

Workshop #1005: Room 207A

Setting a Strategic Direction for Agency Traffic Management Systems (TMSs)

Sponsoring Committees and Organizations:

- TRB Intelligent Transportation Systems Committee (ACP15)
- TRB Freeway Operations Committee (ACP20)
- TRB Traffic Signal Systems Committee (ACP25)
- TRB Artificial Intelligence & Advanced Computing Applications Committee (AED50)
- TRB Joint Subcommittee on Active Traffic Management (ACP20-5)
- AASHTO Committee on Transportation System Operations, ITS Work Group
- European Association of Operators of Toll Road Infrastructures (ASECAP)
- International Bridge, Tunnel & Turnpike Association (IBTTA)
- Traffic Management Center Pooled Fund Study (PFS)
- ERTICO Innovation Platform TM 2.0

Sunday

January 8, 2023

9:00am – noon

Welcome

Introductions, Workshop Purpose, and Desired Outcomes

Jon Obenberger

*FHWA Office of Safety and Operations
Research and Development*

9:00 - 9:05am:	Welcome
9:05 - 9:55am:	Session 1 – Overview
9:55 - 11:00am:	Session 2 – Breakout Discussion
11:00 - 11:40am:	Session 3 – Breakout Results
11:40 - 11:50am:	Session 4 – Action Planning
11:50am - Noon:	Session 5 – Next Steps

Workshop Agenda:

9:00am –
9:05am

- **Welcome:** Introductions, Workshop Purpose, and Desired Outcomes

9:05am –
9:55am

- **Session 1:** Overview – Setting a Strategic Direction and Planning for TMS Improvements

9:55am –
10:50am

- **Session 2:** Identifying Issues to Consider, Successful Practices, and Resources - *Interactive Breakout Session*

10:50am –
11:00am

- *Break*

11:00am –
11:40am

- **Session 3:** Discuss Breakout Session Results

11:40am –
11:50am

- **Session 4:** Action Planning: Identify Topics for Research or Industry Consideration and Collaboration

11:50am –
noon

- **Session 5:** Immediate Next Steps and Sponsors' Perspectives

Session 1: Overview – Setting a Strategic Direction and Planning for TMS Improvements

Moderator: Suzette Peplinski, (*Michigan Dept. of Transportation*)

Note-taker: Fanis Papadimitriou (*Attica Tollway Operations Authority*)

Presentations:

- Opportunities to Plan for Next Generation TMSs (Daniel Lukasik, *Parsons*)
- Setting a Strategic Direction for TMSs, (Matt Junak, *HNTB*)
- Planning and Plans to Support TMS Improvements (Les Jacobson, *WSP*)
- Identifying Needed TMS Improvements and Resources (Pete Marshall, *HDR*)

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Session 1: Overview

Purpose:

- **Frame** the *value proposition* with *setting the strategic direction* for an agencies TMS
- **Identify** potential issues, methods, and information to consider in support of *planning and developing plans to support TMS improvements* and *identifying needed projects and resources* to improve an existing or prepare for the next generation of an agencies TMS
- **Introduce** *information* to provide a basis around topics to be discussed in breakout group discussions to occur in Session 2

Outcomes:

- ***Clear understanding*** of the meaning and intent of each topic
- ***Shared appreciation*** for the topics and their importance
- ***Initial “sample” list of issues*** to consider when framing the strategic direction, future improvements, and resources needed for TMSs in Session 2

Why Plan for TMSs?

- Opportunities to improve TMS capabilities or performance
- Assess, plan, select, and prepare for new capabilities, functions, or services to be incorporated into the next generation of an agencies TMS
- Identify resources needed to support future improvements or preparing for a transition to the next generation of an agencies system
- Most agencies do not have plans for updating or managing the evolution of their TMS

Why Plan for Future TMS Improvements and Needed Resources?

- Explore options to get the full value from existing TMSs
- Identify opportunities to improve capabilities, functions, or performance of a TMS
- Conduct feasibility or planning studies to identify projects or resources needed to improve an existing TMS
- Prioritize possible enhancements or future improvement projects to optimize the use of constrained agency resources (e.g. , operating, capital improvements)
- Plan for improvements and resources needed to support agencies programming funding or allocating resources to facilitate improving existing systems or preparing for a transition to the next generation of their system

Motivation for Setting a Strategic Direction for TMSs:

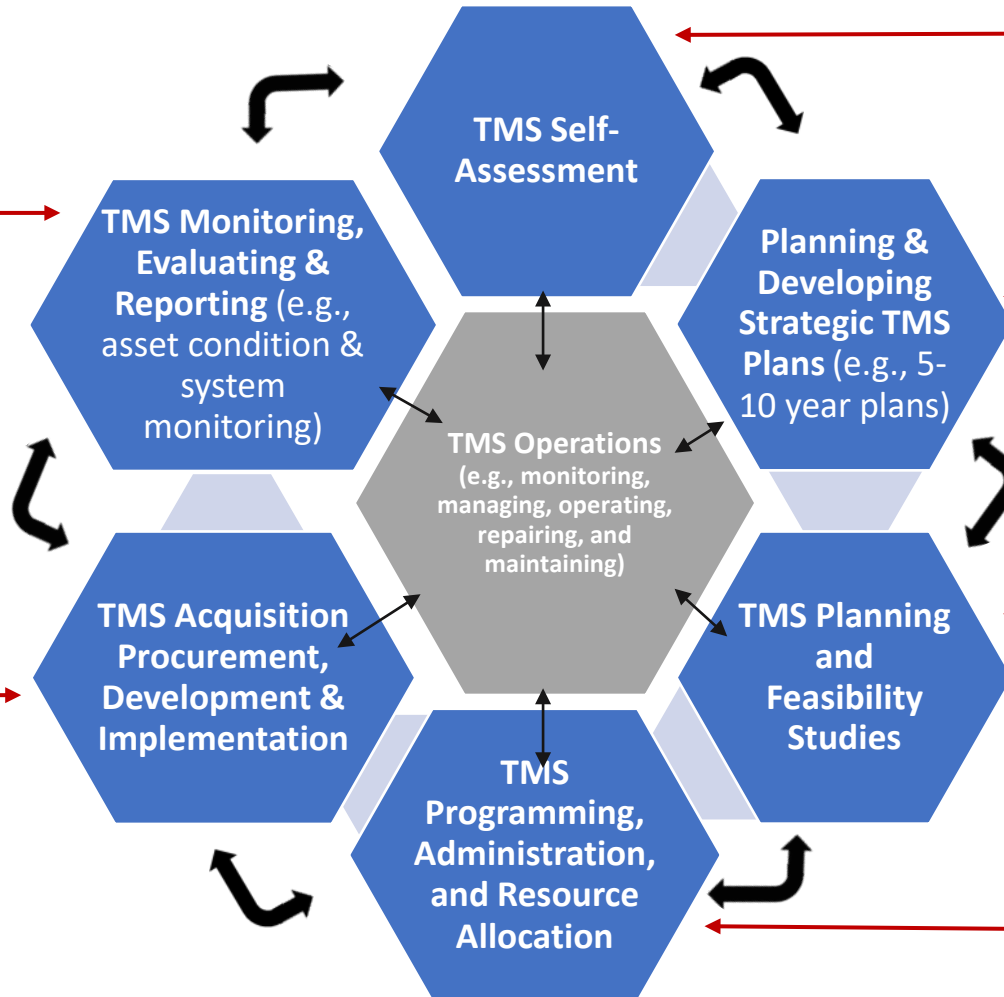
- Assess and identify opportunities to enhance TMS capabilities and performance
- Set the strategic direction of a TMS (e.g., vision, mission, goals/objectives, outcomes)
- Frame the future evolution of a TMS (e.g., performance, capabilities, services)
- Identify and evaluate options to improve TMS capabilities, services, and performance
- Identify resources, methods, or projects needed to achieve desired improvements
- Incorporate needed TMS improvements and resources into future agency budgets
- Link future TMS capabilities, improvements, and needed resources with planning processes and plans of agency (e.g., agency strategic plan, TSMO plan) or region (e.g., ITS Plan, Congestion Management Plan, Transportation Improvement Plan)

Opportunities to Consider TMS Strategic Direction, Improvements, and Resource Needs in Other Agency Processes and Plans:

Agency Processes & Plans:

- Facilities Performance Monitoring and Reporting
- TMS Asset Monitoring and Condition Reporting
- TMS Performance Evaluation and Reporting

Design, Development and Procurement of Projects (e.g., systems engineering)



Agency Processes & Plans:

Capability Maturity Framework for TSMO (TSMO, Traffic Management, Active Traffic Management)

TSMO Program Plan

- Strategic Elements
- Programmatic Elements
- Tactical Elements

Planning & Design of TSMO Initiatives, Operational Strategies, or Projects (feasibility study, planning study)

TSMO Project Selection and Prioritization, TMS Improvement Projects, Allocating Resources for Maintenance and Operations

Topic 1: Setting a Strategic Direction for TMSs

Key Issues

- **Business Process:**
 - **Integrating TMSs into agency and regional funding, business, and strategic planning processes**
 - Ensuring that TMSs are integrated into agency TSMO program and plans; regional TSMO or ITS plans
 - TMSs are sometimes absent elements in those programs and plans
- **Mission, Vision, and Goals:**
 - **Comparing and connecting agency and regional TSMO mission, vision, and the mission, vision, and goals of TMSs**
 - **Collaboratively review, update or develop a consensus on TMS mission, vision, and goals**
 - **Identify and link TSMP Program priorities with priorities to improve TMS services, functions, or actions (e.g., incident management, active traffic management, safety, environment, maintenance, improving operations)**
 - Integrate TMS goals and policies into agency's programs and business processes to intentionally connect decision-making
- **Leadership:**
 - Identifying and sustain champions in organization and region
 - Incorporating disciplines (e.g., IT) and agency programs into TMS program, planning for improvements, and assessments
- **Unique Needs:**
 - Recognizing TMS needs vary by agency and location (e.g. recurring congestion versus non-recurring congestion)
 - Understanding every agency has similar stakeholders – identifying the stakeholders important and unique for each TMS is (e.g., services, functions, actions, geography, setting)

Topic 1: Setting a Strategic Direction for TMSs

Current Practices

- **Planning Processes and Plans:**
 - **Adopting processes which continuously assess and explore opportunities to improve TMS capabilities and performance**
 - Without planning agencies maybe limited to reactive, short-term planning, with fragmented future TMS improvements
 - Reactive approaches limit continuity of planning processes, allocation of sufficient funding, and support resources
 - Continuously planning facilitates identifying future TMS improvements, funding, and resource needs
 - **Connecting strategic planning and plans, planning for improvements, pursuing and developing improvements**
- **Roles:**
 - **Defining roles and responsibilities of:**
 - All agency staff
 - All other agencies and stakeholders involved
 - Identifying opportunities to incorporate staff into various TMS program and planning processes
- **Training and resources:**
 - Increasing professional capacity for key personnel to lead or support various TMS planning processes
 - Procuring expertise, obtaining information, and using tools to support different planning processes and consideration of resource needs (e.g., staffing for operational scenarios or day-to-day operations (e.g., peak period, off-peak))

Topic 1: Setting a Strategic Direction for TMSs

Resources (existing or needed)

EXISTING RESOURCES:

- USDOT resources:
 - Traffic management capability maturity framework tool: https://ops.fhwa.dot.gov/tsmoframeworktool/tool/traffic_mgmt/index.htm
 - A Primer for Program Planning - TSMO (FHWA-HOP-17-017)
 - Performance-Based Planning and Programming Guidebook (FHWA-HEP-13-041)
 - Project Programming & Resource Allocation
- State DOTS with relevant resources: Michigan, Wisconsin, and Ohio

NEEDED RESOURCES:

- **Strategic and Improvement Planning and Plans:**
 - Strategic planning for TMSs and plan capturing needed improvements, staffing, and resources**
 - Planning for TMS improvements (e.g., software subsystems, data subsystems) and plans identifying needs (e.g., funding, staffing)**
- **Performance Measurement:**
 - Return-on-investment (ROI), benefit-cost (B/C), and resource needs for tools to prioritize possible improvement opportunities
 - Linking goals, performance measures, and indicators from agency, TSMO, and TMS Programs and Plans, Strategic Planning and Plans, and Improvement Programs

Topic 2: Planning and Plans to Support TMS Improvements

Key Issues

- **Linking TMS Improvements to Agency Priorities:**
 - **Linking outcomes of projects to improve TMS capabilities and performance (e.g., performance measures) with the outcomes sought by agency or regional policies, programs, or strategic plans (e.g., safety, mobility, climate)**
 - Reevaluating data collection, sources, and types being used to align TMS capabilities and performance to agency and regional policies, goals, and strategic plans
 - Reevaluating current and establish new TMS performance measures and data to track post-implementation results
 - Advancing TMS improvement(s) priorities through concurrent capital projects
- **Assessment:**
 - Identifying TMS current capabilities and opportunities for improvements (e.g., services, functions, or actions) as a part of the process for considering and assessing possible TMS improvements
 - Evaluating the staff, resources, and funding (e.g., repairs, maintenance) to support possible improvements
- **Capabilities:**
 - Managing TMS improvement(s)
 - Procuring, developing, integrating, and testing of improvement(s) of TMS subsystems, components, and devices

Topic 2: Planning and Plans to Support TMS Improvements

Current Practices

- **Planning:**
 - **Considering all processes and plans (e.g., TMS asset management, maintenance and repairs) in the life cycle of a TMS in the planning for possible improvements**
- **Performance Measure Alignment:**
 - Linking performance measures to TMS functions, services, actions
 - Link TMS performance to agency and TSMO program measures (e.g., WSDOT gray notebook, Houston TranStar)
- **Preparation & Continuity:**
 - Preparing intentional responses to planned and unplanned events to achieve operational consistency
 - Securing enough resources to prepare for and conduct the planning and preparing the plan summarizing the results
 - Identify the funding and resources to support the design, development, procurement, implementation, testing, acceptance, initiation, documentation, and configuration of the devices, components, or subsystem improvements
- **Program Funding:**
 - Include proposed TMS improvement projects and resource needs into agency and TSMO Program Plans and budgeting processes
 - Consider costs to manage, operate, maintain, repair, evaluate, and report on performance of TMS improvements as a part of all proposals to improve TMSs and in TSMO and TMS Plans capturing these costs (VicDOT)

Topic 2: Planning and Plans to Support TMS Improvements

Resources (existing or needed)

EXISTING RESOURCES:

- Systems Engineering for ITS: https://ops.fhwa.dot.gov/plan4ops/sys_engineering.htm
- Guide to Contracting ITS Projects (NCHRP Report 560)
- Contracting Guidance to Support Modular Development (Office of Federal Procurement Policy)
- IT Acquisition and Contracts Management (CIO Council)
- Feasibility Studies and Alternative Evaluation Reports, Ohio DOT
- Feasibility and Cost Assessment, Albuquerque MPA Joint TMC
- Transportation Implementation Plan, Mid-Year Update, Davis, CA

NEEDED RESOURCES:

- **Planning for TMS Improvements:**
 - **Engaging disciplines and stakeholders in the process of planning for TMS improvements**
 - Identifying, analyzing, and evaluating implications and feasibility of improvements (e.g., costs, benefits)
 - Professional capacity building on planning for TMS improvements
 - Incorporating TMS improvements and resource needs into agency and TSMO Programs, Plans, and funding processes

Topic 3: Identifying Needed TMS Improvements and Resources

Key Issues

- **Expertise:**
 - Engaging staff collectively aware of TMS design, construction, operating, maintenance, and repair needs and costs
 - Analyzing and considering feasibility and costs of alternative improvements to TMSs
- **Innovation:**
 - Considering emerging and disruptive technologies (agencies invest in hardware but technology advancements quickly make hardware obsolete) in the planning for TMS improvements
 - Offboarding legacy systems, subsystems, or components at the right time (e.g., remaining life-expectancy, costs)
 - Managing the competing interests and implications of requirements, performance, expediency, costs, and ability to maintain TMS subsystems, components, or devices
- **Funding Strategy & Resilience:**
 - Programming maintenance and repairs costs into TMS and TSMO Programs and annual budgets
 - Incorporating resources needed to manage and operate TMSs into TMS and TSMO Programs and annual budgets
 - Planning and plans identifying future improvements, resources, and support to manage and operate agency
 - **Prioritizing and incorporating TMS improvements and resource needs into TMSO and TMS Programs and Plans**

Topic 3: Identifying Needed TMS Improvements and Resources

Current Practices

- **Planning:**
 - **Connecting TMS improvements with TMS Programs and Plans (Integrated plan in Houston TranStar)**
 - Conducting industry reviews for identifying practices and potential solutions
 - Bringing all relevant stakeholders into to the planning process
 - Linking TMS goals and performance measures to concept of operations, use cases, requirements, TMS subsystems and components, and consideration of possible technologies
 - Evolving the planning and design of TMS Subsystems (e.g., from customized software to commercial off-the-shelf (COTS))
- **Development Innovation and acquisition:**
 - **Employing consortium acquisition model (TET Coalition Model)**
- **Data & Performance Measurement Practices:**
 - Embracing data collection through newer mechanisms and uses of data
 - Adopting and adapting solutions for using data from third-party sources (e.g., third party data and near-miss analytics)
 - Reporting and presenting dashboards to key stakeholders, turning data into information into insights

Topic 3: Identifying Needed TMS Improvements and Resources

Resources (existing or needed)

EXISTING RESOURCES:

- NCHRP Report 560
- Systems Engineering Process
- Managing TMS Assets

NEEDED RESOURCES:

- **Project Development Strategies and Methods:**
 - Funding support to conduct planning for proposed improvements before initiating project development
 - Resources available to support the planning and improvement project development processes
 - Share project development and procurement practices
 - Incorporate agency experts from different disciplines into the planning or development of specific improvements
- **Planning for and Identifying TMS Needs:**
 - Standards to support open APIs
 - Standards of public vs. standards of OEMs/private industry
 - Guidance regarding AI-based systems lack of performance
 - Quality assurance and internal checks and balances
- **Data:**
 - Data sharing across agencies and systems
 - TMSs sharing and using data with third parties
 - Developing and managing APIs to support sharing and using data

Session 4: Action Planning

Purpose:

- Identify actions for workshop co-sponsors to consider advancing

Outcomes:

- Actions or activities the co-sponsoring TRB Technical Committees or organizations could advance after the workshop
- Topics for possible research projects or resources to develop to assist public agencies setting strategic direction for TMSs, planning and plans to support TMS improvements, and identifying needed TMS improvements and resources.

Session 4: Action Planning

Possible Activities for Sponsoring TRB Committees and Organizations to Advance

1. Participate in “Innovation Advances Toward the Future of Managing Traffic”

International Symposium, June 26-30, 2023, Vienna, Austria

- Share best practices, identify research needs & opportunities to pool resources, & jointly pursue topics
- Program and registration: www.austriatech.at/ISFO2023
- Sponsors: AASHTO CTSO, ASCE TD&I, ASECAP, ASFINAG, AustriaTech, CEDR, IBTTA, ERTICO TM2.0, IRF-Geneva, ITS Nationals, & TRB (Freeway Operations, ITS, Managed Lanes, Artificial Intelligence and Advanced Computing Applications, Active Traffic Management Joint Subcommittee, International Coordinating Council)

2. Conduct workshop at 2024 TRB Annual Meeting. Possible topics to consider:

- Preparing for, conducting, and summarizing the results of a TMSs assessment
- Opportunities for TMSs to share and using different types of data

3. Facilitate the sharing of TMS information and highlight practices:

- Share information on TMS portal (on National Operations Center for Operations Excellence website)
- Volunteer to answer questions or provide limited assistance to agencies
- Support peer-to-peer exchanges (e.g., TRB or NOCoE webinars) on key TMS topics

Session 4: Action Planning

Possible Activities for Sponsoring TRB Committees and Organizations to Advance

4. Join and contribute funds to TMC Pooled Fund Study to pursue resources needed to support improving TMS capabilities and performance (Extended to April of 2027):
 - Completed, current & new projects: <https://tmcpfs.ops.fhwa.dot.gov>
 - Process conducted annually to identify and prioritize needs, develop proposals, and select new projects to develop technical resources (e.g., 3 new projects in 2023, 15 proposals to consider for 2024)

5. Explore partnerships to propose, sponsor, and conduct research to advancing TMSs:
 - Collaborate to advance research priorities & jointly sponsor (e.g., FHWA, TMC PFS, NCHRP proposals)
 - Identify & prioritize needs for possible research & technical resources
 - Capabilities, Requirements, Planning, and Preparing to Virtually Operate TMSs – Selected by NCHRP in 2023
 - Assessing TMS capabilities & performance – FHWA advancing as new project in 2022
 - Data Management Plans, Practices, and Data Subsystems for TMSs, Submitted to NCHRP Program for selection (Oct. 2022)
 - Planning, designing, procuring, & managing software subsystems to meet current & evolving TMS needs
 - Opportunities, issues to consider, and options to enable TMSs sharing agency owned software and tools

Thank you for your support and participation!

If you have feedback, please email representatives from the workshop co-sponsors:

- Greg Krueger (*TRB ITS Committee*, lead sponsor); gkrueger@hntb.com
- Beverly Kuhn (*TRB Freeway Operations Committee*); b-kuhn@tti.tamu.edu
- Edward Smaglik (*TRB Traffic Signal Systems Committee*); edward.smaglik@nau.edu
- Yin Hai Wang (*TRB Artificial Intelligence and Advanced Computing Applications Committee*); yinhai@uw.edu
- Lisa Burgess / Dan Lukasik (*TRB Active Traffic Management Joint Subcommittee*); lisa.burgess@kimley-horn.com,
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- Raj Ponnaluri (*AASHTO Committee on TSO, ITS Work Group*); raj.ponnaluri@dot.state.fl.us
- John Bassett / Alex Wassman (*Traffic Management Center Pooled Fund Study*); John.Bassett@dot.ny.gov,
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- Mark Muriello (*IBTTA*); mmuriello@ibtta.org
- Martin Russ / Johanna Tzanidaki (*ERTICO TM 2.0 Innovation Platform*); martin.russ@austriatech.at

If you have feedback or suggestions for a specific committee, please email representatives from the workshop co-sponsors