



Mainstreaming TSMO: Experiences From Iowa and Washington State

INTRODUCTION

This case study highlights practices in mainstreaming transportation systems management and operations (TSMO) at the Iowa Department of Transportation (DOT) and the Washington State Department of Transportation (WSDOT). Each agency has its own culture, and the approaches the two DOTs use illustrate mainstreaming in ways that are consistent with each agency's culture and structure.

TSMO applies operational improvements to maximize system performance of existing transportation facilities and to stretch limited funding. TSMO is a set of strategies that enable transportation agencies to implement low-cost solutions, balance supply and demand, provide flexible solutions to meet changing conditions, and benefit more areas and customers. TSMO benefits can include improved safety and reliable traffic flow, which result in reduced congestion, better quality of life, less wasted fuel, cleaner air, and economic advantages.

Iowa DOT and WSDOT have made changes to their organizations to bring TSMO into a broad range of functional areas. These efforts include changes to the organizational structure, outreach and workforce development, program planning, project development and construction, and coordination across disciplines and among partner agencies.

DEFINITION OF MAINSTREAMING TSMO

Mainstreaming TSMO within an organization makes management and operations strategies readily understood, considered, attractive, and available to relevant agency leadership and staff regardless of where they sit in the organization. Mainstreaming formalizes a TSMO program through comprehensive collaboration among a broad group of transportation management stakeholders (e.g., State and local DOTs, cities, counties, metropolitan planning organizations [MPOs], transit authorities, first responders, law enforcement, and legislators). This allows input based on knowledge, skills, and techniques from individuals in all programs that have a stake in improving the multimodal transportation system. Success in TSMO is not dependent on just one champion.

RATIONALE FOR MAINSTREAMING

Mainstreaming TSMO helps transportation agencies align, rather than compete, across programs to accomplish long-term system performance goals for the transportation system. Mainstreaming TSMO integrates a broader range of strategies throughout transportation departments and related agencies and organizations. It engages planners, designers, operators, and construction and maintenance staff, and it touches all aspects of mobility, including congestion, air quality, sustainability, safety, security, reliability, and related quality-of-life concerns. The goal of mainstreaming is to routinely include TSMO strategies as an equal player to address transportation needs within a community or region, along with other options to improve transportation system performance.

MAINSTREAMING TSMO AT IOWA DEPARTMENT OF TRANSPORTATION

Iowa DOT has worked to mainstream TSMO across the agency through processes and practices that other States can tailor and adopt.

OVERVIEW

On its TSMO website, Iowa DOT states, “Our roads are busier than ever before and with more drivers on the road, the potential for crashes and increased congestion is greater than ever... The TSMO plan will help us find ways to fine tune the performance of and proactively manage the state’s transportation system.”¹ Iowa DOT believes that mainstreaming TSMO cannot be achieved by one person or a small group but must be integrated throughout its business practices. Mainstreaming means that TSMO is incorporated into the agency’s way of doing business.

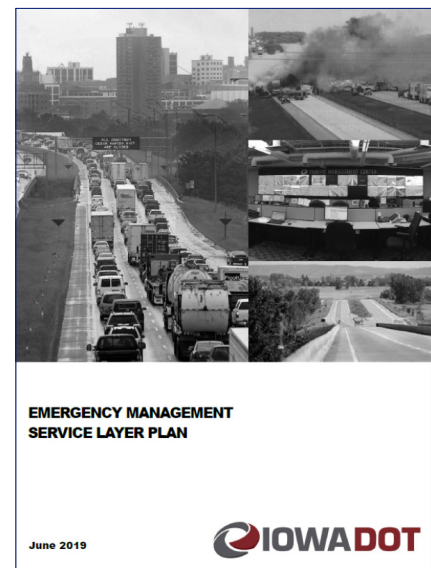
TSMO began as an executive directive that communicated leadership direction and support. Through a comprehensive TSMO planning process, agencywide engagement, and TSMO integration across disciplines, Iowa DOT offers many examples of mainstreaming TSMO.

ELEMENTS OF THE MAINSTREAMING INITIATIVE

Iowa DOT implemented many elements to mainstream TSMO.

TSMO Steering Committee: The agencywide TSMO steering committee enables all agency programs to provide input into its operations and TSMO focus areas. The committee includes groups that have historically had limited involvement and facilitates comprehensive collaboration on operations. One of the early initiatives of the committee was to develop a training plan for all Iowa DOT employees that included a new employee training video as well as more specialized and in-depth training for TSMO professionals. The training initiative was intended to help employees identify their roles in TSMO, to incorporate operations and mobility analysis into project development, and to consider operations throughout the project lifecycle.

TSMO Program Planning: The TSMO strategic and program plans incorporated players from across the agency in the development of eight service layer plans. The service layer plans help streamline and integrate TSMO activities into specific focus areas. The Iowa DOT has completed seven of the eight service-layer plans: traveler information, traffic incident management, intelligent transportation systems and communications systems, work zone management, emergency management, cooperative



Source: Iowa Department of Transportation.

Figure 1. Image. Cover of Iowa Department of Transportation Emergency Management Service Layer Plan.

¹ Iowa DOT. n.d. “Transportation Systems Management and Operations (TSMO)” (website). <https://iowadot.gov/tsmo/>, last accessed January 12, 2023.

automated transportation, and the traffic operations center. Collaboration across functional areas in the Iowa DOT supported the development of these plans. For example, the Emergency Management Service Layer Plan (figure 1) brought together players who previously had had limited interactions (e.g., traffic operations, maintenance, information technology, public transit, rail, aviation, and emergency management).² This multidisciplinary approach helps mainstream TSMO across disciplines and business areas.

Integration in the Statewide Planning Process: TSMO is integrated into Iowa DOT's statewide planning process through the Infrastructure Condition Evaluation for Operations (ICE-OPS). ICE-OPS integrates operations analysis, data, and TSMO planning documents and considerations into the planning processes that identify the statewide 5-year funding program. Through ICE-OPS, Iowa DOT planners examine nine operations-related criteria—bottleneck occurrences, freight bottleneck occurrences, traffic incidents, crash rates, planning time index, event center buffer index, weather-sensitive mileage, average annual daily traffic (AADT), and Infrastructure Condition Evaluation Rating—by interstate segment. Iowa DOT evaluates and weights them to develop ICE-OPS scoring by segment and integrates it into its' planning and programming process, as illustrated in figure 2.

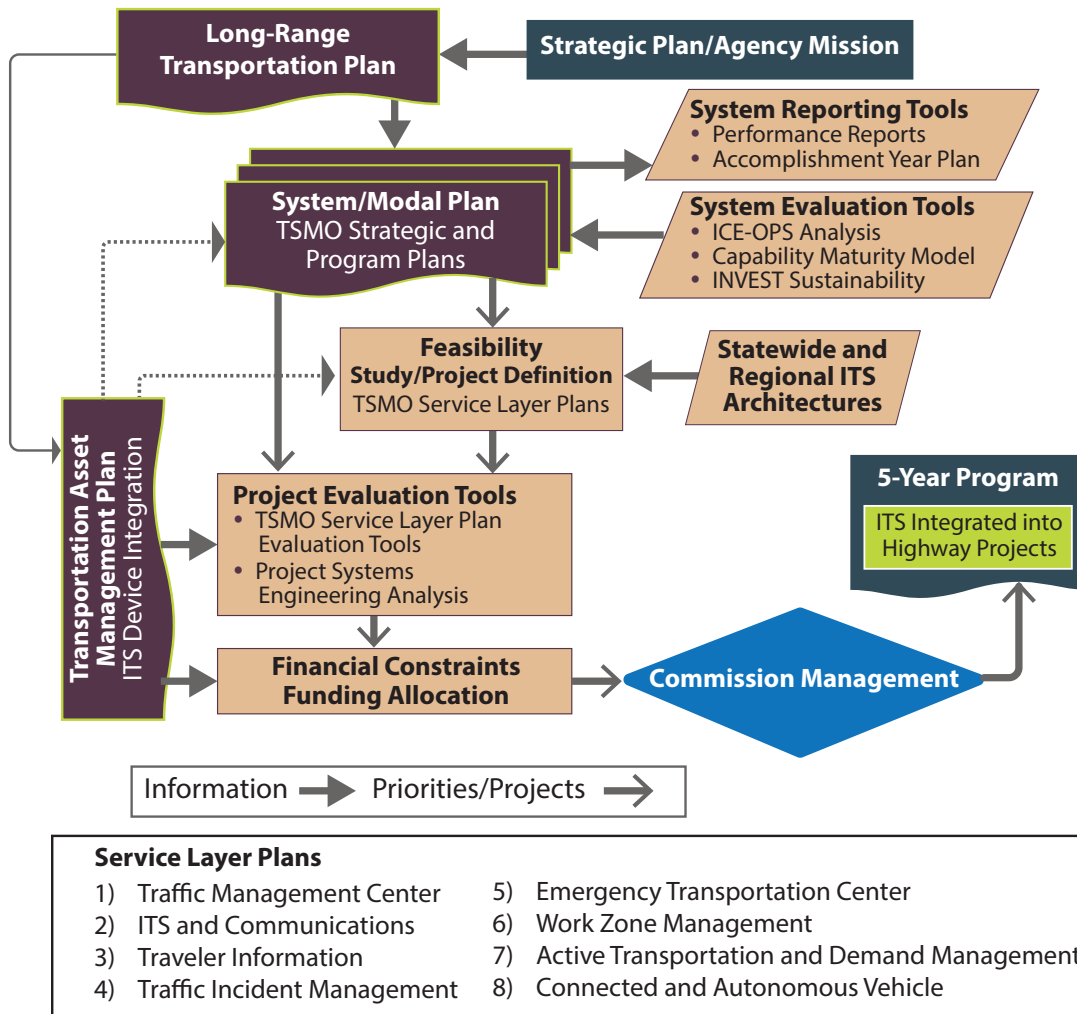
Traffic Critical Projects: Iowa DOT established the Traffic Critical Projects (TCP) program to improve safety and mobility in work zones.³ The program uses a TCP checklist to support TSMO's strategic safety, reliability, efficiency, convenience, and coordination goals for projects on significant highway segments and for application of TSMO strategies in work zone traffic management. The checklist identifies construction projects that may cause significant safety or mobility impacts. These projects are on interstates, freeways, or expressways where the speed limit is 55 mph or greater and within 15 feet of a travel lane with more than 15,000 AADT or 11,000 AADT where 20 percent of the traffic are trucks. Iowa DOT received a 2021 TSMO Award from the National Operations Center of Excellence (NOCoe) for its comprehensive approach to work zone management.⁴

Outreach and Education: Iowa DOT provides outreach and training materials for multiple audiences. Materials include a public-facing video on TSMO, executive-level workshops, district-level training, and an annual statewide traffic incident management conference involving responders from all disciplines. Iowa DOT developed presentations on TSMO for district design staff, the motor vehicles group, the consultant engineering council, the Smart Cities group in the Des Moines Area Metropolitan Planning Organization, State legislators, and new employees; hearing the presentations will soon be a requirement for all Iowa DOT employees. Iowa DOT is also giving presentations outside the agency to talk about this change in direction.

² Gannett Fleming and Pat Noyes and Associates. *Iowa Transportation Systems Management and Operations (TSMO) Emergency Management (EM) Service Layer Plan*. Ames, IA: Iowa DOT. <https://iowadot.gov/TSMO/ServiceLayerPlan5.pdf>, last accessed January 12, 2023.

³ Iowa DOT. 2019. "Chapter 9 Traffic Control," in *Traffic Critical Projects Program Design Manual*. <https://iowadot.gov/design/dmanual/09e-01.pdf>, last accessed January 31, 2023.

⁴ NOCoE. 2021. "2021 TSMO Awards: Work Zones Using TSMO – Iowa DOT," YouTube video, 1:40. <https://www.youtube.com/watch?v=kJyswSOAnpY>, last accessed January 31, 2023.



ICE-OPS = Infrastructure Condition Evaluation for Operations; INVEST = Infrastructure Voluntary Evaluation Sustainability Tool; ITS = intelligent transportation systems; TSMO = transportation systems management and operations.

Source: Iowa DOT.

Figure 2: Graphic. Iowa Department of Transportation (Iowa DOT) systems planning process.⁵

Performance Management: Iowa DOT’s TSMO strategic and program plans identify TSMO goals and objectives that align with its strategic goals. Subsequently, each service layer plan includes specific performance measures and objectives that support the strategic and program objectives. By measuring performance, Iowa DOT can make coordinated and integrated decisions that advance TSMO through agencywide, program, and service-area objectives.

⁵ Lakeside Engineers, LLC, and Pat Noyes & Associates. 2016. *Iowa Transportation Systems Management and Operations (TSMO) Program Plan*. Ames, IA: Iowa DOT. <https://iowadot.gov/TSMO/TSMO-Program-Plan.pdf?ver=2016-05-02-113238-843>, last accessed January 12, 2023.

Development of a Business Case: As part of its TSMO program planning efforts, Iowa DOT articulated “Why TSMO Matters” as a section of its strategic and program plans. The plans make the case that TSMO “will improve the safety and mobility of the transportation system and help Iowans travel to their destinations safely, efficiently, and conveniently.”⁶ The TSMO business case aligns goals and objectives with agency goals and objectives, guides performance measure selection and tracking, and furthers communication efforts.

Organizational Structure: TSMO program management, housed in the Traffic Operations Bureau, is responsible for coordinating and mainstreaming TSMO across Iowa DOT’s headquarters, divisions, and six geographic districts. In recent years, three district TSMO engineer positions were created and filled to bring a new level of operations expertise to the field. Each district TSMO engineer covers roughly two districts, ensuring full coverage of the entire State. Iowa DOT also reorganized its Systems Operations Division to include the six bureaus that work most closely with day-to-day operations: Traffic Operations, Traffic and Safety, Maintenance, Construction and Materials, Motor Vehicle Enforcement, and TraCS (Traffic and Criminal Software). Among other benefits, this reorganization has helped facilitate collaboration on improving work zone operations. The TSMO Steering Committee continually looks for additional opportunities to collaborate with divisions and bureaus to mainstream TSMO throughout the agency.

OUTCOMES

Below are key results from Iowa DOT’s efforts to mainstream TSMO.

Increased Awareness and Understanding of TSMO Across DOT Business Areas: Increasing awareness of TSMO concepts and strategies across Iowa DOT has allowed the integration of TSMO across programs and business practices. This process is self-reinforcing, raising the profile of TSMO across the DOT and allowing more business practices to integrate.

Increased Funding for TSMO: Most of Iowa DOT’s TSMO initiatives are financed with State funds. In addition to increases to the budget for the Systems Operations Division, Iowa DOT established a dedicated funding stream to provide consistent funding for operations needs such as the Highway Helper motorist assist program and Statewide Traffic Management Center staffing.

Expanded TSMO Planning and Implementation: In developing the service layer plans, the TSMO strategic plan, and the program plan, Iowa DOT engaged players from across the agency and partner agencies to identify and address a broad range of issues and interests.

Integration of TSMO at Multiple Levels of the Organization: Iowa DOT’s TSMO initiative is empowering districts and field staff to accomplish things that had previously not been an option. Iowa DOT designated three TSMO engineers to cover the State. They are located in three of the districts and work with the district traffic technicians to identify operational needs on the highways and develop tactical countermeasures. The TSMO Engineers also build relationships with local agencies to advance integrated corridor management.⁷

⁶ Lakeside Engineers, LLC, and Pat Noyes & Associates. 2016. *Iowa Transportation Systems Management and Operations (TSMO) Program Plan*. Ames, IA: Iowa DOT. <https://iowadot.gov/TSMO/TSMO-Program-Plan.pdf?ver=2016-05-02-113238-843>, last accessed March 8, 2023.

⁷ Iowa DOT. 2022. *Iowa DOT TSMO Plan Update*. Ames, IA: Iowa DOT. <https://iowadot.gov/tsmo/TSMO-Plan-Update-2022>, last accessed January 31, 2023.

MAINSTREAMING TSMO AT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WSDOT's efforts to mainstream TSMO include a range of practices that other States can tailor and adopt.

OVERVIEW

WSDOT looks at TSMO from a broad perspective, mainstreaming it across multimodal planning, operations, and asset management. WSDOT considers TSMO a tool in its Practical Solutions toolbox. Practical Solutions is WSDOT's data-driven and performance-based approach to how the agency administers, manages, plans, programs, designs, constructs, operates, and maintains its services and programs. This approach focuses WSDOT on identifying and solving issues and needs quickly and cost-efficiently.

Formalizing operations in WSDOT began 20 years ago with the legislature approving a separate operations program budget. WSDOT has continued to emphasize operations and now focuses on bringing TSMO into planning, effectively moving TSMO from a position of competing with other priorities to functioning as a means of aligning all agency programs to incorporate TSMO.

ELEMENTS OF THE MAINSTREAMING INITIATIVE

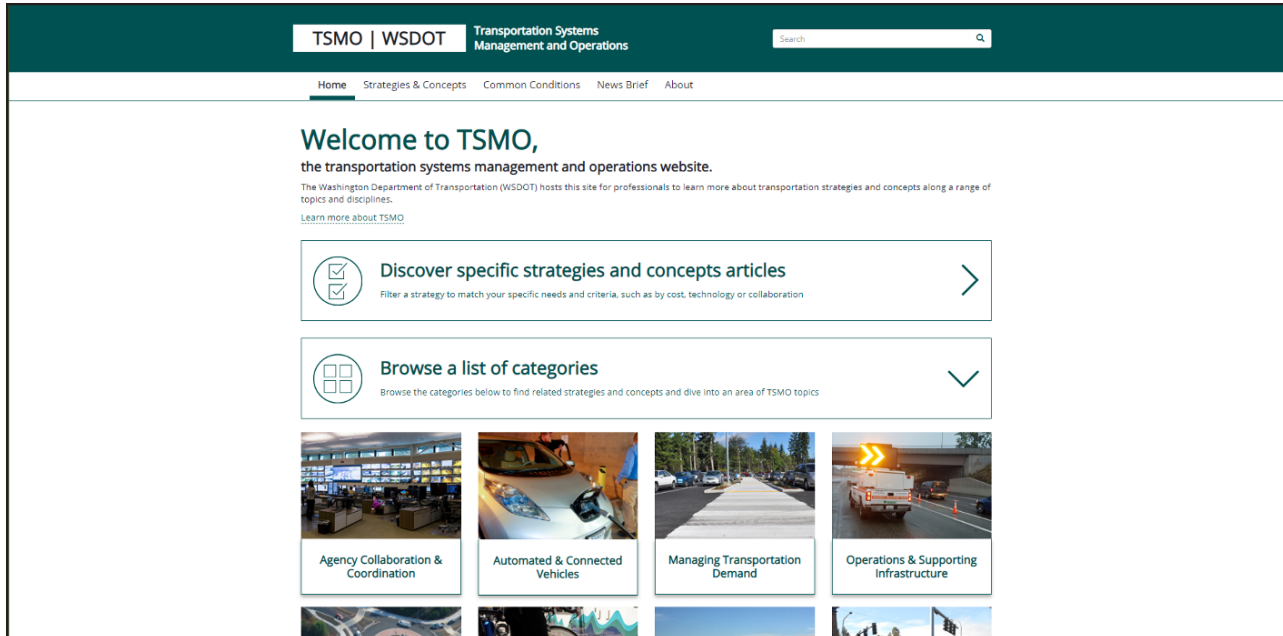
Organizational Structure: WSDOT mainstreams TSMO across agency functions by focusing on managing safety and capacity as assets and through corridor and system management. WSDOT identified a statewide TSMO development engineer to champion TSMO across the agency. An overview of TSMO and how it is integrated across functional areas in the agency appear on WSDOT's website at <https://tsmowa.org/>.

Integration in Project Planning and Development: TSMO is part of each phase of WSDOT's Practical Solutions process. The agency is developing a statewide Practical Solutions performance framework that supports performance-based decisionmaking for its six transportation system policy goals and includes guidance on using TSMO strategies in project planning.

Engagement: WSDOT focuses on enhancing multidisciplinary, multimodal engagement across technical disciplines and with external partners as well as public and community engagement. This level of engagement is evident in the Corridor Sketch Initiative, which includes planning activities and agency partner engagement "to determine the context and performance of state highway corridors and identify high-level strategies for addressing performance gaps."⁸

Education: WSDOT hosts a website (figure 3) to share TSMO information with transportation professionals. For its employees, WSDOT has developed a series of free online courses with the Consortium for Innovative Transportation Education. These courses include TSMO 101: What Is This TSMO Thing Anyway? CMM: Assessing Agency Capabilities, Communicating the Value of TSMO, Integrating TSMO Into Your Agency, and Managing a Corridor. WSDOT continues to add courses to its online training opportunities.

⁸ Washington State DOT. 2017. *User Guide for Corridor Sketch Summaries*. Olympia, WA: Washington State DOT. <https://wsdot.wa.gov/sites/default/files/2021-10/CSS-UserGuide.pdf>, last accessed March 8, 2023.



Source: Washington State DOT.

Figure 3. Image. Washington State Department of Transportation (DOT) TSMO website.⁹

OUTCOMES

Below are key lessons learned while mainstreaming TSMO at WSDOT.

Enhanced Understanding of the Benefits of TSMO Across the DOT and by Stakeholders and Partners: WSDOT’s TSMO website helps stakeholders and partners define proposed TSMO strategies and augment existing project concepts. WSDOT has also integrated TSMO into workforce development through online courses for employees.

Increased Focus on TSMO in Project Development: WSDOT worked to define TSMO to help other disciplines understand the benefits and opportunities TSMO strategies offer. One challenge that WSDOT addressed through better understanding of TSMO is a perception that TSMO competes with other projects for resources. Through expanded education, project staff are increasingly eager and excited about the opportunities to implement TSMO as a complement to other projects or a way to delay the need for a major project.

Integration of TSMO in Investment Decisions: WSDOT has integrated project scoping to bring TSMO strategies and a near-term focus into planning. WSDOT implements and aligns priorities within individual budgets by packaging and prioritizing individual investments, which leads to a right-sized level of development needed to create an investment proposal.

⁹ WSDOT. 2022. “Transportation Systems Management Operations” (website). <https://tsmowa.org>, last accessed June 29, 2021.

SUMMARY

No one-size-fits-all way successfully mainstreams TSMO. Iowa DOT and WSDOT approached TSMO to fit their own strategic priorities and organizational cultures. Iowa DOT has a designated TSMO program, while WSDOT applies TSMO principles and an operations-first approach to integrate TSMO strategies across the agency.

The following are some key takeaways from these examples:

- Identify how TSMO supports and advances the agency's goals and objectives
- Develop a business case for TSMO
- Provide strong TSMO leadership at every level of the organization
- Coordinate and collaborate across disciplines, with partner agencies, and with the public
- Integrate TSMO into processes, policies, and ongoing programs
- Provide information and training for a broad range of audiences
- Organize the agency to integrate TSMO rather than developing a TSMO silo

NON-BINDING CONTENTS

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U.S. Department of Transportation
Federal Highway Administration • Office of Operations
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March 2023

FHWA-HOP-23-018

