

# NCHRP Project 03-126 Transportation Operations Manual

2022 Northwest Transportation Conference

March 9, 2022



# Agenda

- Transportation Operations Manual (TOM) Overview
  - Project scope
  - Organization of the Manual
  - Presentation and format of Manual
  - Review process
  - Manual status
  - Next steps

# Project Scope



Examine existing guidance/documentation



Identify gaps & logical sources of knowledge to fill them



Determine balance between explanatory material & effective practices



Conduct research & outreach as basis to draft the topic content



Perform an internal quality/completeness check



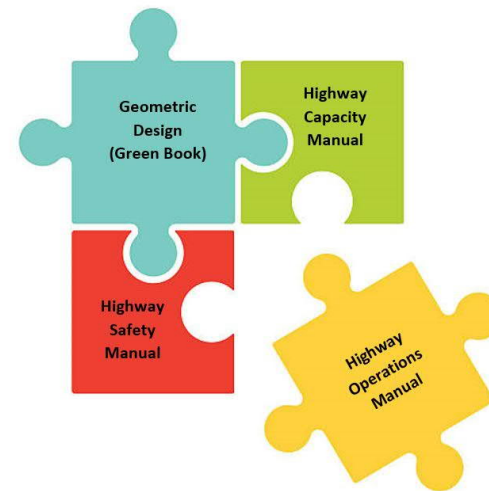
Develop/consider graphical elements to enhance communication of the concepts

# Stakeholder Input

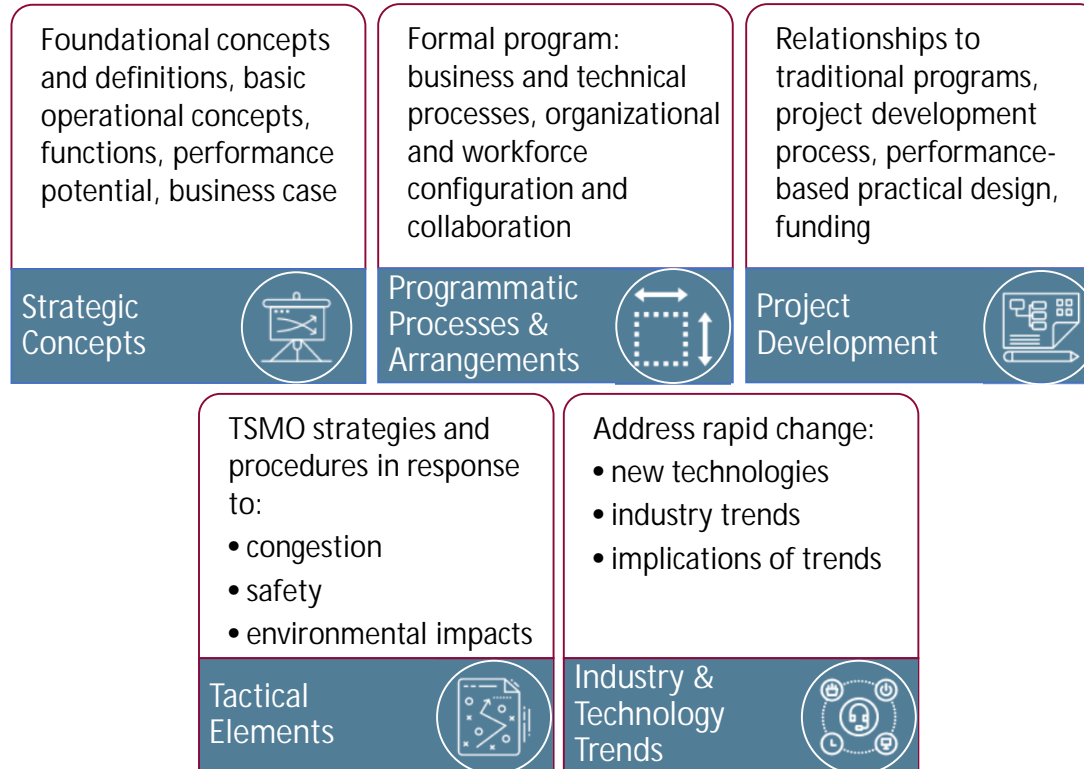
- Executive level
  - Previous State DOT CEO support
- CTSO meeting
- Panel meetings
- Review panel
- Outreach at industry events
  - TRB, AASHTO, ITE, etc.
- AASHTO Technical Committee on Geometric Design
  - Coordination with Green Book update

# Coordination, Collaboration, Integration

- Green Book update
- Highway Capacity Manual
- Highway Safety Manual
- Other documents, efforts as identified



# Content



## Six Parts of the Manual

- A. Introduction
- B. TSMO Concepts and Context
- C. TSMO Program Development and Management
- D. Project Development
- E. Tactical Elements
- F. Industry and Technology Trends

## Part A: Introduction

- Introduction to TSMO
- Manual need and purpose
- Organization of the Manual
- Description of each part and its audience
- How to use the Manual
- Resources and related efforts



## Part B: TSMO Concepts and Context

Focus: Provide an Operations Director with the essentials for success

Chapters:

- TSMO Concepts
- TSMO in the Transportation Agency Context
- Agency Readiness to Advance TSMO

# Part C: TSMO Program Development and Management

Focus: Operations managers

- Day-to-day processes
- Support a well-functioning TSMO organization

Programmatic concepts :

- 8 chapters on Programmatic elements
- Logic, range of approaches, state of the practice, guidance
- Topics focused on CMM capabilities

# Part D: Project Development

Focus: Integrating Transportation Operations into the project development process

Topics:

- Performance-Based Practical Design
- Performance Measures for Operational Improvements
- Linking TSMO to Capital Projects
- Procurement
- Project Funding

# Part E: Tactical Elements

- Overview of Tactical Elements
- Fundamental Elements of Situational Awareness, Communication, Decision Support, and Control
- Event Management
- Arterial Management
- Freeway Management
- Freight Operations
- Advanced Integrated Tactics
- Active Demand and Parking Management
- Active Transportation
- Transit
- Tolling and Road Pricing

# Part F: Industry and Technology Trends

- Technology Trends
  - Advanced communications, cybersecurity, big data & analytics, artificial intelligence & advanced computing, connected vehicles, automated vehicles
- Industry Trends
  - Changing roles; risk management; emerging technology; evolution of organizations, structure, workforce
- Implications of Industry and Technology Trends
  - Next Generation TMS, Next Generation TIS, MOD/MaaS, Smart Cities, RUC

# Design to Optimize User Experience



Usability and Logic



Navigation and Wayfinding



Readability






Accessibility



Content Organization

# Content Features for Different Interests

- Part B focused on Executives
- Cross-references
- Thematic Icons
- Callout boxes
  - Exemplary Practice 
  - Related Resources 
  - Tips 
- Case Study Inset
- Chapter Bibliographic References
- Document Glossary

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Bookmarks

- 5.1 What is a TSMO Program?
- 5.2 The TSMO Program Plan
- 5.3 Elements of a TSMO Program Plan
- 5.4 TSMO Program Planning Considerations
- 6.1 Definitions
- 6.2 Approaches to TSMO Tactics Planning and Programming
- 6.3 Scales of Planning for TSMO Tactics
- 6.4 Key Steps in a TSMO Tactics Planning Process
- 6.5 Planning Analysis Tools
- 6.6 TSMO Programming and Funding
- 6.7 TSMO Asset Management

TSMO Program Development and Management

# Part C

## Five

### TSMO Program Planning

This chapter defines a TSMO program and the strategic, programmatic, and tactical elements that are fundamental to its structure. The chapter reviews how a TSMO program can be managed and improved through TSMO program planning. It discusses key considerations for TSMO program planning, including the process to develop a plan and the variation in the types and applications of plans depending on the agency's needs and current program status.

#### 5.1 What is a TSMO Program?

##### 5.1.1 Definition

FHWA defines a **TSMO program** as "the organizational structure and mechanisms needed to deliver the vision, mission, and strategic goals and objectives for advancing TSMO in an organization." The program consists of a "coordinated, interrelated set of strategies, procedures, and activities (such as projects), all intended to meet the goals and objectives articulated in vision statements and policies" (Grant et al., 2017).

Based on this definition, the following statements often guide the scope and direction of a TSMO program:

- **TSMO Vision.** A statement that describes a target to which the transportation agency and its customers aspire upon achieving a TSMO mission.
- **TSMO Mission.** An action-oriented statement describing TSMO's function and objectives.

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- 5.2 The TSMO Program Plan .....14
- 5.3 Elements of a TSMO Program Plan.....15
- 5.4 TSMO Program Planning Considerations..... 20

#### TSMO Program Example

South Dakota DOT states that a TSMO Program "should include setting objectives, planning, executing, managing, sustaining, and improving TSMO strategies in a clear and deliberate manner" (2016).

#### TSMO Vision Examples

"Deliver a safe and connected multi-modal transportation system that links Nevadans and supports the state's economic vitality through TSMO solutions."  
— Nevada DOT

"Manage and operate a safe, reliable, optimized transportation system for all users through the collaborative efforts of stakeholders, technology-based solutions, and innovative strategies."  
— Alabama DOT



Bookmarks

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**Tips for Executives**  
Tips for TSMO Program Plan Practitioners

Establish the scope of the program plan in terms of emphasis on the strategic, programmatic, and tactical elements.

Identify and obtain productive engagement with internal and external stakeholders.

Align the TSMO strategic element with the agency-wide strategic context.

Consider leadership buy-in when developing programmatic actions that may adjust policies or organizational structure or function.

Develop a prioritization process to apply to the tactical element's programs, projects, and services.

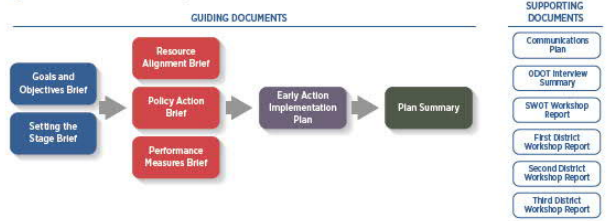
## 5.4 TSMO Program Planning Considerations

### 5.4.1 Program Plan Development Process

The process for program plan development may vary depending on intended program scope. Agencies in early stages of adoption and advancement may find it important to engage a wide range of stakeholders by forming working groups or task forces, including experts from various agency disciplines, leadership and middle management, traffic management center staff, public safety partners, MPOs, other regional and local agencies. The process may involve both central office technical units and district/field personnel. These teams can be organized to focus on program issues or on specific implementation challenges related to roles, responsibilities, and resources.

Figure 5.4.1 illustrates the process followed and documents produced during Ohio DOT's TSMO Plan development (2017).

Figure 5.4.1 Ohio DOT TSMO Plan Development Process



### 5.4.2 Variation in Need and Plans

Most TSMO program plans address the strategic, programmatic, and tactical elements defined previously. However, the order in which these program plan elements are presented, the format, and the level of detail can vary depending on the agency's context and needs. These variations depend on existing systems' operational deficiencies, current TSMO activities, existing organizational status of TSMO, and status of previous ITS and related plans.

**Exemplary Practice**  
Oregon DOT Operations Program Plan

Oregon DOT chose to develop an Operations Program Plan that emphasized the strategic element along with programmatic actions at a high level as a guide for leadership to execute over a five-year period.

Agencies with limited experience with TSMO may wish to consider establishing a strategic framework to elevate TSMO within the organization. Agencies that have already established a formal commitment to TSMO may focus on programmatic elements such as specific areas of process or institutional capability needed to support continuous improvement. Agencies with a well-established programmatic structure for TSMO may concentrate on tactics. The level of detail, timing, and sequence can vary according to the experience with TSMO and level of program maturity in that agency.

Program plans may vary in their articulation of justification, emphasis areas, and level of detail. They can be limited to a high-level presentation of TSMO justification and relationship to agency mission and goals, with a general description of program features. Alternatively, they may present detailed action plans for specific changes and may include a portfolio of specific TSMO strategies and related activities for implementation. Plans may be in the form of a single document or a set of related materials, prepared at one time or sequenced over time.

### 5.4.3 Statewide vs. MPO TSMO Program Plans

The scope of planning for TSMO at the metropolitan level may differ from that at the statewide level. MPOs are not facility owner-operators but serve an important function for discussion, development, and coordination of member actions. At the strategic level, MPOs provide a forum for consideration of the appropriate role of TSMO in the region. At the programmatic level, MPOs develop regional ITS architectures, develop TSMO-related performance reports, and conduct a congestion management process as the basis for developing TSMO components in the long-range transportation plan and short-range transportation improvement program. They are often responsible for the allocation of certain federal and local funding sources, which can be directed toward TSMO projects. In addition, a few MPOs provide collective program management over widely distributed TSMO assets such as arterial signal systems, develop performance databases, and provide training programs for members.

Because MPOs are not facility owner-operators, and therefore do not maintain processes and an organization to design, implement, and maintain projects, their plans typically focus on the strategic and tactical elements for planning purposes. The outcome of an MPO TSMO program plan will often represent the inputs from and ultimately impact multiple regional stakeholders, including the state DOT, local governments, transit agencies, and other multimodal service providers. Early examples of this kind of collaborative planning are found among the Regional Concepts for

**Exemplary Practice**  
Texas DOT TSMO Plans

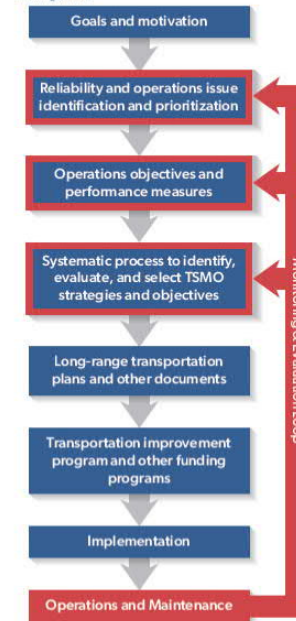
Texas DOT chose to develop a *Statewide TSMO Strategic Plan*, along with *Individualized district program plans* and *district tactical plans*. As the statewide plan (Texas DOT, 2018) explains:

"The Statewide TSMO Strategic Plan will provide guidance on how TSMO will be conducted throughout the state. Districts or geographic regions will use the Statewide TSMO Strategic Plan as the framework to develop their own TSMO programs to meet their unique needs; one output of which is a District TSMO Program Plan. Depending on the needs of each district, tactical plans may be developed to provide additional details and protocols for how certain mobility strategies (such as incident management, work zone management, etc.), project deployment, and transportation improvement programs will be conducted. These three components will provide actionable guidance to implement TSMO activities across the state and integrate management and operations into the fabric of the organization to maximize the potential efficiencies."

Bookmarks

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Figure 6.2.1 Integration of Planning for Operations into the Standard Planning Process



Source: Adapted from FHWA, *Enhancing Transportation: Connecting TSMO and Planning*, 2016

- ▶ Difficulty comparing the performance impact of capacity vs. TSMO investments due to significant differences in the implementation timeframe.
- ▶ Varying degree of dedicated vs. competitive funding for TSMO.
- ▶ Range of experience with TSMO evaluation data and methodologies.

All approaches to planning for TSMO tactics should be coordinated to a maximum extent with other agency planning activities focused on capital construction and maintenance. This coordination is reflected in an alignment of goals and objectives, involvement of affected customers and communities, use of common evaluation measures and timeframes, and funding and cost-effectiveness considerations. An FHWA publication, *Enhancing Transportation: Connecting TSMO and Planning*, describes the importance of the connection between the work of an agency's planning staff and operations staff (FHWA, 2018):

*Greater coordination and collaboration among planners and operators help span the differing planning horizons between them. Operators broaden their perspective to include a longer-term vision for system performance and planners have a greater understanding of the shorter-term planning needs for operations. This leads planners and operators to focus their attention on planning for TSMO investments that address both short-term and long-term needs more effectively.*

An idealized approach to integrating TSMO into an agency planning process is illustrated in Figure 6.2.1. The figure shows how the identification of TSMO tactics flow from and feed back into setting goals and objectives and can become incorporated into standard agency planning products such as the nearer-term transportation improvement program (TIP) and long-range transportation plan (LRTP). Incorporation into the TIP depends on a programming process that considers a performance-based decision-making framework and a prioritization process that accommodates TSMO projects.

## 6.3 Scales of Planning for TSMO Tactics

### 6.3.1 Overview

In addition to the relationship of TSMO tactics planning to agency planning and the degree to which the two are integrated, TSMO tactics planning can also vary by scale, from statewide to corridor or facility. The level of project specificity and supporting analysis typically increases as the scale's focus narrows down.

### 6.3.2 Statewide TSMO Planning

At the early stages of TSMO program implementation, agencies may conduct a high-level planning analysis on a statewide basis to match system performance improvement needs and opportunities with appropriate TSMO tactics by type, without identifying specific deployments or projects. This high-level matching may subsequently provide a basis for location-specific tactics planning, incorporation into program planning, and ultimately implementation. This experiencing recurring or non-recurring congestion or disruption that can be addressed by specific TSMO tactical elements while aligning with agency objectives. Further guidance on the high-level consideration of TSMO tactics is addressed in the FHWA publication *Developing and Sustaining a Transportation Systems Management & Operations Mission for Your Organization: A Primer for Program Planning*.

### 6.3.3 District/Regional TSMO Planning

In large metropolitan regions, agencies (DOTs or MPOs) may conduct district-wide or regional TSMO tactical planning to identify TSMO tactics on a bottleneck, corridor, or regional basis, specifically aligned to statewide or regional TSMO policy and architecture. In metropolitan areas over 200,000 population, the federally-required *Congestion Management Process* (CMP) provides a logical context to incorporate TSMO tactics into the LRTP or metropolitan transportation plan and the short-term TIP. While the federal requirements are not specific for a CMP process, an effective approach for maximum integration of TSMO into the planning process (as per Figure 6.2.1) should include the following:

- ▶ Create MPO stakeholder consensus on including TSMO in the LRTP and/or other planning products as a priority goal together with specific operations objectives and related performance measures. This may include not only consideration of TSMO tactics within a TSMO program but also

**Exemplary Practice**

**Statewide TSMO Planning Examples**

Some agencies conduct statewide planning that includes tactics identification for incorporation into a TSMO master plan. The *Michigan State Highway Administration TSMO Master Plan* is based on a top-down analytical process focused on a set of state corridor "systems" with sets of scalable and stageable tactics combinations that can be refined over time. The three-step process includes:

1. Identification of Statewide Priorities
2. Screen Corridors and Develop TSMO Systems
3. Perform System Analysis

In a second approach, agencies may compile TSMO tactics for investment through a "call for projects" from DOT districts or other units of government. Such a process uses an application template to rank projects for funding based on their scores for a set of specific standardized analyses related to safety, mobility, operation, engineering issues, and cost. The *Michigan DOT Operations Template* is one example of this approach.

Pennsylvania DOT has developed a comprehensive *TSMO Guidebook on Planning* designed to be used "throughout the development and implementation of ... transportation operations plans and programs. It "clarifies and strengthens the connection between various planning processes, such as CMP, the LRTP, the Regional Operations Plans, the Regional ITS Architecture, and the TIP."

# Review Process

- Phase 1 review (complete)
  - NCHRP Panel and AASHTO CTSO Leadership Team
  - Individual chapters grouped for review
- Phase 2 review
  - All chapters in a single pdf document
  - Full CTSO, other AASHTO committees, other groups
- AASHTO balloting process starts Q2 2022

# TOM Status

- Contract modification executed
- Work added to:
  - Provide enhanced review
  - Include specific coverage of diversity, equity, and inclusion
  - Incorporate Manual concepts in the NOCoE website
- Revisions completed
  - All author revisions
  - Technical editing, DEI review, and document production complete
- Phase 2 document review begins this week

# TOM Next Steps

- Phase 2 review
- Ballot Manual
- Resolve comments
- Support AASHTO Publication
  - Met to discuss process February 10
- Develop methodology for Manual updates
- Develop roadmap for future updates
- Develop process for new content

Questions?

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