1. **Call Meeting to Order**
   Scott Poska, NCITE President, called the meeting to order at 12:30pm. A buffet-style lunch proceeded the meeting.

2. **Introductions**
   All attendees introduced themselves, stated their employer and NCITE involvement, and answered the question “What is your favorite game-time snack?”. Fifty people were in attendance. Responses to the question were as follows:

<table>
<thead>
<tr>
<th>Snack</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken wings</td>
<td>8</td>
</tr>
<tr>
<td>Chips and salsa</td>
<td>6</td>
</tr>
<tr>
<td>Pizza</td>
<td>5</td>
</tr>
<tr>
<td>Popcorn</td>
<td>5</td>
</tr>
<tr>
<td>Anything</td>
<td>4</td>
</tr>
<tr>
<td>Doritos</td>
<td>2</td>
</tr>
<tr>
<td>Bacon-wrapped anything</td>
<td>1</td>
</tr>
<tr>
<td>Buffalo chicken dip</td>
<td>1</td>
</tr>
<tr>
<td>Candied ginger</td>
<td>1</td>
</tr>
<tr>
<td>Caramel corn</td>
<td>1</td>
</tr>
<tr>
<td>Cheese and crackers</td>
<td>1</td>
</tr>
<tr>
<td>Cheez-Its</td>
<td>1</td>
</tr>
<tr>
<td>Chicken in a biscuit</td>
<td>1</td>
</tr>
<tr>
<td>Chips and chili cheese dip</td>
<td>1</td>
</tr>
<tr>
<td>Chips and guacamole</td>
<td>1</td>
</tr>
<tr>
<td>French fries</td>
<td>1</td>
</tr>
<tr>
<td>Fritos</td>
<td>1</td>
</tr>
<tr>
<td>Lil’ Smokeys</td>
<td>1</td>
</tr>
<tr>
<td>Meatballs</td>
<td>1</td>
</tr>
<tr>
<td>Pheasant poppers</td>
<td>1</td>
</tr>
<tr>
<td>Pizza rolls</td>
<td>1</td>
</tr>
<tr>
<td>Ribs</td>
<td>1</td>
</tr>
<tr>
<td>Vegetables</td>
<td>1</td>
</tr>
</tbody>
</table>

3. **Announcements**
   Scott made the following announcements:
   - Information regarding upcoming committee meetings.
   - 2018 is the Year of the Engineer. If anyone is interested in helping with this planning, they should contact Mike Martinez.
   - The 2018 ITE Annual Meeting will take place in Minneapolis. John Crawford, the Local Arrangements Committee Chair, provided a few highlights including events at Brit’s Pub and US Bank Stadium.

4. **Awards**
   Scott presented the following awards:
   - 2017 NCITE Intern Scholarships presented to Anna Corman of Iowa State University who interned with Washington County and Cameron Valuch of the University of Minnesota who interned with MnDOT.
   - 2017 NCITE Past Presidents Award presented to Scott McBride of MnDOT.

5. **Presentation**
Scott introduced Mike Fairbanks, NCITE Director. Mike introduced Sue Porter of MnDOT to present an update on MnDOT’s TSMO Implementation Plan. The presentation is attached to these minutes. Highlights of the presentation included:

- **What is TSMO?**
  - Transportation System Management and Operation is defined in MAP 21 and the FAST Act as “integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects”.
  - The Iowa DOT has a simpler definition of “a coordinated approach to managing and operating our roadways as safely and efficiently as possible”.

- **Example TSMO Strategies and Solutions:**
  - Work Zone Management
  - Traffic Incident Management
  - Traveler Information
  - Managed Lanes
  - Integrated Corridor Management
  - Connected and Autonomous Vehicles

- **What is MnDOT Missing with TSMO?**
  - TSMO is not simply a technology issue or knowledge of best practices.
  - Specific processes and institutional arrangements need to be put in place.
  - Operations needs to be a formal core MnDOT program like construction and maintenance.

- **Key Questions for Operations:**
  - What are your customers’ needs and expectations?
  - What are your current business processes for operations?
  - Where do you want to go and how are you going to get there?

- **MnDOT scored themselves (1 through 4, with 4 being the highest) on current operations:**
  - Business processes – 2+
  - Systems and technology – 3
  - Performance measurements – 2+
  - Culture – 2+
  - Organization and workforce – 2-
  - Collaboration – 4-

- **MnDOT has developed a TSMO Leadership Team. Sue is the TSMO Lead and has performed or is performing the following activities:**
  - Serving as the point of contract for MnDOT TSMO
  - Established a high-level agency team to oversee TSMO
  - Determined the current state of MnDOT TSMO operations
  - Determining if a formal TSMO plan should be developed
  - Preparing MnDOT for connected and autonomous vehicle growth

- **MnDOT put in a request for the following TSMO-related items:**
  - Statewide ITS System Integrator
  - Purchase probe data
  - Additional RTMC operators/dispatchers
  - Additional signal operations staff
  - New FIRST route and vehicle
  - Streaming video to public
  - Autonomous bus
- CV/AV project manager
- SPaT Challenge
- RTMC programmer
- Connected Corridors funding

6. **Adjourn**
Mike thanked the speaker and adjourned the meeting at 1:30pm.

Respectfully submitted,

[Signature]
Jacob Folkeringa
2018 Secretary

February 8, 2018
Transportation Systems Management and Operations (TSMO)

Sue Porter
NCITE
January 24, 2018
### Agenda

<table>
<thead>
<tr>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is TSMO and Why it is Important?</td>
</tr>
<tr>
<td>What is MnDOT missing with its current TSMO activities?</td>
</tr>
<tr>
<td>Capability Maturity Matrix (CMM)</td>
</tr>
<tr>
<td>Strategic Plan</td>
</tr>
<tr>
<td>Implementation &amp; Business Plan</td>
</tr>
<tr>
<td>What about Autonomous and Connected Vehicles?</td>
</tr>
<tr>
<td>Discussion/Questions</td>
</tr>
</tbody>
</table>
What is Transportation System Management and Operation?

Defined in MAP 21 & FAST Act

• “Integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects”

• Supported and enabled by Intelligent Transportation System (ITS) technologies

Integration is both technical and institutional
A coordinated approach to managing and operating our roadways as safely and efficiently as possible,

• focused on maximizing existing infrastructure,
• addressing the causes of breakdowns in flow,
• and overall performance of the transportation system.
Why is TSMO important?

Percentage of Miles of Twin City Urban Freeway System Congested

Source: Regional Transportation Management Center
Example Operations 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
- Connected & Autonomous Veh
MnDOT Operations Strategies
What is MnDOT Missing w/TSMO (i.e. Reaching Full Potential of Operations)

- Full potential is **not** primarily a “technology” issue or knowledge of best operations practices
- The key: Put in place and manage specific supportive business and technical processes and supporting institutional arrangements

**“Mainstreaming Operations”**

Operations needs to be a formal core MnDOT program just like construction and maintenance.
Current Operations Organization

- State Patrol
- Met Council
- Cities/Counties
- Other MPOs
- Local Partners – PDs, Fire, Tow
- Transit
- FHWA

Deputy Commissioner & Chief Engineer
Susan Mulvihill

Assistant Commissioner State Aid
Mitch Rasmussen
- State Aid
- Vacant

Assistant Commissioner Engineering Services
Nancy Daubenberger
- Bridge
  - Kevin Western
- Project Management & Tech Support
  - Tom Sylvest

Assistant Commissioner Operations
Jody Martinson
- District 1
  - Duane Hill
- District 2
  - Mike Ginn
  - (Acting)
- District 3
  - Dan Anderson
- District 4
  - Tom Nill
  - (Acting)
- District 5
  - Jeff Vlaminick
- District 6
  - Jon Huseby
- District 7
  - Greg Ous
- Metro District
  - Scott McBride
- Maintenance
  - Steve Lund

Assistant Commissioner Modal Planning & Program Management
Tim Henkel
- Transportation System Management
  - Mark Giesek
- Transit
  - Tim Seddon
  - (Acting)

Assistant Commissioner Corporate Services
Sue Stein
- Human Resources
  - Karin van Dyck
- Audit
  - Dan Kahle

Chief Financial Officer
Kristi Schroedl

Controller/Financial Management
Robin Sylvester

Chief Counsel
Craig Gustafson

Chief Counsel Office

Chief Counsel

- State Patrol
- Met Council
- Cities/Counties
- Other MPOs
- Local Partners – PDs, Fire, Tow
- Transit
- FHWA
Key Leadership Questions for Mainstreaming Operations

- What are your customers’ needs and expectations?
- What are your current business processes for operations (e.g., who is responsible, what expertise is needed, what resources)?
- Where are you today?
- Where do you want and need to go?
- How are you going to get there?

Each DOT will have unique challenges and opportunities.
Mainstreaming Operations

• Consider organizational issues and relationships
• Focus on supporting business and technical processes within the agency
• Define what constitutes an effective program
• Mutual Benefits – Including operations in the Highway Safety Improvement Program, Congestion Management Process, Asset Management Plan, etc.
Critical Dimensions for Improved Operations in a DOT

- All (6) dimensions are:
  - Essential
  - Interrelated
- Require executive support and leadership
- Support continuous improvement of operations and reliability
TSM&O Regional Workshops

• August 2014 – Milwaukee
  • Ray Starr – ITS R&D
  • Jim Kranig – RTMC Manager
  • Todd Stevens – District Maintenance Engineer
  • Mike Schweyen – District Traffic Engineer

• May 2015 – Northwest Passage (mini – CMM)
  • Cory Johnson – ITS R&D
  • Brian Kary – RTMC
  • Mike Kamnikar – Metro Maintenance
  • Steve Misgen – Metro Traffic
  • Tiffany Dagon – Metro Traffic

• Introduction to the TSM&O Capability Maturity Matrix – Developed under SHRP2
Operations Capability Dimensions

**Business Processes**
- Planning and programming
- Budgeting (resources)
- Project Scoping

**Performance**
- Defining measures
- Data acquisition and analytics
- Presentation (internal and external)

**Systems and Technology**
- Use of systems engineering
- Systems architectures
- Standards and interoperability
Operations Capability Dimensions

Culture
- Leadership
- Outreach
- Technical understanding

Organization / Staffing
- Programmatic status
- Organizational structure
- Staff development and retention

Collaboration
Relationships and partnering:
- Within DOT
- Among levels of government
- Public safety agencies
- MPOs
- Private sector
Levels of Capability Maturity

Most Agencies Today

Performed
- Relationships & Activities ad hoc
- Champion-driven

Managed
- Processes developing
- Staff training
- Limited accountability

Optimized
- Performance-based improvement
- Formal program
- Formal partnerships

Ultimate Goal for the Future

Integrated
- Process documented
- Performance measured
- Organization aligned
- Program budgeted
## Assessment of MnDOT Capabilities

<table>
<thead>
<tr>
<th>Category</th>
<th>Current Assessment Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business Processes</strong></td>
<td></td>
</tr>
<tr>
<td>(Planning, programming, budgeting, implementation)</td>
<td>Level 2 Plus</td>
</tr>
<tr>
<td><strong>Systems &amp; Technology</strong></td>
<td></td>
</tr>
<tr>
<td>(Systems engineering, standards and technology interoperability)</td>
<td>Level 3</td>
</tr>
<tr>
<td><strong>Performance Measurement</strong></td>
<td></td>
</tr>
<tr>
<td>(Measures, data &amp; analytics and utilization)</td>
<td>Level 2</td>
</tr>
<tr>
<td><strong>Culture</strong></td>
<td></td>
</tr>
<tr>
<td>(Technical understanding, leadership, outreach, and program authority)</td>
<td>Level 2 Plus</td>
</tr>
<tr>
<td><strong>Organization/Workforce</strong></td>
<td></td>
</tr>
<tr>
<td>(Organizational structure and workforce capability development)</td>
<td>Level 2 Plus</td>
</tr>
<tr>
<td><strong>Collaboration</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Level 4 Minus</td>
</tr>
</tbody>
</table>
Minnesota CMM

• Business Processes – 2 Plus
  • Some planning (HSOP, TAMP), plans include funding for roadside infrastructure, asset management, office budgeting process, operations mentioned in MnSHIP and STMP
  • No formal TSMO plan

• Systems & Technology – 3
  • Approved products, equipment on state contract, ITS architecture, training in systems engineering, common software
Minnesota CMM

• Performance Measurement – 2 plus
  • High level and detailed performance measures identified and tracked for metro freeways

• Culture – 2 plus
  • Senior management support for operations due to cost effectiveness, not as much support within GM MnDOT
  • No single overall core program
• **Organization / Workforce** – 2 minus
  • No dedicated top level management, roles not formally defined

• **Collaboration** – 4 minus
  • TOCC state patrol agreements, 800 MHz digital trunked radio, agreements for operating signals, cooperative operation with neighboring states, data and video provided to media, academic and private entities
Business Processes Actions

• Create a formal statewide TSMO plan
  • Formalize goals, roles, functions, organization

• Gain support within MnDOT and external partners (cities, counties, MPOs, MSP, Fire, etc)
First big step

- Develop a MnDOT Statewide ITS plan (completed July 2015)
Statewide ITS Plan
10 YR Investment Needs Above Base

Scenario A: $10.5 M
- Asset Management: $1.5 M
- Expansion: $9 M
- Operations: $12 M

Scenario B: $15M
- Asset Management: $3 M
- Expansion: $8 M
- Operations: $12 M

Scenario C: $26M
- Asset Management: $6 M
- Expansion: $8 M
- Operations: $12 M
### Statewide ITS Plan

**Outcomes of Optimization Scenario**

#### Expansion/Asset Mgmt.
- All expansion of other scenarios
- Build out of ITS on Hwy 52 and I-35 in D6, Hwy 169 in D7, I-94 in D3/4
- ITS assets replaced at life cycle targets
- 511 road weather is automated

#### Decommissioned ITS
- Only those devices no longer needed

#### ITS Communications
- Statewide virtual ITS network (with Mn.IT) for management of devices at RTMC
- All ITS devices are connected

#### Operations
- All ITS operations managed through RTMC 24 x 7
- Improved Emergency Management ability
- Automated 511 road/weather data input

#### Staffing
- 4 FTE for RTMC Operations
- 1 FTE for Metro Traffic
- 1 FTE for statewide Maintenance and Integration
- 2 FTE for ITS Design

#### Transportation System Management & Operations
- Core strategy for Agency
- TSM&O Plan developed and implemented
- Seek to achieve highest level of TSM&O in most areas
• Be the point of contact for MnDOT TSM&O related issues and national committees

• Establish a high level agency leadership team to oversee TSM&O

• Determine “current state” of all TSM&O strategies using the Capability Maturity Matrix

• Determine if a formal TSM&O plan should be developed

• Prepare MnDOT Organization for Connected and Autonomous Vehicle growth (headed by OTST – Jay Hietpas/ITS R&D group)
<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sue Mulvihill</td>
<td>Deputy Commissioner &amp; Chief Engineer</td>
</tr>
<tr>
<td>Jody Martinson</td>
<td>Assistant Commissioner Operations Division</td>
</tr>
<tr>
<td>Amr Jabr</td>
<td>Asst. Division Director</td>
</tr>
<tr>
<td>Jeff Vlaminck</td>
<td>District Engineer</td>
</tr>
<tr>
<td>Duane Hill</td>
<td>District Engineer</td>
</tr>
<tr>
<td>Steve Lund</td>
<td>State Maintenance Engineer</td>
</tr>
<tr>
<td>Bryan Dodds</td>
<td>Metro Maint &amp; Ops Office Director</td>
</tr>
<tr>
<td>Steve Misgen</td>
<td>Metro Traffic</td>
</tr>
<tr>
<td>Brian Kary</td>
<td>RTMC</td>
</tr>
<tr>
<td>Ray Starr</td>
<td>ITS R&amp;D</td>
</tr>
<tr>
<td>Mark Nelson</td>
<td>MnDOT Planning Director</td>
</tr>
<tr>
<td>Sue Porter</td>
<td>TSMO Lead</td>
</tr>
<tr>
<td>James McCarthy</td>
<td>FHWA</td>
</tr>
<tr>
<td>Jed Falgren</td>
<td>District Maint Engineer</td>
</tr>
<tr>
<td>Tom Dumont</td>
<td>District Traffic Engineer</td>
</tr>
</tbody>
</table>
### FY 18 – FY 19 Change Request

<table>
<thead>
<tr>
<th></th>
<th>Statewide ITS System Integrator</th>
<th>Statewide integrator to support Greater Minnesota ITS but also take pressure off RTMC integration staff that currently support Greater Minnesota. Includes one vehicle.</th>
<th>1 FTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Probe Data</td>
<td>Purchase probe data to be integrated into RTMC iPEMs system for real-time operational decision making along arterial corridors with no data and within construction zones.</td>
<td>$400K</td>
</tr>
<tr>
<td>4</td>
<td>RTMC Operator/Dispatchers</td>
<td>RTMC Operator/Dispatchers to expand RTMC hours of operation on weekends to support incident management, construction projects and events</td>
<td>2 FTE</td>
</tr>
<tr>
<td>5</td>
<td>RTMC Operator/Dispatchers</td>
<td>RTMC Operator/Dispatcher to do part-time statewide operations. <strong>MSP would still do statewide ops overnight.</strong></td>
<td>2 FTE</td>
</tr>
<tr>
<td>6</td>
<td>Signal Operations Staff</td>
<td>Signal Operation staff to support central system, performance measures, SPaT, ATCMTD, Greater Minnesota Signal Operations.</td>
<td>1 FTE</td>
</tr>
<tr>
<td>7</td>
<td>New FIRST Route including vehicle</td>
<td>One new FIRST route to provide coverage in the northern metro and additional coverage on the weekend (total 2 routes) to include one new vehicle with CMS.</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Streaming Video to Public statewide</td>
<td>Ability to provide streaming video to general public via 511 as well as higher quality video to external partners such as media, multiple local 911 call centers, emergency responders, local traffic agencies, etc. Initial capital investment and then on-going operational cost.</td>
<td>$750K</td>
</tr>
<tr>
<td>Project</td>
<td>Description</td>
<td>Budget</td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>Autonomous Bus</td>
<td>This is an unfunded project that is a priority to the Commissioner. Funds will be used to procure the contract, provide temporary infrastructure for testing at MnROAD, and consultant support.</td>
<td>$450K</td>
<td></td>
</tr>
<tr>
<td>Electrical Engineer/Project Manager</td>
<td>Electrical Engineer - Project manager to CV/AV projects and succession planning behind Ray Starr. Supports CV/AV, ESS, and Signals and Lighting Standards</td>
<td>1 FTE</td>
<td></td>
</tr>
<tr>
<td>SPaT Challenge</td>
<td>AASHTO has challenged each state to provide Connected Vehicle technology at 20 signals by 2020. These funds will be used for Phase I (develop data security measures)</td>
<td>$400K</td>
<td></td>
</tr>
<tr>
<td>RTMC Programmer</td>
<td>RTMC (embedded MN.IT) to support various needs including ATCMTD (AV/CV), IRIS enhancements, video switch, support signalized arterials, etc.</td>
<td>2 FTE</td>
<td></td>
</tr>
<tr>
<td>Connected Corridors</td>
<td>Additional Funds for SPaT phase II.</td>
<td>$1.2M</td>
<td></td>
</tr>
</tbody>
</table>
Thank you again!

Sue Porter

Susan.Porter@state.mn.us

651-366-5734