Transportation System Management & Operations (TSM&O)

“I.T.S. just not that complicated”

Chris Hilyer
Assistant State Maintenance Engineer, TSM&O
TSM&O is...

An integrated program to optimize the performance of existing multimodal infrastructure through implementation of systems, services, and projects to preserve capacity and improve the security, safety, and reliability of our transportation system.

In simpler terms, TSM&O is a program based on measuring performance, actively managing the multimodal transportation network, and delivering positive safety and mobility outcomes to the travelling public in Alabama.

“TSM&O is an outcome driven, performance-based system.”
TSM&O strategies: (include but are not limited to the following)

- Traffic incident management,
- Traveler information services,
- Roadway weather information,
- Freeway management,
- Automated vehicle location,
- Traffic signal coordination,
- Work zone management,
- Electronic payment/toll collection,
- Transit priority/integration,
- Emergency response and homeland security,
- Freight management,
- Transportation demand management, and
- Transit fleet management and dispatching
Why is TSM&O important?

Roadway level-of-service has significantly deteriorated over the last 20 years. Regular congestion has continued to increase, while increasing capacity is constrained by cost and impacts.

As roadways have reached high volumes, they have become increasingly sensitive to the delay and safety impacts of crashes, construction, and weather, which together are responsible for over one-half of travel delay and most of the resulting unreliability.
Who is TSM&O?

TSM&O partners are comprised of public and private agencies throughout transportation, partnered together to improve communications, coordination, and collaboration leading to more effective leveraging of existing infrastructure.
Who should use TSM&O?

TSM&O is designed for transportation agency managers whose span of control relates to the operations and management of the roadway system, including policy makers and program managers related to ITS and TSM&O at both the state and regional level, as well as managers of systems operations related activities such as traffic engineering, maintenance, and public safety.

Both AASHTO and NOCoE provide guidance that can be used to evaluate agency capabilities in key areas of process and institutional arrangements and to prepare a formal action plan. A self-evaluation customizes the guidance based on current agency capability of the following six (6) dimensions:

- Business Processes
- Systems & Technology
- Performance Measurement
- Culture
- Organization / Workforce
- Collaboration
# Capability Maturity Model

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Level 1 Performed</th>
<th>Level 2 Managed</th>
<th>Level 3 Integrated</th>
<th>Level 4 Optimized</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business Processes</strong>&lt;br&gt;<em>(Planning, programming, budgeting, implementation)</em></td>
<td>• Activities and relationships ad hoc • Champion driven</td>
<td>• Processes developing • Staff training • Limited accountability</td>
<td><strong>INTEGRATED</strong></td>
<td><strong>OPTIMIZED</strong></td>
</tr>
<tr>
<td><strong>Systems &amp; Technology</strong>&lt;br&gt;<em>(Systems engineering, standards and technology interoperability)</em></td>
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<tr>
<td><strong>Performance Measurement</strong>&lt;br&gt;<em>(Measures, data &amp; analytics and utilization)</em></td>
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<tr>
<td><strong>Culture</strong>&lt;br&gt;<em>(Technical understanding, leadership, outreach, and program authority)</em></td>
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<tr>
<td><strong>Organization / Workforce</strong>&lt;br&gt;<em>(Organizational structure and workforce capability development)</em></td>
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<tr>
<td><strong>Collaboration</strong>&lt;br&gt;<em>(Partnerships among levels of government and with public safety agencies and private sector)</em></td>
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“TSM&O is an outcome driven, performance-based system.”
Who supports TSM&O?

The AASHTO Subcommittee on Transportation Systems Management and Operations (STSMO) serves as the focal point for promoting and supporting integrated implementation of transportation systems management and operations (TSM&O) by engaging state DOTs, other AASHTO committees, and other partner organizations.

STSMO has five technical working groups (TWGs):

1. Systems Operations Strategies
2. Performance Measures
3. TSM&O Research
4. Traffic Incident Management
5. Connected Vehicles

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Who supports TSM&O?

The Center is a partnership of the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), and the Intelligent Transportation Society of America (ITSA) with support from the Federal Highway Administration (FHWA).

The National Operations Center of Excellence (NOCoE) is designed to offer a suite of resources to serve the transportation systems management and operations (TSM&O) community. The new Center will offer an array of technical services such as peer exchange workshops and webinars, ongoing assessments of best practices in the field, and on-call assistance.

The NOCoE has two primary components. The first is the Operations Technical Services Program, funded through contributions from state transportation agencies and FHWA.

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When is TSM&O?

Algo Phase I has been deployed in East Central, Southeast, and Southwest Regions. Algo Phase II is scheduled for 2016 with deployments in West Central and North Regions.

<table>
<thead>
<tr>
<th>Current capabilities</th>
<th>Potential Future capabilities</th>
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<tbody>
<tr>
<td>Event management</td>
<td>Traffic forecasting</td>
</tr>
<tr>
<td>Event detection</td>
<td>Smart Work Zones</td>
</tr>
<tr>
<td>Event verification</td>
<td>A.S.A.P. tracking</td>
</tr>
<tr>
<td>Event notification</td>
<td>Smart Parking</td>
</tr>
<tr>
<td>Performance reporting</td>
<td>Signal operations</td>
</tr>
<tr>
<td><a href="www.algotraffic.com">www.algotraffic.com</a></td>
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</tr>
</tbody>
</table>

* An event is defined as any activity contributing to recurring or non-recurring congestion, inclusive of work zone activities, accidents, weather, special events, etc...
When is TSM&O?

**Supporting documents:**

Statewide ITS Architecture  
Regional Transportation Management Center Standard Operating Procedures  
Performance Measures  
Traffic Incident Management Guidelines  
Strategic Business Plan  
Media Video Sharing Agreement  
Stakeholder Video Sharing Agreement (Developed)  
Functional Requirements based Standard Specifications (Under Development)  
MOA / MOU for interoperability with neighboring states (Under Development)
Current TSM&O Initiatives

Algo sub-system deployments:
- Here™ 3rd Party Probe Data integration
- WOWZA™ video distribution management
- “Push Style” 511 system
- RuggedCom™ Network Management System
- Waze Connected Citizens Program

TSM&O Program Development:
- Statewide and Regional Vision, Objectives, and Priorities
- Master Conceptual Plan
- Corridor Management

FHWA’s Every Day Counts (EDC):
- EDC I – Adaptive Signal Systems
- EDC II – Traffic Incident Management (TIMs) training
- EDC III – Smart Work Zones

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Why TSM&O?

The national congestion recession is over.

Urban areas of all sizes are experiencing the challenges seen in the early 2000s – population, jobs and therefore congestion are increasing.

With a resurgent economy, traffic congestion was up nearly every month last year.

The 2015 Urban Mobility Scorecard provides national and local measures of the traffic congestion problem.

The problem impacts individual and commercial drivers; as well as local economies.
Why TSM&O?

Congestion costs are increasing.
The congestion “invoice” for the cost of extra time and fuel (in constant 2014 dollars):

2014 - $160 billion
2000 - $114 billion
1982 - $ 42 billion

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Why TSM&O?

Congestion wastes a massive amount of time, fuel and money. In 2014:

- 6.9 billion hours of extra time
- 3.1 billion gallons of wasted fuel
- Upwards of 2.5 times as much travel time as in light conditions
  - Unexpected crashes
  - Bad weather
  - Special events
  - Work zones
  - Other irregular congestion causes

“TSM&O is an outcome driven, performance-based system.”
Why TSM&O?

Congestion is also a type of tax.

- $160 billion of delay and fuel cost
- 18% ($28 billion) of the delay cost was the effect of congestion on truck operations
  - This does not include any value for the goods being transported in the trucks
- Cost to the average commuter
  - $960 in 2014
  - $400 in 1982 (inflation-adjusted)
Why TSM&O?

Congestion affects people who travel during peak periods. The average auto commuter:

• Spent an extra 42 hours traveling in 2014 up from 18 hours in 1982
• Wasted 19 gallons of fuel in 2014 up from 4 gallons in 1982
Why TSM&O?

Congestion is also a problem at other hours.

- Approximately 41% of total delay occurs in the midday and overnight when travelers expect free-flow travel.
- Many manufacturing processes depend on a free-flow trip for efficient production.
  - Just-In-Time delivery
    - Mercedes
    - Honda
    - Hyundai
Why TSM&O?

2020 Congestion forecast

- National congestion cost will grow from $160 billion to $192 billion
- Delay will grow from 6.9 billion to 8.3 billion hours
- Wasted fuel will increase from 3.1 billion to 3.8 billion gallons
- Average commuter’s congestion cost will grow from $960 to $1,100 each
- Average commuter will waste 47 hours and 21 gallons of fuel

"TSM&O is an outcome driven, performance-based system."
Why TSM&O?

“Transportation System Management & Operations (TSMO) is an outcome driven, performance-based system.”

- With fewer funds available, we can not build our way out of congestion.
- Improving our current roadways has become critical.
- We can better manage and operate our transportation system.
- On average, capacity expansion provides a 2:1 ROI, while capacity management “TSM&O” provides a 9:1 ROI.
Innovative technologies / Resources and processes

INFORMATION INPUT SOURCES

- National Weather Service
- 3rd Party Data
- Cameras Detectors Sensors
- Media
- Emergency Responders
- Customers

INFOGRAPHIC:

INFORMATION OUTPUT SOURCES

- 511
- Web
- Social Media
- Media
- Signs Radios
- Customer Alerts

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Innovative technologies / Resources and processes

Regional Transportation Management Centers (RTMCs)

<table>
<thead>
<tr>
<th>Current Service Level:</th>
<th>Planned Service Level:</th>
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<tbody>
<tr>
<td>Mobile 24/7</td>
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</tr>
<tr>
<td>Birmingham 16/5</td>
<td>Birmingham 24/7</td>
</tr>
<tr>
<td>Montgomery 12/5</td>
<td>Montgomery 12/5</td>
</tr>
<tr>
<td>Tuscaloosa 12/5</td>
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</tr>
<tr>
<td>Huntsville 12/5</td>
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Innovative technologies / Resources and processes

Alabama Service Assistance Patrol (ASAP)

Current Service Level:          Planned Service Level:
Mobile        24/7           Mobile        24/7
Birmingham    16/5           Birmingham    24/7
Montgomery    12/5           Montgomery    12/5
Tuscaloosa    12/5           Tuscaloosa    12/5
Huntsville    12/5
Traffic Accidents cause approximately 60% of all congestion in our metropolitan areas. This incident related congestion can carry serious implications in terms of air quality, personal safety, and the mobility of goods and people in the region.

KC Scout’s Incident Management Program aims to minimize response and clearance times through better coordination and improved technology. The Incident Management Program in the Kansas City region requires an unprecedented level of coordination and cooperation between transportation agencies, law enforcement agencies, emergency response agencies, and the private sector.

We, the undersigned, pledge to work cooperatively toward the continued success of a coordinated Incident Management Program in the Kansas City metropolitan region. We believe that such a program is critical to improving the safety and efficiency of our urban transportation system and to support continued economic growth in the region.

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Innovation leads to enhanced system performance.