

Organizing for TSMO

Case Study 1: Business Processes – Optimizing Existing Planning and Implementation Processes with TSMO

July 2019



U.S. Department
of Transportation

**Federal Highway
Administration**

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TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. FHWA-HOP-19-063	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Organizing for TSMO – Case Study 01: Business Processes		5. Report Date July 2019	
		6. Performing Organization Code:	
7. Author(s) Lacey L. Atkins, Olivia R. Brey, Austin Hoekstra, Charles R. Lattimer		8. Performing Organization Report No.	
9. Performing Organization Name and Address Atkins North America, Inc. 482 South Keller Rd. Orlando, FL 32810		10. Work Unit No.	
		11. Contract or Grant No. DTFH6116D00048/0001	
12. Sponsoring Agency Name and Address United States Department of Transportation Federal Highway Administration 1200 New Jersey Ave. SE Washington, DC 20590		13. Type of Report and Period	
		14. Sponsoring Agency Code HOP	
15. Supplementary Notes Joseph Gregory (FHWA – HOTM)			
16. Abstract Given the varying stages of TSMO adoption and advancement, the Federal Highway Administration identified the need for case studies to provide examples of common challenges and best practices for transportation agencies to learn from each other. This is one of 12 case studies developed to support organizing for TSMO. This case study focuses on business processes. Four agencies with mature business processes were interviewed: Florida Department of Transportation District 5 (FDOT D5), Iowa Department of Transportation (IowaDOT), Maricopa Association of Governments (MAG), and North Central Texas Council of Government (NCTCOG). Each agency provided information on how they improved their business processes, challenges, lessons learned, and the next steps to continually improve this dimension.			
17. Key Words Capability Maturity Model, Transportation Systems Management and Operations, reliability, business processes, case study, lessons learned		18. Distribution Statement No restrictions. This document is available to the public through the National Technical Information Service, Springfield, VA 22161. http://www.ntis.gov	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 32	22. Price

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List of Abbreviations and Acronyms

AASHTO	American Association of State Highway and Transportation Officials
CMM.....	Capability Maturity Model
D5.....	District 5
DOT	Department of Transportation
FDOT	Florida Department of Transportation
FHWA.....	Federal Highway Administration
IowaDOT	Iowa Department of Transportation
ITS.....	Intelligent Transportation Systems
MAG	Maricopa Association of Governments
MPO.....	Metropolitan Planning Organization
NCTCOG	North Central Texas Council of Government
SHRP2.....	Strategic Highway Research Program 2
TIP.....	Transportation Improvement Program
TPO	Transportation Planning Organization
TRB.....	Transportation Research Board
TSMO	Transportation Systems Management and Operations

EXECUTIVE SUMMARY

Transportation systems management and operations (TSMO) provides tools for transportation managers to address safety, system performance, and reliability. TSMO is “an integrated set of strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects designed to preserve capacity and improve security, safety, and reliability of the transportation system.”¹ Through participation in the second Strategic Highway Research Program (SHRP2) workshops, transportation agencies are working to better support TSMO programs. Deploying intelligent transportation systems (ITS), hiring internal information technology staff, and using performance measures for data-driven decisions are just a few examples of the many activities a TSMO program can support.

Given the varying stages of TSMO adoption and advancement, the Federal Highway Administration identified the need for case studies to provide examples of common challenges and best practices for transportation agencies to learn from each other. This is one of 12 case studies developed to support organizing for TSMO. This case study focuses on business processes.

Four agencies with mature business processes were interviewed: Florida Department of Transportation District 5 (FDOT D5), Iowa Department of Transportation (IowaDOT), Maricopa Association of Governments (MAG), and North Central Texas Council of Government (NCTCOG). Each agency provided information on how they improved their business processes, challenges, lessons learned, and the next steps to continually improve this dimension. Some of the best practices identified include:

- NCTCOG’s development of a financial group to assist with implementation. Often, agreements needed to deploy TSMO strategies require additional administrative support. Planning for these challenges enables operational staff to focus on mobility.
- MAG’s investment priorities as a structure for TSMO planning. Realizing financial constraints early in planning processes enables agencies to actionably deploy TSMO strategies.
- IowaDOT’s integration of TSMO planning with traditional planning efforts. Realizing TSMO strategies early in project planning provides opportunities to mitigate transportation challenges in the short-term, resulting in allocated funds to be dispersed among other long-term planning efforts.
- FDOT D5’s task-oriented improvement activities. Developing items with practical value promotes success in improving TSMO business processes. Development of processes can be tracked and celebrated when outcomes are clear and communicated.

¹ Source: <https://ops.fhwa.dot.gov/tsmo/index.htm>

CHAPTER 1 – INTRODUCTION

Historically, transportation agencies have managed congestion primarily by funding major capital projects that focused on adding capacity to address physical constraints such as bottlenecks. Operational improvements were typically an afterthought and considered after the new infrastructure was already added to the system. Given the changing transportation landscape that includes increased customer expectations, a better understanding of the sources of congestion, and constraints in resources, alternative approaches were needed. Transportation systems management and operations (TSMO) provides such an approach to overcome these challenges and address a broader range of congestion issues to improve overall system performance. With agencies needing to stretch transportation funding further and demand for reliable travel increasing, TSMO activities can help agencies maximize the use of available capacity and implement solutions with a high benefit-cost ratio. This approach supports agencies' abilities to address changing system demands and be flexible for a wide range of conditions.

Effective TSMO efforts require full integration within a transportation agency and should be supported by partner agencies. This can be achieved by identifying opportunities for improving processes, instituting data-driven decision-making, establishing proactive collaboration, and developing actionable activities to develop processes that optimize performance.

Through the second Strategic Highway Research Program (SHRP2), a national partnership between the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), and the Transportation Research Board, (TRB), a self-assessment framework was developed based on a model from the software industry. SHRP2 developed a framework for agencies to assess their critical processes and institutional arrangements through a capability maturity model (CMM). CMM uses six dimensions of capability to allow agencies to self-assess their implementation of TSMO principles¹:

1. Business processes – planning, programming, and budgeting.
2. Systems and technology – systems engineering, systems architecture standards, interoperability, and standardization.
3. Performance measurement – measures definition, data acquisition, and utilization.
4. Culture – technical understanding, leadership, outreach, and program authority.
5. Organization and workforce – programmatic status, organizational structure, staff development, recruitment, and retention.
6. Collaboration – relationships with public safety agencies, local governments, metropolitan planning organizations (MPO), and the private sector.

Within each capability dimension, there are four levels of maturity (performed, managed, integrated, and optimized), as shown in Figure 1. An agency uses the CMM self-assessment to

¹ FHWA, Office of Operations, "Organizing for Reliability – Capability Maturity Model Assessment and Implementation Plans Executive Summary," May 2015. <https://ops.fhwa.dot.gov/docs/cmmexesum/sec1.htm>

identify their level of maturity in each dimension, to determine their strengths and weaknesses in each dimension, and determine actions they can take to improve their capabilities.

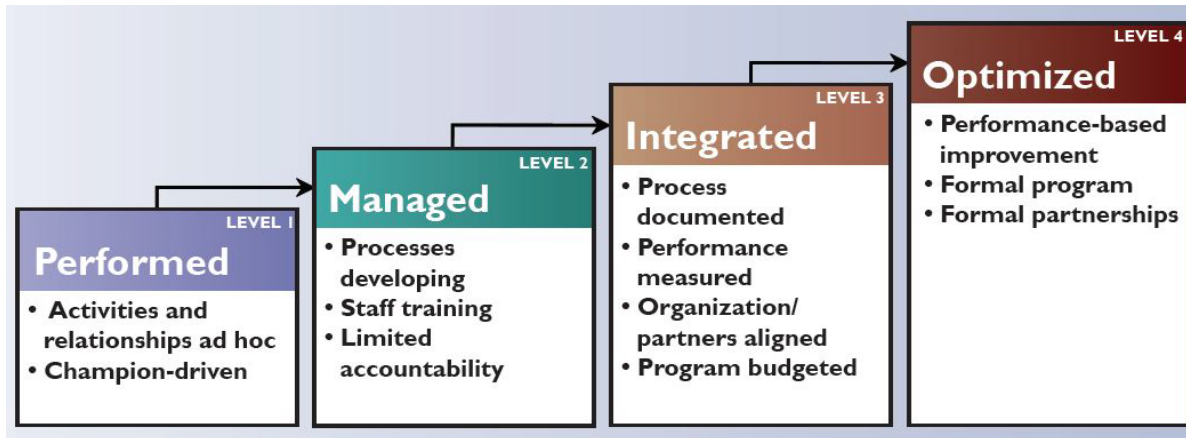


Figure 1. Chart. Four Levels of Maturity

Source: Creating an Effective Program to Advance Transportation System Management and Operations, FHWA Jan 2012

Purpose of Case Studies

In the first 10 years of implementation of the TSMO CMM, more than 50 States and regions used the tool to assess and improve their TSMO capabilities. With the many benefits experienced by these agencies, FHWA developed a series of case studies to showcase leading practices to assist other transportation professionals in advancing and mainstreaming TSMO into their agencies. The purposes of the case studies are to:

- Communicate the value of changing the culture and standard practices towards TSMO to stakeholders and decision-makers.
- Provide examples of best-practices and lessons learned by other State and local agencies during their adoption, implementation, and mainstreaming of TSMO.

These case studies support transportation agencies by showing a wide range of challenges, opportunities, and results to provide proof for the potential benefits of implementing TSMO. Each case study was identified to address challenges faced by TSMO professionals when implementing new or expanding existing practices in the agency and to provide lessons learned.

Identified Topics of Importance

Business processes are a key component to integrating TSMO within an agency because they establish procedures on how to conduct business, identify resource needs, and clarify the vision and mission of an organization. The agencies highlighted for this case study established TSMO business processes through identification of needs in each of their respective agencies.

Interviews

Agencies were selected for each case study based on prior research indicating that the agency was excelling in particular TSMO capabilities. Care was taken to include a diversity of

geographical locations and agency types (departments of transportation, cities, and metropolitan planning organizations) to develop case studies that other agencies could easily relate to and learn from. Interviews were conducted with selected agencies to collect information on the topic for each case study.

Description of Business Processes

Business processes include specific, structured activities or tasks and related decision points that are needed to deliver a TSMO program successfully.² This dimension includes:

- Planning – Inclusion of management and operations strategies in transportation planning.
- Programming – A defined TSMO program with clear and organizationally supported vision, mission, goals, and objectives.
- Budgeting – Dedicated resources to support management and operation strategies, both project specific and inside the organization.
- Project Development – The process by which projects are selected and developed to improve transportation conditions. Inclusion of TSMO strategies in existing project development processes manuals.
- Implementation – Action items to carry out specific strategies, projects, or programs.

Business processes are included in each of the three elements of TSMO plans: strategic, programmatic, and tactical. Strategic business process elements set the framework for how TSMO will be conducted in an agency. They set a clear definition of what the agency wants to accomplish through defined vision, mission, goals, and objectives. Programmatic business processes look at day-to-day activities and revise existing processes and protocols for TSMO integration. Finally, tactical refers to deployment or implementation of TSMO activities, projects, or services. Example tactical business processes include development of financial plans, TSMO implementation plans, and prioritization processes for project or service deployment. Business processes and how they are executed vary among agencies and regions.

A primary function of business processes is to foster the organizational shift to include TSMO strategies in transportation planning. Traditional transportation planning has primarily been project-focused, including a list of desirable projects, costs, and available funding for construction. Integrating TSMO into the existing planning process optimizes an agency's performance through inclusion of projects and services that reap a higher benefit-cost reward.

TSMO planning goals should align with existing planning goals of the region or agency, such as improved mobility, reliability, and safety. To integrate TSMO into the existing planning process, existing protocols and processes should be evaluated such as:

- Funding allocation.
- Project selection.
- Asset management.
- Staffing.

² FHWA, A Primer for Program Planning, 2017. <https://ops.fhwa.dot.gov/publications/fhwahop17017/fhwahop17017.pdf>

Revising existing long-range transportation planning processes to include management and operation projects and services—for example, incident management, integrated corridor management, and evaluating alternative construction methods—mitigates mobility, reliability, and safety issues in the short-term, maximizes the utility of infrastructure, reduces capital costs, and takes the greatest advantage of capital investments.

More specifically, adjusting allocation of funding through TSMO budgeting would reserve transportation dollars for both corridor improvements and back-of-house transportation management operators or other management and operational staff.

MPOs play a critical role in developing regional transportation plans. State and local transportation agencies should work closely with MPOs to revise or make additions to regional planning initiatives and budgets to include TSMO.

CHAPTER 2 – BEST PRACTICE EXAMPLES

The North Central Texas Council of Governments (NCTCOG), Maricopa Association of Governments (MAG), Iowa Department of Transportation (IowaDOT), and the Florida Department of Transportation District 5 (FDOT D5) participated in previous second Strategic Highway Research Program (SHRP2) efforts. The capability maturity model (CMM) workshops with SHRP2 helped inform them about transportation systems management and operations (TSMO) and how it can apply to their agencies' business processes. This chapter highlights several successful initiatives each agency accomplished, specifically regarding business processes for TSMO.

North Central Texas Council of Governments (NCTCOG)

NCTCOG Transportation Department serves a 12-county Metropolitan Planning Area of North Central Texas. Areas served include Dallas-Fort Worth-Arlington, Denton-Lewisville, and McKinney urbanized areas and surroundings. NCTCOG works closely with regional, State, and federal partners to “strengthen both the individual and collective power of local governments and to help them recognize regional opportunities, eliminate unnecessary duplication, and make joint decisions.”¹ Major products produced by NCTCOG include a long-range Metropolitan Transportation Plan, a shorter-term Transportation Improvement Program (TIP), a Congestion Management Process, and a Unified Planning Work Program.

Revised Planning Processes

NCTCOG works with partner agencies to develop the region's TIP, which includes a list of funded and prioritized projects for implementation. TIPs from other regions are compiled to make up the statewide TIP. Each region's TIP is comprised of projects developed by NCTCOG and other partner agencies. After NCTCOG completed their CMM assessment, they revised the TIP eligibility criteria for projects to include TSMO strategies, such as inclusion in the Intelligent Transportation Systems (ITS) Strategic Deployment Plan, the project's impact on congestion challenges, and if the project enables collection of real-time data, among others. This criterion is referred to as the Traffic Signal and Intelligent Transportation System Project Selection Criteria. The criteria are shown in Figure 2.

¹ <https://www.nctcog.org/about-us.02/28/2019>

Step 1

Provide Basic Project Information

- Once NCTCOG staff has determined that the requirements in Step 1 have been met, staff will review and evaluate the eligibility requirements in Step 2.

Step 2

Meet All Eligibility Criteria

- Consistency with NCTCOG long-range transportation plan.
- Minimum of 30 percent of the project is located on Routes of Significance.
- Project is consistent with the Regional Intelligent Transportation Systems (ITS) Architecture.
- Project development will follow the Systems Engineering Process.
- Project achieves reduction in volatile organic compounds and nitrogen oxides.
- Project reduces impacts of recurring and/or non-recurring congestion.
- Project benefit cost analysis as calculated by NCTCOG must yield a benefit-cost ratio of 1 or greater.
- Project is included in the North Central Texas ITS Strategic Deployment Plan.
- Project sponsor has executed the Memorandum of Understanding Concerning Guiding Principles for Multi-Agency Communication, Data, and Video Sharing.
- All traffic signal implementation and replacement projects included in the Transportation Improvement Plan need to provide battery backup and communication to allow remote operation including timing plan download capability.
- The Project sponsor will make transportation data it collects, such as traffic signal and highway and traffic condition data, and transit data, accessible on a real-time basis to travel navigation services, 511DFW (Dallas – Fort Worth), other public agencies, app developers, and other parties who use such data for research or the development of products and services that may deliver mobility and other benefits to the North Central Texas/Dallas – Fort Worth Region.

Step 3

Meet Five or More Criteria

- Project sponsors is providing more than 20 percent local match.
- Project is multijurisdictional.
- Project fills in gaps in the existing ITS infrastructure by completing critical systems.
- Project leverages transportation resources by targeting investment, where possible, to facilities undergoing reconstruction.
- Project shares communication and data exchange through Lonestar or center-to-center.
- Project encourages multimodalism (e.g. bike/ped and transit or freight).
- Project results in energy savings such as light-emitting diode signal bulbs or solar.
- Project leverages, creates, or enhances sustainable funding sources including public/private sector (such as sustainable funding for 511).
- Project can demonstrate increased safety.
- Project supports the development and expansion of automated performance measures.
- Project provides direct benefits to emergency services and incident response (e.g. police and fire).
- Project provides ITS Central Control and Communications between ITS.
- Project provides vehicle-to-vehicle or vehicle-to-infrastructure or promotes innovative ITS concepts.

Figure 2. Chart. Selection Criteria

Source: <https://www.nctcog.org/nctcg/media/Transportation/DocsMaps/Manage/ITS/TSMOFundingCriteria111717.pdf>

NCTCOG also identified whether TSMO could help address the needs of a corridor using an innovative approach by utilizing asset management data. The agency expanded their asset management concept to include a focus on system performance. This enhancement enables identification of corridor-specific “hot spots” in which TSMO strategies could improve overall system performance. The agency uses these opportunities to pilot TSMO projects that will immediately demonstrate the cost-saving, performance-driven, and enhanced safety benefits of TSMO strategies. These activities have helped NCTCOG obtain buy-in from local decision makers to include TSMO in transportation planning activities.

Revising their legacy project selection criteria and planning activities has enabled NCTCOG to incorporate TSMO solutions in their traditional planning process. The agency uses cost-efficient, short-term TSMO strategies which releases previously allocated resources to make funds available for other long-term planned projects.

Transitioning from Planning to Implementation

Since NCTCOG became more active with planning for TSMO, they have worked diligently in the region to deploy several TSMO strategies, such as vanpool programs, traffic signal re-timing, employer trip reduction programs, incident management, and more. Different agencies within NCTCOG’s region support each TSMO strategy deployed. Some are supported by the Federal Highway Administration and the Texas Department of Transportation, while others receive backing from regional agencies such as municipalities, emergency services, transit agencies, or counties. Before any strategy can be deployed, NCTCOG develops agreements with the supporting agency. As NCTCOG increased the number of operational and management strategies deployed, they learned that they needed additional support to move from planning to implementation. The agency created what they refer to as a “grant fiscal team” to manage contracts and agreements for individual strategy deployments. Managing agreements has been a large undertaking for the agency as they continue to grow the types of programs they implement.

The process used for implementation of TSMO strategies differs between agencies. NCTCOG identified challenges associated with growing implementation demands and countered this by creating a dedicated group specifically for implementation. This refined deployment process has enabled planning and implementation groups to focus solely on desired mobility strategies and left the administrative tasks to their newly established “grant fiscal team.”

Maricopa Association of Governments (MAG)

MAG is a Council of Governments that serves as the regional air quality planning agency and MPO for transportation in Maricopa County. This includes the Phoenix area and the neighboring urbanized area in Pinal County, containing the Town of Florence and City of Maricopa. MAG provides regional planning and policy decisions in areas of transportation, air quality, water quality, and human services. MAG was formed in 1967 when local elected officials recognized the need for long-range planning and policy development on a regional scale. They realized that many issues such as transportation and air quality affected residents beyond the borders of their individual jurisdictions.²

² <http://azmag.gov/About-Us/About-MAG>

Investing in TSMO

The population of Arizona is mostly located in the greater Phoenix and Tucson areas. The metropolitan Phoenix area, located in Maricopa County, makes up about 68 percent of the State’s population. Since development of their ITS program in 2001, MAG has worked to broaden their spectrum to accommodate all parts of the county, including areas with less dense population. In the MPO’s Systems Management and Operations Plan investment priorities have been identified to accommodate all agencies that maintain the region’s transportation network. MAG’s TSMO plan identifies four investment priorities to accommodate the needs of the region: Integrated Corridor Management, Regional Priority Arterials, Local Priority Corridors, and Regional Operations Priorities. Table 1 shows details for these investment priorities.

Table 1. MAG TSMO Investment Priorities

Investment Priority	Description	Implementing Agencies
Integrated Corridor Management	Equipping freeway segments and major arterials (including crossings) adjacent to the freeway for diversion strategies.	Departments of transportation (DOT), local agencies, and MAG
Regional Priority Arterials	Managing traffic on segments of high-priority corridors to improve safety, reliability, and mobility.	Local agencies
Local Priority Corridors	Provisions placed for local priority projects to be considered for inclusion in the TIP.	Local agencies
Regional Operations Priorities	Traffic operations support at the regional level. Includes programs versus specific infrastructure.	DOTs, local agencies, emergency services, transit, MAG

In the TSMO plan, MAG notes that projects helping the agency realize TSMO objectives and goals will be given priority in planning efforts. Based on priority investments, MAG selected 25 TSMO strategies for project deployment and identified how and when these strategies will be funded and implemented.

MAG’s unique approach to planning for TSMO by first considering investment capabilities enabled the agency to develop realistic, measurable, and achievable strategies for implementation. The MPO considered the financial capabilities of all regions in the county, realizing the needs of the entire transportation network. The project selection process identified in the agency’s TSMO plan is anticipated to improve project implementation in the region despite the common challenge of resource allocation.

Florida Department of Transportation, District 5 (FDOT D5)

FDOT D5 is one of seven districts in Florida. FDOT D5 covers nine counties and spans nearly 9,000 square miles. The district is home to tourist destination Orlando. Over 4,100,000 residents who travel around 125.9 million vehicle miles daily on roads live in the FDOT D5 region. The

area is also served by seven transit authorities, one passenger rail line, four freight rail lines, one deep-water port, 25 public use and 133 private use airports, and is home to Space Florida.³ FDOT D5 can be seen in Figure 3. The TSMO Division of FDOT is part of the Traffic Engineering and Operations Office. The TSMO Division is responsible for managing the State's ITS program, which facilitates mobility strategies and programs.

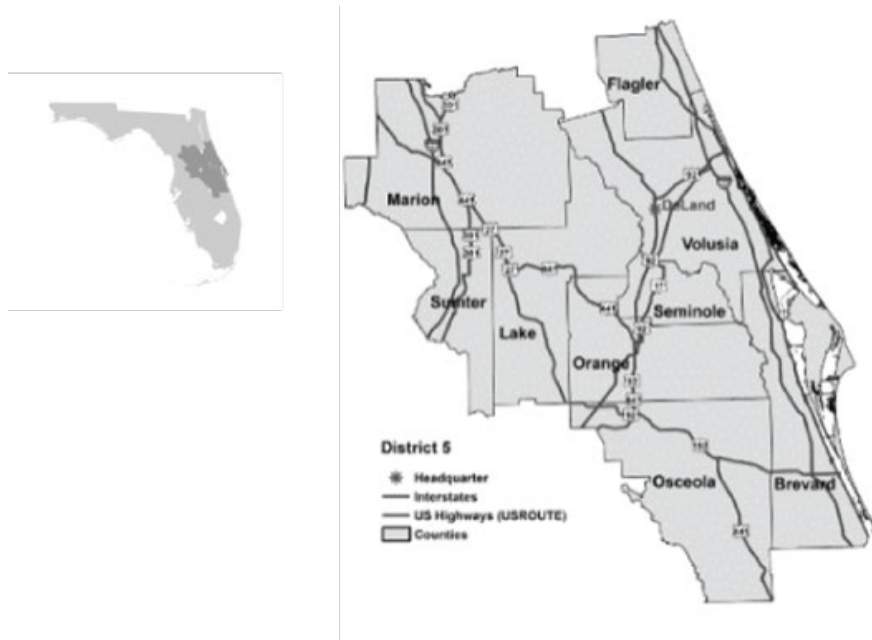


Figure 3. Image. FDOT District 5
Source: FDOT

TSMO Implementation Plan

Following an initial capability maturity model (CMM) assessment in 2014, FDOT D5 began working on their TSMO Implementation Plan. To develop the plan, a multi-discipline team including other local agencies convened to discuss regional needs and challenges. They identified short-term solutions and assigned them to various agency personnel for implementation. The team also looked at long-term solutions and developed a prioritization process for implementation. Through these collaborative meetings, several goals were established as key items for the implementation plan to address. FDOT D5 performed a follow-up CMM assessment in 2017 to evaluate progress of the implementation plan and identify areas where continued focus is needed. Several business processes were identified as maturing the agency's capabilities in this dimension.

As part of the implementation plan, FDOT D5 developed a task action matrix to track progress of achieving TSMO goals and objectives for business processes. As shown in Figure 4, the matrix identifies the progress of a task, who is responsible for delivery, when the task should be completed, and which TSMO goal and objective the task supports.

³ <http://www.fdot.gov/agencyresources/districts/>

Organizing for TSMO – Case Study 1: Business Processes

Goals	Objectives	Task Action Items	Current Progress	Task Leader	Deliverable Due
Consensus on a standardized and documented TSM&O project development life cycle to include template, project schedules, scoping language and requirements (NEPA, SYS engineering, FTA)	Detail a cradle-to-grave project development process for all FDOT projects by 2018	Establish an on-going working meeting between ITS, Operations, and Planning that meets every week to discuss the TSM&O program Deliverable: Weekly meeting between District Five ITS, Operations, and Planning regarding TSM&O program	Complete	Transportation Planning Manager	Ongoing as the weekly Monday morning coordination meeting.
		Introduce TSM&O work items into the standard corridor study and PD&E scope(s) Deliverable: Updated Corridor Study and PD&E Scopes, inclusive of TSM&O	In progress	Transportation Planning Manager	Q2 FY 2018/19
		Execute and monitor the progress on the tasks in the Implementation Plan Deliverable: Establish a framework for monitoring the progress of FDOT and regional partners in applying the Implementation Plan (see Performance Measures Dimension)	Ongoing	District TSM&O Engineer	Q2 FY 2018/19
	Clearly define roles and responsibilities of different functional units within the project development life cycle as illustrated in the Organization & Workforce Dimension	Develop a TSM&O-specific organization chart for FDOT D5 Deliverable: District Five TSM&O Organization Chart	Complete	Transportation Planning Manager	Q4 FY 2016/17
	Identify requirements associated with different improvement strategies (i.e. transit improvements, ITS deployment, environmental impacts) by 2018	Develop list of five to seven "proven TSM&O strategies" and accompanying material Deliverable: Develop education and outreach materials for several "proven TSM&O strategies"	In progress	District TSM&O Engineer	Q2 FY 2017/18
	Gain consensus on scoping language and standardized project schedules for different project types (i.e. transit improvements, ITS deployment, environmental impacts)				
Develop a programming and budgeting processes for TSM&O	Identify potential TSM&O program funding source(s) by 2020	Engage individual M/TPOs on the topic Deliverable: Conduct ongoing coordination to identify and implement TSM&O funding sources	Initiating	Transportation Planning Manager	Q2 FY 2020/21

Figure 4. Chart. Excerpt from Task Action Matrix

Source: Transportation Systems Management and Operations Implementation Plan FDOT D5, 2017.

Also included in FDOT D5’s implementation plan is a proposed MPO/Transportation Planning Organization (TPO) project prioritization process. FDOT D5 recommends that each MPO in the region revisit their project prioritization to ensure that performance values, goals, and objectives are considered, and more outcome-based projects are selected to support regional needs. FDOT D5 recommended that each MPO develop corridor master plans to identify opportunities to deploy TSMO strategies. They recommend implementing a scoring process to ensure project prioritization is informed by data-driven outcomes. Figure 5 shows the varying levels for TSMO strategies.

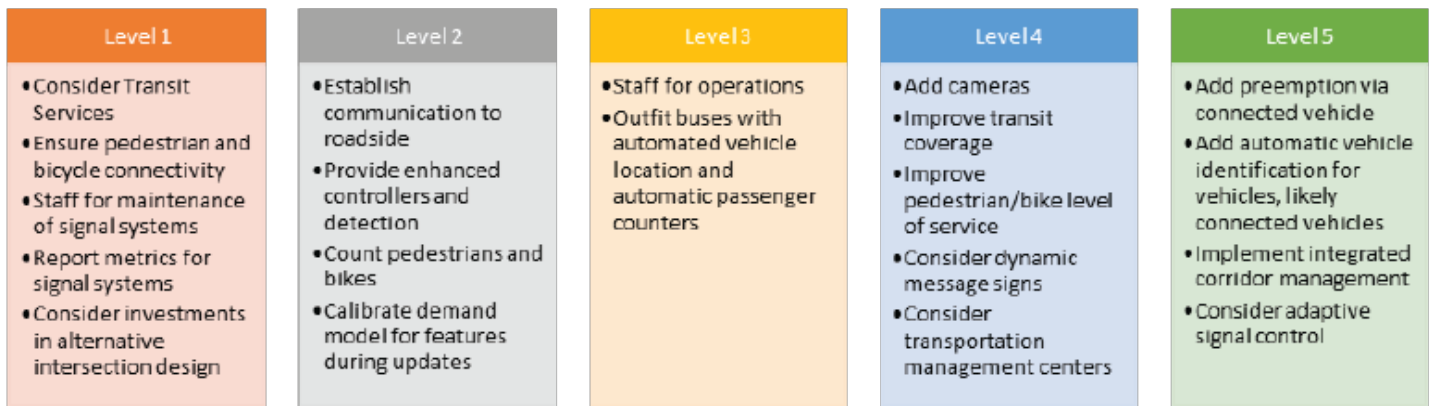


Figure 5. Chart. Levels for TSMO Strategy Consideration

Source: Transportation Systems Management and Operations Implementation Plan FDOT D5, 2017.

FDOT D5 attributes the implementation plan’s success to their TSMO Consortium. This group initially came together around 15 years ago and included regional traffic offices sharing best practices. Through the first CMM in 2014, FDOT D5 identified the need to bring in a wider audience. The group shifted to include all MPOs, TPOs, counties, major municipalities, and other local agencies and became established as the region’s TSMO Consortium. The group meets bi-monthly to discuss regional TSMO challenges, strategies, programs, and successes.

Iowa Department of Transportation (IowaDOT)

The Office of Traffic Operations is part of the Highway Division of IowaDOT. The Highway Division’s responsibilities include design/planning, maintenance, construction, operations, and support of intelligent transportation system technology. IowaDOT is divided into six geographical districts, each responsible for maintaining the State highway system in their respective region. The Office of Traffic Operations released IowaDOT’s first TSMO plan in early 2016. Since its release, IowaDOT continues to improve TSMO processes and grow their TSMO program.

Incorporating TSMO

Following IowaDOT's first CMM assessment in 2013, the agency began building their TSMO Plan to accommodate transportation challenges in the State. The agency structured their TSMO Plan into three components:

1. **TSMO Strategic Plan:** This plan highlights transportation challenges in the State, identifies the business case for TSMO, and discusses the strategic objectives, vision, mission, and goals for IowaDOT's TSMO Program.
2. **TSMO Program Plan:** This plan outlines the operational resources and processes needed to support TSMO in the agency. It discusses programmatic objectives and strategies needed to deliver the Strategic Plan.
3. **TSMO Service Layer Plans:** These plans detail in-depth action items to optimize several service needs such as work zone management and incident management.

To develop the plan, working groups met to create action items that would enable the agency to incorporate TSMO concepts into the existing project development process. These groups evaluated project development activities from inception to post-letting. Based on recommendations from these groups, the agency decided to develop a TSMO Steering Committee to facilitate implementation and mature the agency's TSMO program. This committee meets quarterly to discuss TSMO progress, strategies, outreach, and more.

IowaDOT also identified ways in which TSMO activities could be included with planning efforts. IowaDOT has been working to shift the focus from infrastructure and capacity projects to operational projects and integrate these operational improvements into a five-year construction program. This construction program will facilitate integration of TSMO strategies into project construction without the need to generate funding for TSMO-specific projects. They have also identified modifications to long-range planning efforts for future inclusion of TSMO concepts. The resultant long-range planning diagram to be implemented in the future is shown in Figure 6. Inclusion of TSMO concepts to existing long-range plan development will enable the agency to identify cost-efficient solutions to mitigate challenges in the short-term, allowing previously allocated funds to be distributed to other long-term efforts.

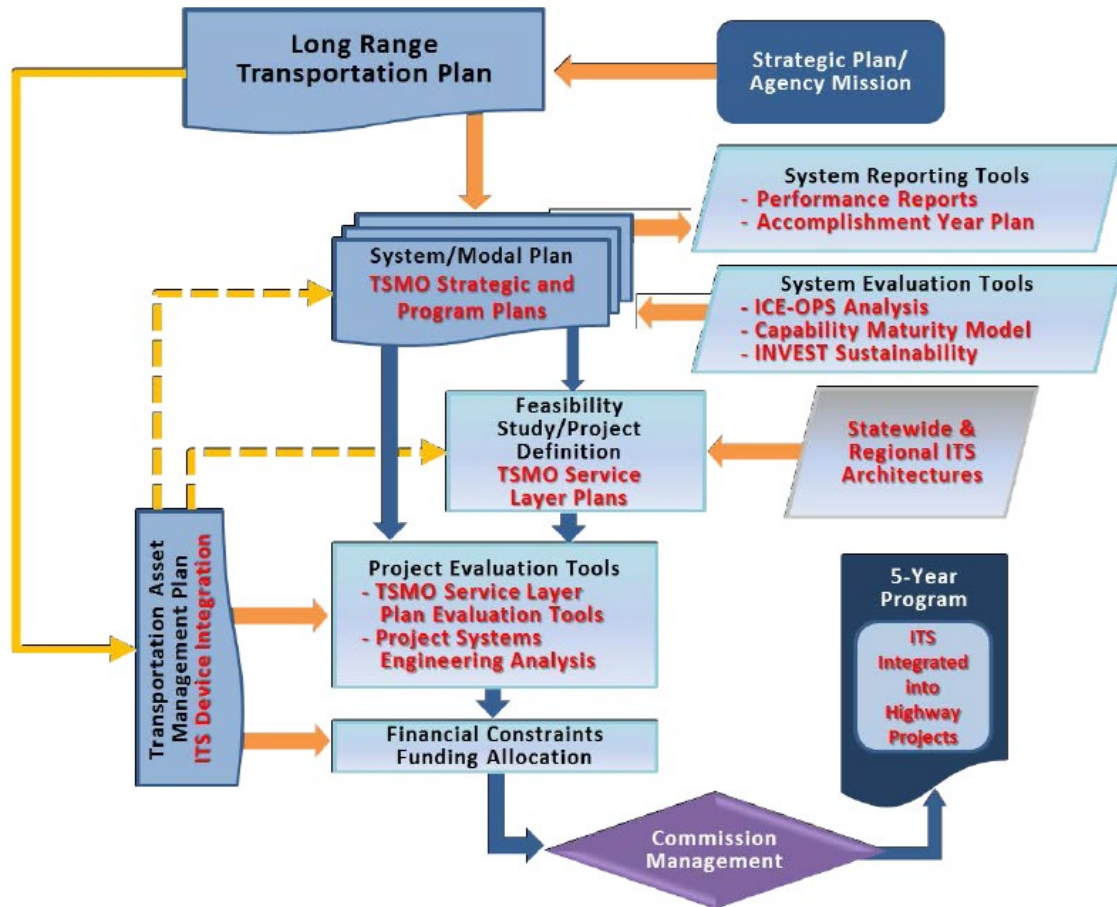


Figure 6. Diagram. TSMO Long Range Planning Diagram

Source: Transportation Systems Management and Operations Program Plan, IowaDOT, February 2016.

IowaDOT’s next steps are to engage and educate other organizations in the State, such as the MPOs and regional planning associations, on the value of TSMO. As part of outreach, IowaDOT intends to work with partner agencies so that TSMO concepts and strategies are included in regional TIPS.

CHAPTER 3 – SUMMARY

Business processes define the formal organizational processes needed to successfully execute a transportation systems management and operations (TSMO) program. They provide concise guidance on how TSMO should be conducted throughout an agency such as project planning, development, implementation, budgeting, and scoping. Business processes can also include administrative strategies, budgeting for additional staff, contract procurement, and more. Agencies highlighted in this case study have developed business processes to support development of their respective TSMO programs. Some of the best practices identified in this case study include:

- Integrating TSMO strategies into existing transportation planning efforts enables agencies to make cost-efficient, data-driven investments for infrastructure planning efforts. TSMO strategies can often be implemented in the short-term, allowing agencies to maximize existing infrastructure and reserve funds for other long-term improvements.
- Planning to deploy TSMO strategies is successful when funding constraints are identified and resolved early in the planning process. When agencies plan TSMO strategies into available funding mechanisms, deployment is realized sooner than traditional transportation planning efforts.
- TSMO processes do not always need to be generated from a base level. Frequently, many agency processes are in place to support TSMO activities. Revising existing processes to align with regional TSMO goals and objectives will ensure that TSMO is incorporated in agency-wide processes.
- Task-specific priorities enable agencies to track progress, identify areas for growth, and celebrate successes. Developing processes for implementation is helpful to ensure the agency matures its TSMO program by systemically defining how and when achievements will be made to elevate TSMO processes in the agency or region.

Agencies planning to begin development of their own TSMO program or activities should identify which processes will integrate best with their existing capabilities and procedures. The best practices highlighted in this case study can be used as a resource to identify opportunities to establish TSMO business processes in developing TSMO programs nationally.

REFERENCES

Information for use in this case study was gathered from sources noted throughout the report together with the following web sites:

- FHWA’s What is Transportation Systems Management and Operations (TSMO)?
 - <https://ops.fhwa.dot.gov/tsmo>
- AASHTO’s TSMO Guidance
 - <http://www.aashtotsmoguidance.org/>
- FHWA’s Organizing and Planning for Operations
 - <https://ops.fhwa.dot.gov/plan4ops/>
- FHWA’s Organizing for Operations Resources
 - https://ops.fhwa.dot.gov/plan4ops/focus_areas/organizing_for_op.htm
- FHWA’s Organizing for Reliability – Capability Maturity Model Assessment and Implementation Plans
 - <https://ops.fhwa.dot.gov/docs/cmmexesum/sec1.htm>
- FHWA’s Creating an Effective Program to Advance Transportation Systems Management and Operations, Primer
 - <https://ops.fhwa.dot.gov/publications/fhwahop12003/index.htm>
- FHWA’s Improving Transportation Systems Management and Operations – Capability Maturity Model Workshop White Paper – Business Processes
 - <https://ops.fhwa.dot.gov/docs/cmmwhitepapers/busprocess/index.htm>
- Additional SHRP2 Resources
 - <https://www.fhwa.dot.gov/goshrp2/>
- North Central Texas Council of Governments
 - <https://www.nctcog.org/>
- Iowa Department of Transportation
 - <https://www.iowadot.gov>
- Maricopa Association of Governments
 - <https://www.azmag.gov>
- Florida Department of Transportation
 - <http://FDOT.gov>

Table 2. Interview Participants and Agencies

Agency	Florida Department of Transportation, District 5 (FDOT D5)	North Central Texas Council of Governments (NCTCOG)	Iowa Department of Transportation (IowaDOT)	Maricopa Association of Governments (MAG)
Agency Representative Name:	Jeremy Dilmore	Natalie Bettger	Scott Marler	Sarath Joshua
Agency Representative Title:	TSMO Engineer	Senior Program Manager, Congestion Management and System Operation	Director of Operations Bureau	Senior Program Manager – Intelligent Transportation Systems and Safety
Agency Representative Email:	Jeremy.dilmore@dot.state.fl.us	nbettger@nctcog.org	Scott.marler@iowadot.us	N/A
Interview Date:	July 13, 2018	July 19, 2018	July 20, 2018	July 27, 2018

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July 2019
FHWA-HOP-19-063