TRB Annual Meeting 2023 Workshop #1005 Summary –

Setting a Strategic Direction for Agency Traffic Management Systems

Sunday, January 8, 2023, 9:00am – noon EST

Sponsoring Committees:

- 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 TSMO
- 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

Workshop Summary and Resources:

This summary of the workshop, presentations, and other resources are available electronically on the National Operations Center of Excellence's (NOCoE's) web page.

Workshop Planning Volunteers:

Beverly Kuhn	*Texas A&M Transp. Inst*.	Mark Muriello	*IBTTA*
Dan Lukasik	*Parsons*	Martin Russ	*AustriaTech*
Edward Smaglik	*Northern Arizona Univ.*	Matt Junak	*HNTB*
Evan Sullivan	*USDOT Volpe Center*	Peter Marshall	*HDR*
Fanis Papadimitriou	*Attikes Diadromes*	Phil Masters	*Parsons*
Greg Krueger	*HNTB, TRB ITS Committee*	Raj Ponnaluri	*Florida DOT*
Jon Obenberger	*USDOT FHWA (workshop lead)*	Susanna Zammataro	*Int'l Road Federation – Geneva*
Leslie Jacobson	*WSP*	Suzette Peplinski	*Mich. Dept. of Transportation*
Lisa Burgess	*Kimley-Horn*	Yinhai Wang	*Univ. of Washington*
Malika Seddi	*ASECAP*		

Introduction

On Sunday, January 8, 2023, during the Transportation Research Board's 102nd Annual Meeting, a three-hour workshop focused on agencies' practices for setting a strategic direction for agency Transportation Management Systems (TMSs). This document provides a summary of: (i) each of the workshop's sessions; (ii) feedback from participants provided during the breakout session; and (iii) action items recommended for co-sponsoring committees to consider advancing in 2024 and beyond.

The workshop itself crowdsourced knowledge regarding TMS vision development, strategic direction, multi-year improvement plans, and resources for systems management and operations. Transportation agencies may find this document useful when thinking about the next generation of their TMSs and traffic management centers (TMCs).

State of the Practice (Session 1)

Suzette Peplinski (Michigan Department of Transportation) began Session 1 by introducing several speakers and outlining the workshop's three main topics. Suzette related each topic and illustrated how attendees could leverage Session 1 material during Session 2 discussions and Session 3 report-outs. The following presentations (approximately ten minutes each) provided definitions, example issues, and basic methodologies when setting a strategic direction and planning for TMS improvements:

- *Workshop Briefing: Opportunities to Plan for the Next Generation of Agencies TMSs*, Dan Lukasik (Parsons)
- *Topic 1: Setting a Strategic Direction for TMSs*, Matt Junak (HNTB)
- *Topic 2: Planning and Plans to Support TMS Improvements*, Les Jacobson (WSP)
- *Topic 3: Identifying Needed TMS Improvements and Resources*, Pete Marshall (HDR)

Each presenter touched on three discussion-areas within their respective topics:
1) Issues for agencies to consider
2) Successful practices
3) Existing or needed resources to help agencies apply these practices.

Session 1's presentations are available on the TMS portal located on the National Operations Center of Excellence (NOCoE) webpage.

Discussions (Session 2)

Susanna Zammataro (International Road Federation - Geneva) asked attendees to form breakout discussion groups according to the Session 1 topic that interested them the most.

The workshop's three main topics mirrored Session 1 presentations (mentioned above):
1) Setting a Strategic Direction for TMSs
2) Planning and Plans to Support TMS Improvements
3) Identifying Needed TMS Improvements & Resources

During Session 2, each breakout-group discussed key issues to consider, successful practices, and available or needed resources for their respective topic. Notetakers wrote down major discussion items in an online notetaking document. Breakout groups were encouraged to discuss and comment on items identified during Session 1's framing presentations. An emphasis was placed on participants introducing and discussing new items. Near the close of Session 2, each group identified the top three items they would report-out during Session 3.

Discussion Results – Report-out (Session 3)

Lisa Burgess (Kimley-Horn) facilitated report-outs from each discussion group. The following section synthesizes those verbal report-outs and the notes each group submitted.

Bold text in this section indicates mutual interest among more than one breakout group within the same topic and/or concurrence across another topic.

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)

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

- o Identifying opportunities to incorporate staff into various TMS program and planning processes
- Training and resources:
  - o Increasing professional capacity for key personnel to lead or support various TMS planning processes
  - o 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))

Resources (Existing or Needed)

EXISTING RESOURCES:

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

NEEDED RESOURCES:

- **Strategic and Improvement Planning and Plans:**
  - o **Strategic planning for TMSs and plan capturing needed improvements, staffing, and resources**
  - o **Planning for TMS improvements (e.g., software subsystems, data subsystems) and plans identifying needs (e.g., funding, staffing)**
- Performance Measurement:
  - o Return-on-investment (ROI), benefit-cost (B/C), and resource needs for tools to prioritize possible improvement opportunities
  - o 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:**
  - o **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)**
  - o Reevaluating data collection, sources, and types being used to align TMS capabilities and performance to agency and regional policies, goals, and strategic plans
  - o Reevaluating current and establish new TMS performance measures and data to track post-implementation results
  - o 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

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)

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:

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

Current Practices

- **Planning:**
  - o **Connecting TMS improvements with TMS Programs and Plans (Integrated plan in Houston TranStar)**
  - o Conducting industry reviews for identifying practices and potential solutions
  - o Bringing all relevant stakeholders into to the planning process
  - o Linking TMS goals and performance measures to concept of operations, use cases, requirements, TMS subsystems and components, and consideration of possible technologies
  - o Evolving the planning and design of TMS Subsystems (e.g., from customized software to commercial off-the-shelf (COTS)
- **Development Innovation and acquisition:**
  - o **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

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

Action Planning & Immediate Next Steps (Session 4)

Mark Muriello (IBTTA) requested feedback from participants on the list of possible next steps and activities the co-sponsors may consider advancing in 2023 and 2024. Workshop co-sponsors expressed significant interest in further collaboration, to continue exchanging information and conduct other activities in support of agencies assessing the capabilities and performance of TMSs. The co-sponsors also expressed their support to conduct a workshop during the 2024 TRB Annual Meeting focusing on future capability assessment methods. The proposed future actions the co-sponsors support are provided below.

Actions Co-sponsors Support:

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

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

Closing: (Session 5)

Greg Krueger (HNTB, TRB ITS Committee Chair and lead workshop sponsor) thanked participants, volunteers, and other co-sponsors of this year's workshop. Greg prompted workshop co-sponsors in the room to make final remarks. Several co-sponsors that were unable to attend submitted pre-recorded video remarks for use at the end of the workshop. A compilation of pre-recorded remarks is available at: https://youtu.be/2_3C8ZLUHs0.