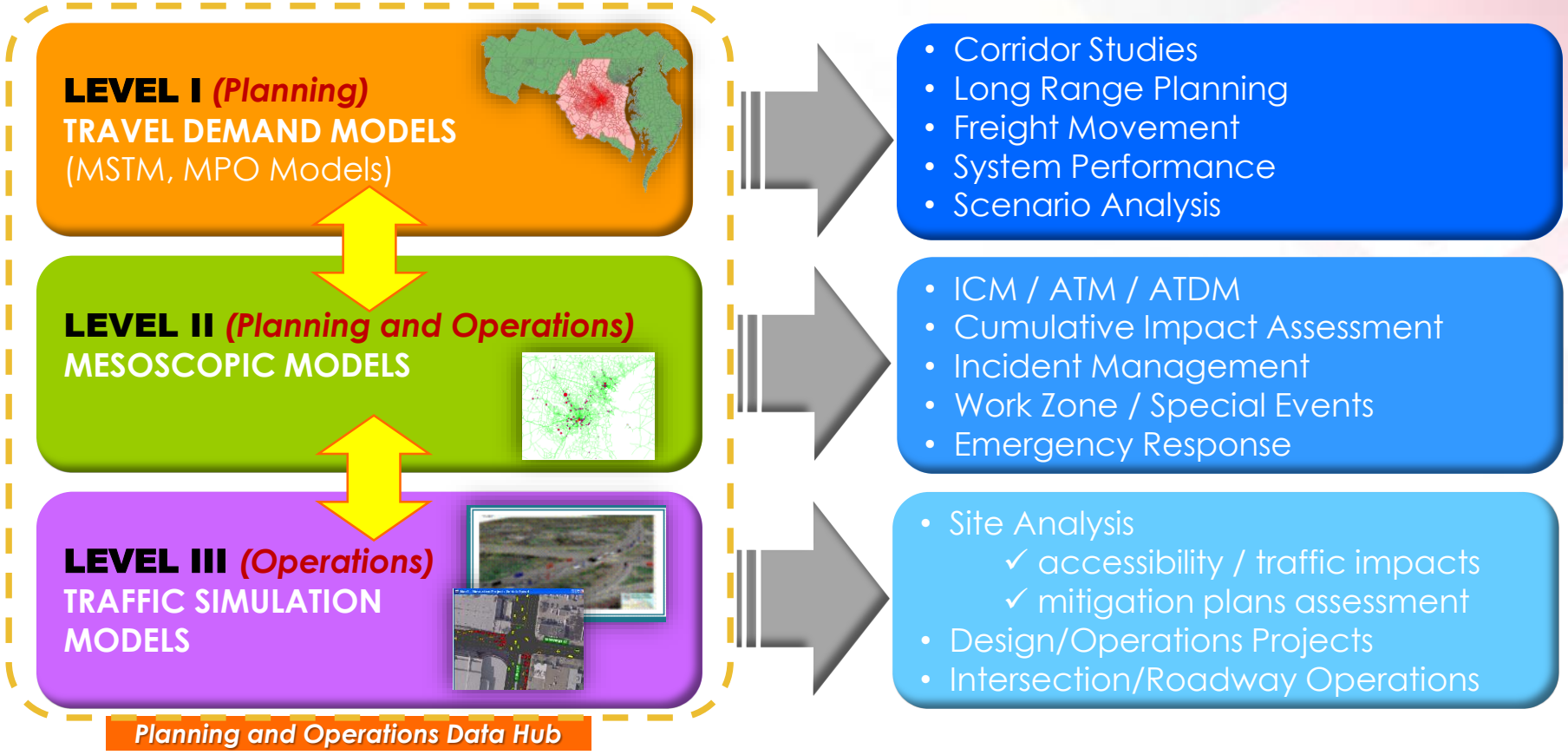
ANALYSIS, MODELING & SIMULATION TOOLS FOR ICM



Other Tools – Scenario Planning Tools, Reliability Analysis Tools , Economic Analysis Tools etc.

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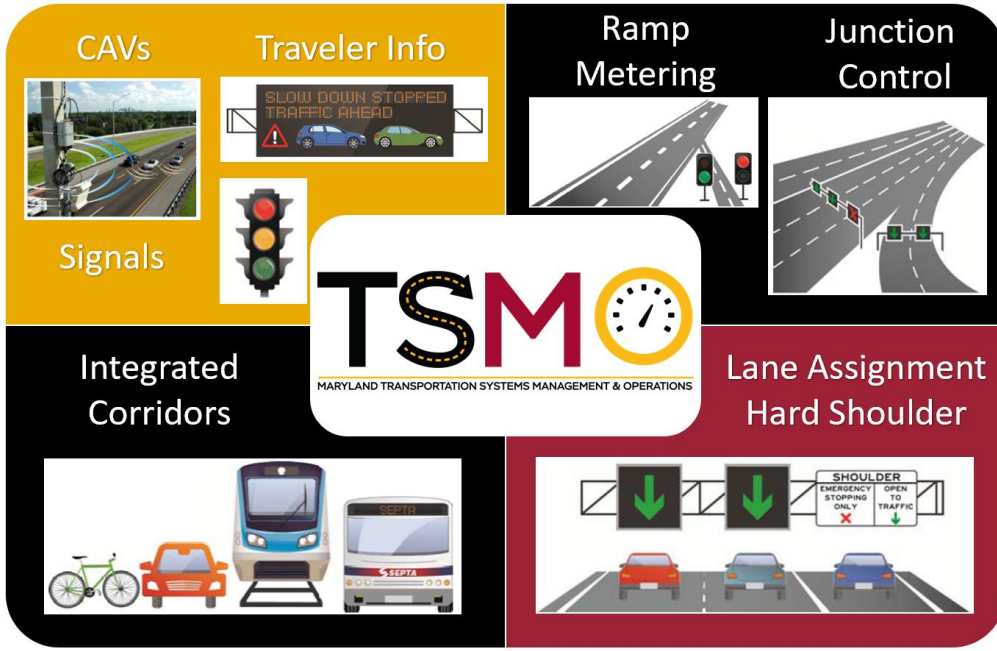
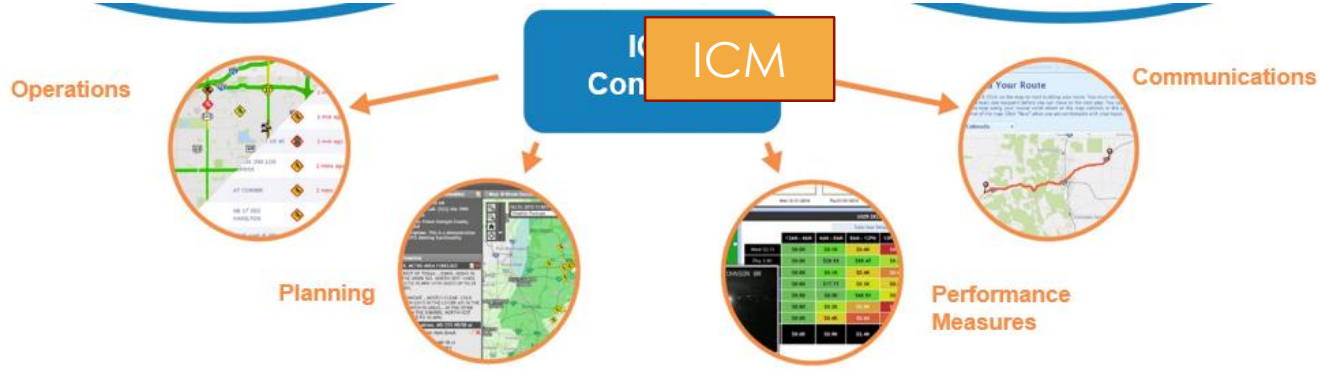
ICM DEPLOYMENT APPROACHES



- **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**

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