Development of the AASHTO Transportation Operations Manual

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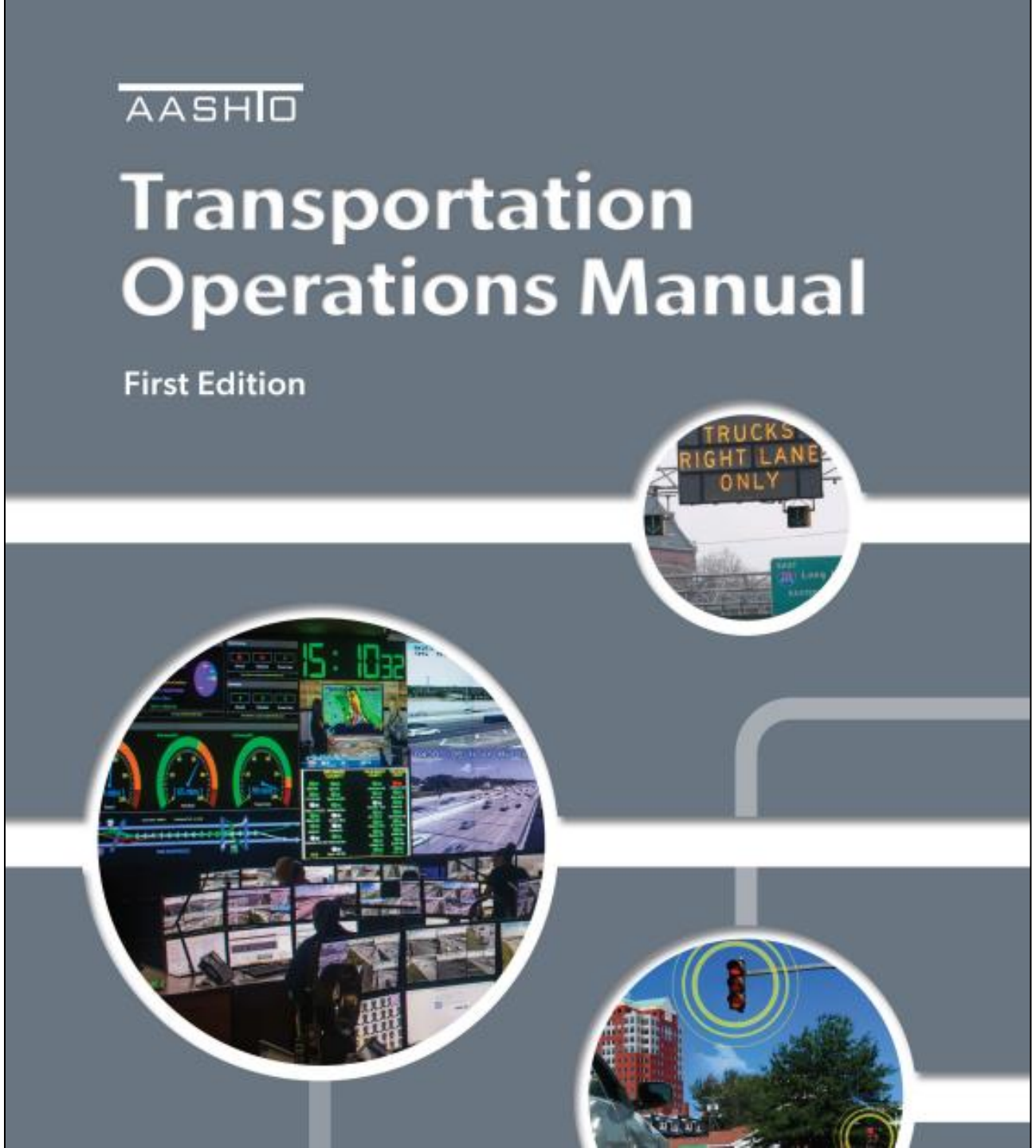


Agenda

- Need for the Transportation Operations Manual
- Manual Preparation Scope
- Content, Structure and Features
- Example: TSMO Program Planning
- Review and Publication
- Related Activities and Next Steps

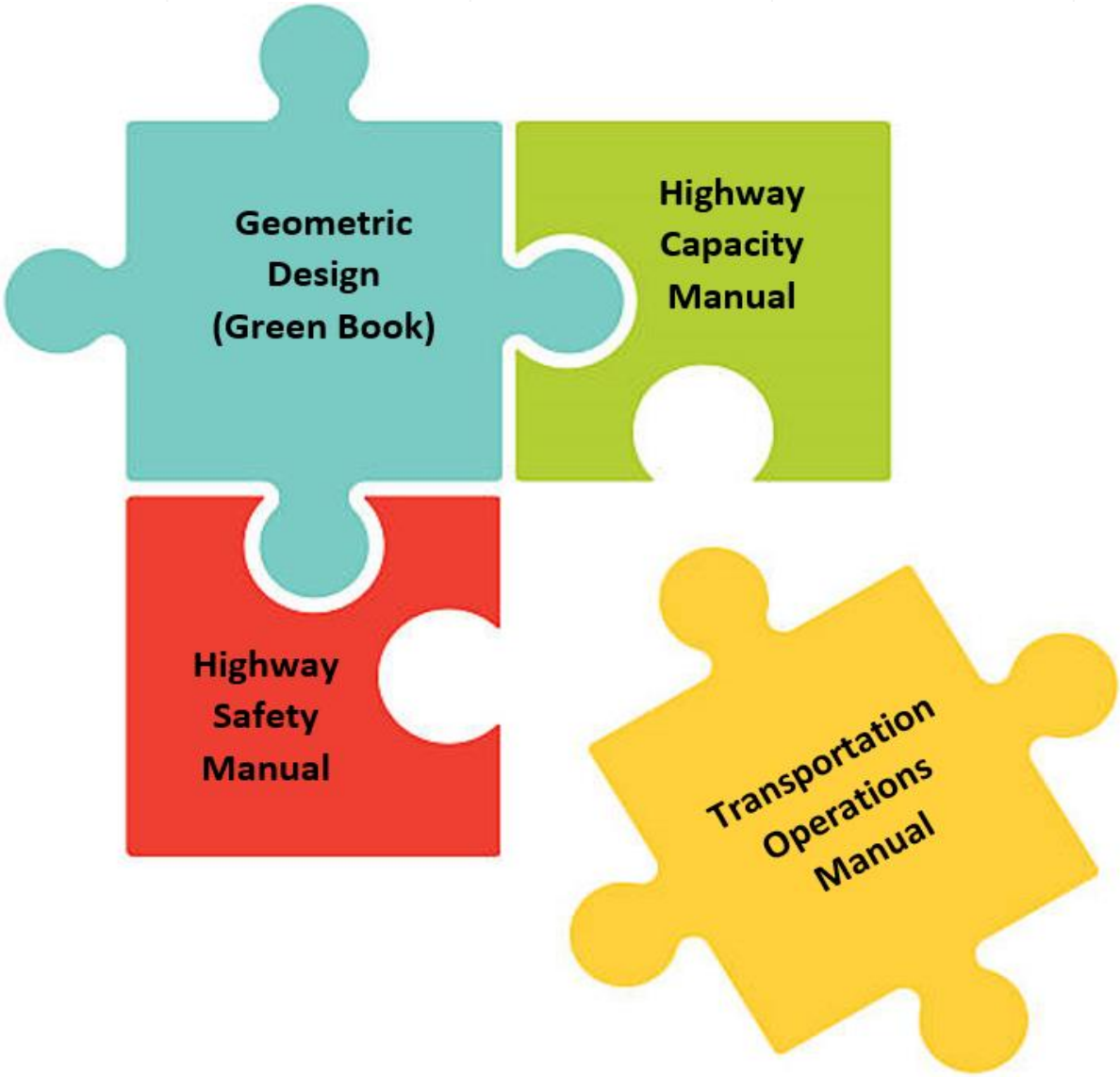
TSMO – Transportation Systems Management and Operations

- All activities that are focused on optimizing the performance of the transportation system.
- Makes the most of existing infrastructure to address safety, congestion, and reliability concerns.
- Strategies and a mindset.

Need for Manual

NCHRP 03-126 Objective

"…to develop the first edition of a *Transportation Operations Manual* for publication by AASHTO…an authoritative companion to the AASHTO Green Book…a holistic view of the operation and management of the transportation system, both in urban and rural settings and for people and goods."



Manual Preparation Scope

Examine existing guidance / documentation

Identify gaps & logical sources of knowledge

Balance between explanatory material & effective practices

AASHTO CTSO review and industry outreach

Develop graphical elements to enhance concepts

Stakeholder Outreach

- **AASHTO CTSO**
  - Panel meetings, review
- **State executive level**
  - Previous State DOT CEO Support
- **Industry**
  - TRB, AASHTO, ITE, etc.
- **AASHTO Technical Committee on Geometric Design**
  - Coordination with Committee Chair

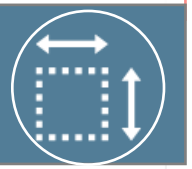
Manual Content

Foundational concepts and definitions, basic operational concepts, functions, performance potential, business case

Strategic Concepts

Formal program: business and technical processes, organizational and workforce configuration

Processes & Arrangements



Relationships to traditional programs, project development process, funding, exceptions to standards, relationship to existing guidance

Traditional Projects

TSMO strategies and procedures in response to:

- congestion
- safety
- environmental impacts

TSMO Tactics

Address rapid change:

- new technologies
- evolution of institutions
- new business models

Future Trends

Manual Structure

Six parts each with a separate focus.

A. **Introduction**

B. **TSMO Concepts and Context**

C. **TSMO Program Development and Management**

D. **Project Development**

E. **Tactical Elements**

F. **Industry and Technology Trends**

Design to Optimize User Experience

Usability / Logic

Navigation and Wayfinding

Readability

Accessibility

Content Organization

Content Features for Different Interests

- A to Z Index Terms
- “In this Chapter…”
- Thematic Icons
- Section Cross-references
- Exemplary Practice
- Case Study Insets
- Manual Glossary
- Chapter Bibliographic References

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.

Chapter Contents

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5.2 The TSMO Program Plan 70
5.3 Elements of a TSMO Program Plan 71
5.4 TSMO Program Planning Considerations 76

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.

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

TSMO Mission Examples

"The PennDOT TSMO mission is to move people and goods, from Point A to Point B, as efficiently, safely, and reliably as possible."

— Pennsylvania DOT

"Through innovation, collaboration, and performance-based decision making, transportation facilities are developed, constructed, maintained, and operated cost-effectively, with the end user in mind."

— Texas DOT

Connecting TSMO to Agency Functions: FHWA Factsheets

A series of fact sheets developed by FHWA explains the strategic relationship between TSMO and other agency functions in addition to planning and design.

- *Asset Management*
- *Construction*
- *Design*
- *Environment*
- *Human Resources*
- *Maintenance*
- *Performance Management*
- *Planning*
- *Safety*
- *Information Technology*

- *TSMO Goals and Objectives*. Future desired outcomes of the TSMO Program that help meet a vision and/or mission (goals) and specific, measurable results that relate to achieving the goals (objectives). Goals and objectives could be strategic or programmatic.

A standalone vision and mission specific to TSMO is not necessarily required of a TSMO program. An agency can tie its TSMO goals and objectives to its overall mission and vision and use them to formulate and execute actions taken to support the TSMO program.

The TSMO program itself can be structured around three fundamental elements:

- *Strategic*. The foundation of a TSMO program that sets strategic goals and/or objectives and performance measures for the program itself. The strategy should also clearly define the relationship of TSMO to the agency's mission or vision, and its overall strategic goals, objectives, and performance measures.
- *Programmatic*. The processes and institutional structures for implementing TSMO activities, including business and technical processes, culture, leadership, organization, staffing, and collaboration needed for the effective implementation of the established strategies.
- *Tactical*. The specific services, programs, and projects supporting agency TSMO strategic and performance objectives.

5.1.2 Relationship to Other Programs

TSMO program effectiveness is dependent on recognition by, and integration with, agency planning, programming, project development, and design functions. Incorporating TSMO in the agency's plans and programs can address the impacts not addressed by other programs, such as non-recurring congestion and unpredictable events like traffic incidents, adverse weather conditions, and unplanned increases in demand. Therefore, planning for an operations program should be coordinated with planning for other agency activities (such as capital construction, safety, maintenance, etc.) by creating alignment between their respective planning processes (including documents), time frames, and funding considerations.

TSMO integration may be achieved through a planning and programming process that directly incorporates TSMO as a general principle into the agency project development and design process. This integration results in programs and projects that respond to goals and objectives with a strategic mix of operational and capital construction enhancements.

Alternatively, TSMO may be developed in a separate planning and programming process, coordinated with other programs and projects, and subsequently integrated at the implementation stage. A TSMO program's relationship to both planning (***Chapter 3, Section 3.3***) and design (***Chapter 3, Section 3.4***) functions are discussed further in Chapter 3. TSMO's relationship to a host of other agency functions are explained in a series of FHWA fact sheets (see sidebar).

Related Resources

Communicating TSMO Resources

FHWA has compiled a set of resources that can help agencies communicate TSMO to their stakeholders and build a business case to support program management and resource needs. The resources include an Outreach Kit, a series of fact sheets on communicating TSMO to other agency programs, and examples from several agencies.

5.1.3 Communicating the Value of TSMO – Making the Business Case

The TSMO business case articulates the purpose and benefits of making investments in TSMO tactics and program capabilities appropriate to the audiences on which TSMO effectiveness depends. It is composed of a compelling argument and rationale that justifies the need for investment in TSMO and TSMO program management to sustain and improve TSMO. It involves:

- Identifying the transportation problem to be addressed.
- Relating the problem to the most relevant and effective TSMO tactics.
- Showing how effective TSMO tactics require certain strategy and program investments.
- Illustrating the benefits versus the costs.

While many transportation agencies embrace TSMO, there is an ongoing need to articulate the business case for establishing, expanding, and sustaining a TSMO program or function within an agency.

Business Case Audiences, Formats, and Content

As described in ***Chapter 4 (Section 4.4.1)***, there are a range of audiences for the business case. Internal audiences may include other business units and agency leadership. External audiences include policy makers and elected officials who influence or direct the allocation of resources, and other external stakeholders whose cooperation is needed for effective TSMO. Depending on the audience, the format of a business case may range from a formal technical report or memo, to brief presentations or handouts, to an elevator speech or informal conversation. (See ***Chapter 4 [Section 4.4]*** for a sample elevator speech.) Multiple formats can be used in combination to target different audiences.

Related Resources

Benefit-Cost Analysis Resources

FHWA presents a set of guidance and tools for applying benefit-cost analysis to TSMO strategies. Key resources include:

Tool for Operations Benefit Cost Analysis (TOPS-BC)

USDOT ITS Knowledge Resources Benefits and Costs Database

Operations Benefit/Cost Analysis Desk Reference and the follow-up *TSMO Benefit-Cost Analysis Compendium*

Making the business case can combine any one of several strategic arguments by:

- Defining TSMO and relating it to the agency's mission, vision, goals, and objectives.
- Citing trends and statistics that identify problems or threats to transportation performance (e.g., increasing congestion, delay and unreliability, crashes, environmental harm).
- Presenting evidence about how TSMO can solve these problems, including outcomes and benefits from current TSMO tactics or recent investments, as well as peer experience or national research and findings.

Figure 5.1.1 presents an example TSMO business case from Minnesota DOT that uses each of these three components.

Chapter 2 contains further detail on these potential business case content areas, including:

- ***Typical transportation issues addressed by TSMO*** (see **Chapter 2, 2.1.1**).
- A ***summary of payoffs from investing in TSMO tactics*** (see **Chapter 2, 2.2, Table 2.2.1**), where these benefits or outcomes can be characterized qualitatively or expressed quantitatively from a benefit-cost analysis or similar.
- TSMO benefits (see **Chapter 2, 2.6**).

Figure 5.1.1 Example Business Case for TSMO – Minnesota DOT

Source: MnDOT (2019)

One key objective of the business case may be to provide the rationale for, and benefits from, specific institutional, organizational, and procedural changes that would improve the current level of agency TSMO capability. Such changes may be needed to:

- Improve overall agency efficiency in meeting mobility objectives.
- Enhance capital investments to include TSMO.
- Support greater levels of TSMO investment, often with very high cost-effectiveness.
- Strengthen interagency partnerships.
- Upgrade TSMO tactics' outcomes, including safety, mobility, and reliability benefits.

5.1.4 Improving and Sustaining a TSMO Program

Like any formal agency program, a TSMO program can be managed, sustained, and continuously improved on an incremental basis over time, starting with an organized process to develop a formal program. ***TSMO program planning*** is the process to define, evaluate, and articulate actions and strategies to manage, sustain, and improve a TSMO program.

TSMO program planning should:

- Align with other agency plans, such as the agency's overall Strategic Plan, Long-range Transportation Plan, Transportation Improvement Plans, Strategic Highway Safety Plan, multimodal or mode-specific strategic or deployment plans, and others.
- Incorporate a self-assessment process such as the TSMO Capability Maturity Model (see ***Section 4.3 in Chapter 4*** or ***Chapter 12***) to identify current opportunities and challenges (sometimes referred to as strengths and weaknesses) and prioritize actions and strategies for improving the program.
- Build consensus among the agency's functional units, divisions, and districts.
- Solicit stakeholder input from and coordinate with the activities of partner agencies such as metropolitan planning organizations (MPO), other state agencies like law enforcement and information technology office, toll authorities, local governments, other modal organizations (such as public transit, and rail), public safety agencies, and key private sector service providers (such as freight operators).
- Respond to agency's needs, context, and existing planning and operational management processes and reflect the roles and responsibilities of the organization undertaking the development or advancement of the program.

Related Resources

FHWA Guide on Making the Business Case

FHWA's *Advancing TSMO: Making the Business Case for Institutional, Organizational, and Procedural Changes* offers guidance on why a TSMO business case for institutional, organizational, and procedural changes might be necessary, how to develop one, and tailor it to various audiences.

Sources of Agency TSMO Program Plans

Two good sources of links to agency TSMO Program Plans are the *FHWA Organizing and Planning for Operations Program webpage on TSMO Plans* and by searching the *National Operations Center of Excellence Knowledge Center*.

5.2 The TSMO Program Plan

5.2.1 Concept of a TSMO Program Plan

A TSMO program plan encompasses the formal activities and supporting documents to justify and guide the development of the policies, resources, business and technical processes, institutional framework, and collaborative activities needed to deliver the most effective TSMO.

The concept of a TSMO program plan is built around the recognition that effective TSMO requires integration into the transportation agency as a formal program. This requires tailoring TSMO-specific processes and supporting institutional arrangements essential to effective TSMO reflecting its unique projects and activities, technologies, and implementation requirements.

A TSMO Program Plan addresses each of the elements of a TSMO Program: strategic, programmatic, and tactical (see Figure 5.2.1).

Figure 5.2.1 TSMO Program Plan Elements

Source: *FHWA, "Developing and Sustaining a Transportation Systems Management & Operations Mission for Your Organization: A Primer For Program Planning"*

5.2.2 Functions of a TSMO Program Plan

The functions of a TSMO program plan include:

- Articulating the business case for TSMO, its role within the agency's mission, goals and objectives, and its relationships with other agency programs and processes.
- Highlighting the value of TSMO in responding to specific customer service needs and deficiencies, new technology and business models, and opportunities for collaboration.
- Specifying the TSMO-specific technical processes required to engineer TSMO systems, and the planning and project development processes to implement them.
- Addressing the critical roles, responsibilities, and capabilities needed to support continuous improvement of an effective TSMO program.
- Identifying essential resource needs, including financial, staffing, and performance measurement resources.

Related Resources

TSMO Program Planning Resources

FHWA's Organizing and Planning for Operations website provides resources that guide agencies in developing a TSMO program plan. The *TSMO Plans webpage* lists "Reports and Publications" and "Webinars and Training."

Two important publications are:

FHWA's Primer for Program Planning

NCHRP Report on Program Planning

5.3 Elements of a TSMO Program Plan

5.3.1 Strategic Element

Program plans are often introduced by a background presentation about TSMO within the context of overall agency transportation policy and strategies. This provides the agency's point-of-departure for formal TSMO program planning. Depending on the agency's existing commitment to TSMO and assumptions about the audience's familiarity with TSMO, the ***strategic element*** noted below may be extensive and detailed or high-level and general. This element typically includes:

- *Business case.* The business case for TSMO (see Section 5.1.3) can be tailored to a range of audiences and the varied focus of program plans. It addresses the definition, need for, and benefits of TSMO itself, including both national experience and a "snapshot" of existing local efforts. Depending on the current level of agency commitment to TSMO, the business case may also focus on the rationale and benefits of making specific institutional, organizational, and procedural changes needed to support the TSMO program, as may be presented in the ***programmatic element*** (see below).

Exemplary Practice

Minnesota DOT TSMO Strategic Plan

Minnesota DOT's TSMO Program Plan contains a Strategic Plan that includes a rationale for the plan, a business case for TSMO, the department's approach to TSMO that the plan seeks to advance, and TSMO goals and objectives.

Figure 5.3.1 Texas DOT TSMO Statewide Strategic Plan Goals and Objectives

Goal	Objective
Safety	Reduces crashes and fatalities through continuous improvement of traffic management systems and procedures.
Reliability	Optimize travel times on transportation systems in critical corridors to ensure travelers are reaching their destinations in the amount of time they expected for the journey.
Efficiency	Implement projects that optimize existing transportation system capacity and throughput.
Customer Service	Provide timely and accurate travel information to customers so they can make informed mobility decisions.
Collaboration	Proactively manage and operate an integrated transportation system through multi-jurisdictional coordination, internal collaboration, and cooperation between various transportation disciplines and partner agencies.
Integration	Prioritize TSMO as a core objective in the agency's planning, design, construction, operations, and maintenance activities.

Figure 5.3.2 Oregon DOT Operations Program Plan Linkages to its Long-Range Transportation Plan

Oregon Transportation Plan Goals and Policies	How Operations Relates to the Goals and Policies
Goal 2 - Management of the System To improve the efficiency of the transportation system by optimizing the existing transportation capacity with improved operations and management. ***Policy 2.1—Capacity and Operational Efficiency*** It is the policy of the State of Oregon to manage the transportation system to improve its capacity and operations efficiency for the long term benefit of people and goods movement. ***Policy 2.2—Movement of Assets*** It is the policy of the State of Oregon to manage transportation assets to extend their life and reduce maintenance costs.	Operations' central objective is to maximize the capacity and efficiency of the existing system through technology, real-time management, and collaborative actions. Operations is applied to all transportation system modes and users. Plans and resources for ongoing maintenance of ITS assets is a key Operations program consideration. Operations strategies reduce the need to add system capacity which wold require additional maintenance resources.

- *TSMO vision, mission, purpose, goals, and objectives.* These components demonstrate the linkage of TSMO to agency mission, vision, and goals and establish targets to be achieved, as well as problems to be addressed by the TSMO program. Figure 5.3.1 illustrates the goals and objectives of Texas DOT's TSMO Statewide Strategic Plan (2018). The specification of TSMO goals and objectives may also include identification of performance measures, including those that relate strategic agency priorities to TSMO. Linkages may be made between the TSMO program and plan to other agency strategic plans to show how TSMO is a critical part of a consistent approach to the agency's mission. For example, in its Operations Program Plan, Oregon DOT demonstrated how operations directly supports several goals in its long-range multimodal transportation plan, the Oregon Transportation Plan, as shown in Figure 5.3.2.
- *Relevant TSMO strategies.* Building on existing TSMO deployments and activities, the strategic element may need to present the rationale for expanding existing or adding new TSMO tactics to respond to known system performance deficiencies, for both recurring and nonrecurring congestion. Strategic priorities may be defined based on these observations.

5.3.2 Programmatic Element

The programmatic element consists of actions or initiatives designed to improve agency core capabilities related to business processes and institutional arrangements necessary to achieve the plan's strategic goals by supporting effective implementation of projects in the ***tactical element***. A ***CMM self-assessment*** (see ***Chapter 4, 4.3*** and ***Chapter 12, 12.4***) exercise, may be done as a lead-in to or part of the program plan preparation to identify where programmatic improvements are needed. Improvement areas often align with the six dimensions of capability maturity.

Some of the key actions and initiatives to be considered in program plans are:

- *Business Processes.* These processes focus on planning, programming, and funding for TSMO tactics, including:
  - Integration into the long-range transportation planning and transportation improvement program planning processes
  - Development of technical tools for TSMO planning, forecasting, data management, and decision support
  - Funding needs and financial resources management
  - TSMO project development process and integration into agency-wide project development process
  - TSMO/ITS asset management
  - Research and development
  - Legislative or regulatory considerations
- *Performance Management.* This includes a performance management framework and processes to manage and improve TSMO tactics to meet agency goals, consisting of:
  - Performance deficiency analysis and forecasting tools
  - Performance measures, measurement, and reporting
  - Data management and decision support systems
  - Quality management and continuous improvement
- *Systems and Technology.* These include the development of functions essential to the TSMO program and project development and implementation, including:
  - Systems engineering including discussion of technology interoperability
  - ITS architecture and concepts of operation

Capability Maturity Model Self-Assessment

A CMM self-assessment facilitates identifying current agency capabilities, targets for the future, and actions to achieve them. The self-assessment provides a snapshot of overall agency TSMO program capability and a baseline from which to strategize what actions and resources might be necessary to incrementally advance the agency to an improved future state.

Exemplary Practice

Ohio DOT TSMO Plan – Programmatic Element

Ohio DOT's TSMO Plan includes a programmatic element comprising "policy actions" organized around the six dimensions of the TSMO CMM. The plan presents each policy action as a one-page brief that provides: a description; critical steps; benefits, impacts, and outcomes; and highlights responsible parties, resources, and dependencies.

- Procurement and integration of new technology and systems
- IT considerations such as privacy and security

- *Organization and Workforce*. This includes application of an appropriate organizational model or structure and workforce capabilities, including:
  - TSMO's place in agency hierarchy
  - Vertical and horizontal business unit alignment and reporting relationships
  - Defined roles and responsibilities for TSMO
  - Internal coordination and cooperation among business units
  - Staff core capacities, training, outsourcing
  - Conditions of employment, recruitment and retention, and succession plans
- *Collaboration and Outreach/Communication*. This includes establishing an understanding of interagency roles and responsibilities, including:
  - Partnerships with public safety agencies and government entities
  - Public-private partnerships for technical or service support
  - Communication, marketing, and engagement with customers as well as underrepresented/overburdened communities who may be adversely impacted by TSMO tactics
- *Culture and Leadership*. This includes creation of an understood and accepted common framework for the definition and value of TSMO, including:
  - Leadership and championing of TSMO
  - Creation of an authorizing environment that enables the development of policies to support TSMO
  - Education for understanding the value and role of TSMO within the agency and among its partners

Figure 5.3.1 shows a sample set of programmatic recommendations and alignment with strategic goals from the Alabama DOT Statewide TSMO Master Plan (2019).

Figure 5.3.1 Example Programmatic Element Content

Leadership and Organization		Goal
6	Reorganize statewide work chart structure to increase the opportunity for TSMO collaboration by the State TSMO Engineer and supporting organizational structure.	A,C
7	Develop and implement an ongoing TSMO training program. Topics to include: signal timing, signal hardware, performance management, incident management, work zone management, evacuation management, and others as required.	S,M,A,C
8	Encourage technical staff retention: Clearly define roles and responsibilities; Identify and create job titles with appropriate knowledge, skills, and ability; Provide pay commensurate with knowledge, skills, and ability.	S,M,A
-	Clearly define roles and responsibilities.	S,M,A
-	Identify and create job titles with appropriate knowledge, skills, and ability.	S,M,A
-	Provide pay commensurate with knowledge, skills, and ability.	S,M,A
9	Cross-train critical positions to better secure knowledge and functionality for staff changes.	S,M,A

5.3.3 Tactical Element

The tactical element identifies specific TSMO services, programs, and projects designed to achieve the TSMO strategic goals and performance objectives. The tactical elements can be staged over time, assigned priorities, and associated with available resources or degrees of implementation given possible resource level scenarios. Tactics go beyond ITS infrastructure and implementing programs to the necessary TMC procedures, field protocols, interagency roles and coordination, and staff training. The tactical element's components can include:

- Prioritized actions related to specific services, projects, or programs identified and scheduled on an annual and planning period basis.
- Investment plan identifying and assembling the resources needed for TSMO, capital, staff, operating, and maintenance activities.
- Performance monitoring plan including TSMO-specific measures, data gathering and analysis, reporting, and management response.
- Implementation guidelines identifying roles, responsibilities, and schedule for project development implementation and continuing operations.
- Impact assessment to identify the potential positive and negative impacts of TSMO's tactics on transportation system users and particularly underserved/overburdened communities and consider soliciting their input on methods to maximize benefits and minimize harms.

Exemplary Practice

Iowa DOT TSMO Program Plan – Tactical Element

Iowa DOT's TSMO Program Plan contains a 5-year TSMO program consisting of a prioritization tool and annualized list of:

- Projects and services (e.g., Traffic incident and emergency managements, TMC services)
- Construction projects (e.g., standalone ITS device installations)
- Activities, policies, and procedures (i.e., those identified in the plan's programmatic element)

5.4 TSMO Program Planning Considerations

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.

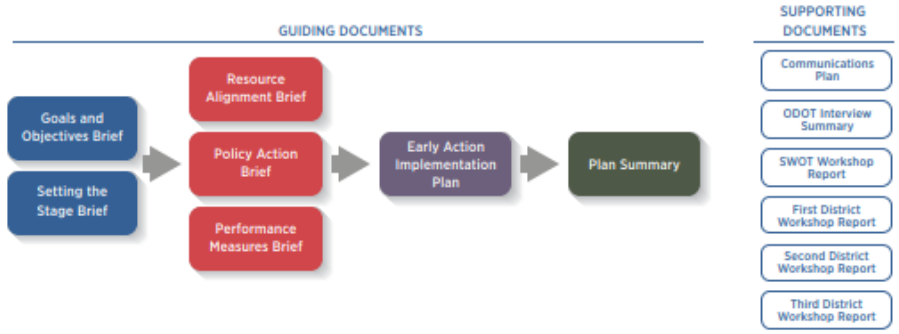
Develop a prioritization process to apply to the tactical element's programs, projects, and services.

5.4.1 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.

The guiding documents referenced in the figure are available from the *Ohio DOT's TSMO Plan webpage*; the supporting documents are not publicly available. *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.

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.

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.

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 typically 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."

Exemplary Practice

Notable MPO TSMO Plans

The Delaware Valley Regional Planning Commission's *Transportation Operations Master Plan* is a component of its Long-Range Plan and contains strategic and tactical elements. It consists of a set of operations goals and objectives, a vision of future ITS infrastructure and other TSMO services, specific capital projects and ongoing programs, and a financial plan.

The Atlanta Regional Commission's *Atlanta Regional TSMO Strategic Plan* presents a TSMO vision and a 10-year strategic set of actions consisting of both programmatic and tactical initiatives.

Transportation Operations, sponsored by FHWA in four metropolitan regions. Resources on these plans can be found on *FHWA's Regional Concept for Transportation Operations webpage*. Examples of more recent MPO-led TSMO plans are highlighted in the sidebar "Notable MPO TSMO Plans."

Within metropolitan regions, some larger local jurisdictions (cities and counties) are significant roadway owner-operators with their own TSMO infrastructure and activities and develop their own TSMO plans, working with relevant state and regional entities.

The mix of facility ownership (both state and local) within many metropolitan areas, and the number of local government jurisdictions and modes, highlights the importance of coordination among state, regional, and local entities at all stages of TSMO planning, starting with common goals and objectives, the nesting of systems architectures, and the coordination of ITS and TSMO planning activities. Relevant regional ITS architectures can be referenced and should be consistent with a TSMO program plan. The TSMO program plan may include programmatic actions to update regional and the statewide ITS architectures.

5.4.4 Program Plan Updates

Program plans should be developed with a specific time frame, in recognition of evolving objectives, priorities, opportunities, and TSMO tactics. Stages or phases with milestones should be indicated to facilitate progress tracking for defined plan elements. Triggers for updating should also be indicated as plan components are implemented, as policy or the program evolves, and as new technology or concepts of operation emerge.

Implementation experience ("lessons learned") will indicate unanticipated challenges and opportunities at all levels, such as changes in operational strategy priorities, a need for staff augmentation, improvements in technology, and availability of resources. This experience can be fed back into plan updates. Improvements in agency capabilities can also be measured over time externally through system performance tracking and internally by periodic capability maturity assessments to make sure priority dimensions are being addressed.

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TOM Review and Publication

- Phase 1 Review: NCHRP Panel and CTSO Leadership
- Phase 2 Review: Full CTSO and other committees
- Successfully balloted by AASHTO CTSO
- Approved by AASHTO Board of Directors at 2022 Annual Meeting
- Published by AASHTO in May 2023
- Available through the AASHTO store: https://store.transportation.org/item/collectiondetail/246

Related Activities and Next Steps

- Implementation Plan
- Methodology for Manual updates
- Recommendations for additional topics/content

- Guide for TOM Implementation
- CTSO oversees the TOM
- Update Regional Operations Leadership Forum to incorporate TOM
- Update National Operations Center of Excellence website to organize around content and structure TOM

Further Information

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