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Feasibility of a Regional Transportation Systems Management and Operations (TSMO) Program

Kristine M. Williams, FAICP

Jeff Kramer, AICP

Tia Boyd

Taylor Dinehart

National Institute for Congestion Reduction

University of South Florida

Center for Urban Transportation Research | University of South Florida

4202 E. Fowler Avenue, ENG030, Tampa, FL 33620-5375

nicr@usf.edu



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16. Abstract To address new and changing forms of congestion and technological advances for Transportation Systems Management & Operations (TSMO) in the 21st century, Metropolitan Planning Organizations (MPOs) will need to evolve in terms of their purpose and relationship within a megaregion or corridor. This report is the culmination of a multiyear effort to provide the Central Florida TSMO working group with a framework on how MPOs can collaborate within a megaregion to advance TSMO in the planning process. The project included a literature review, case examples of multi-MPO and multi-state collaborations in TSMO, and interviews with agencies engaged in regional TSMO planning and management activities. A peer exchange was also conducted with TSMO planners and engineers from around the country to discuss how MPOs can collaborate to advance transportation systems management and operations in the planning process. This effort culminated in the formation of a framework for a regional TSMO program and identified opportunities to address equity within the regional TSMO framework for underserved and unbanked communities.			
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Abbreviations and Acronyms

ARC	Atlantic Regional Commission
ATCMTD	Advanced Transportation and Congestion Management Technologies Deployment Grant
AAMPO	Alamo Area MPO
CAMPO	Capital Area MPO
CCC	Chairs Coordinating Committee
CFMPOA	Centra Florida MPO Alliance
CFR	Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality Improvement
CMP	Congestion Management Process
DMS	Dynamic Message Signs
DRCOG	Denver Regional Council of Governments
FAST Act	Fixing America’s Surface Transportation Act
FHWA	Federal Highway Administration
FOIA	Freedom of Information Act
GDOT	Georgia Department of Transportation
GRTA	Georgia Regional Transportation Authority
GTC	Genesee Transportation Council
HG-GAC	Houston-Galveston Area Council
HSIP	Highway Safety Improvement Program
ICT	Information and Communication Technologies
ITS	Intelligent Transportation Systems
JPACT	Joint Policy Advisory Committee on Transportation
KTMPO	Killeen Temple MPO
L RTP	Long Range Transportation Plan
MAG	Maricopa Association of Governments
MAP-21	Moving Ahead for Progress in the 21st Century Act
MARTA	Metropolitan Atlanta Rapid Transit Authority
MOU	Memorandum of Understanding
MPO	Metropolitan Planning Organization
NCTCOG	North Central Texas Council of Governments
NFTA	Niagara Frontier Transportation Authority
NFTPO	North Florida Transportation Planning Organization
NHPP	National Highway Performance Program
NICR	National Institute for Congestion Reduction
NITTEC	Niagara International Transportation Technology Coalition
NYSDOT	New York State Department of Transportation
NYSTA	New York State Thruway Authority
PL	Metropolitan Planning
PPACG	Pikes Peak Area Council of Governments
PSRC	Puget Sound Regional Council
RCTO	Regional Concept of Transportation Operations

RFFA	Regional Flexible Funds Allocation
RITIS	Regional Integrated Transportation Information System
RTC	Regional Transportation Committee
RTSMOP	Regional TSMO Program
RTSRP	Regional Traffic Signal Retiming Program
RTTAC	Regional Transportation Technical Advisory Committee
SANDAG	San Diego Association of Governments
SCTPA	Sun Coast Transportation Planning Alliance
SEFTC	Southeast Florida Transportation Council
SNF	Smart North Florida
STBGP	Surface Transportation Block Grant Program
STTC	Surface Transportation Technical Committee
TAQC	Transportation and Air Quality Committee
TBARTA	Tampa Bay Area Regional Transit Authority
TCC	Transportation Coordinating Committee
TDM	Transportation Demand Management
TDM	Transportation Demand Management
TETC	The Eastern Transportation Coalition
TIP	Transportation Improvement Program
TOC	Traffic Operations Center
TPAC	Transportation Policy Alternatives Committee
TPAS	Truck Parking Availability System
TPO	Transportation Planning Organization
TSM&O	Alternate acronym for TSMO - Transportation Systems Management and Operations
TSMO	Transportation Systems Management and Operations
UPWP	Unified Planning Work Program
USC	United States Code
USDOT	United States Department of Transportation
VMS	Variable Message Signs

Executive Summary

To address ongoing and persistent congestion on the surface transportation system across multiple jurisdictions and metropolitan areas, 21st century Metropolitan Planning Organizations (MPOs) will need to evolve in terms of their purpose and relationship within a megaregion or corridor. In an effort to confront this task, the eight MPOs that comprise the Central Florida Regional TSMO Working Group requested researchers from the National Institute for Congestion Reduction (NICR) to explore the potential of establishing and sustaining an entity to advance TSMO in the region.

A literature review was conducted to identify best practices and lessons learned for TSMO strategies at the regional and megaregional scale. Case examples of multi-MPO and multi-state collaborations in TSMO were developed and among these example agencies, interviews focused on regional TSMO planning and management activities were conducted and documented. Finally, a peer exchange with planners and engineers from around the country was organized to discuss how MPOs can collaborate to advance TSMO in the planning process.

The project culminated in a framework for an effective regional TSMO program comprised of seven key elements:

1. Developing a strategic TSMO plan
2. Publishing a work plan
3. Publishing an annual review
4. Identifying stable and dedicated funding mechanisms
5. Providing dedicated staff for TSMO activities
6. Establishing a clear governance structure that includes political support
7. Developing a plan for education and communication activities

The study also explored opportunities to address equity within a regional TSMO program. Key avenues identified relative to equity included (1) highlighting equity in the goals and objectives of the strategic plan, (2) including diversity, equity, and inclusion principles and language into the organization's bylaws, MOUs, or other defining documents, (3) including equity considerations in funding criteria and for project evaluation and selection, and (4) adopting performance measures that evaluate the organization's progress in meeting equity objectives defined in the adopted strategic plan, work plan, or other planning documents.

1. Introduction

Metropolitan Planning Organizations (MPOs) are federally mandated transportation planning organizations comprised of representatives from local governments, modal providers, and appropriate state officials. MPOs develop and maintain the required transportation plans and programs for a metropolitan planning area to ensure that federal funds support local priorities. Transportation Systems Management & Operations (TSMO) involves the application of multimodal transportation strategies and technologies intended to maximize the efficiency, safety, and reliability of the transportation network. Examples include, but are not limited to, work zone management, traffic incident management, special event management, transit management, traffic signal coordination, congestion pricing, active transportation and demand management, and integrated corridor management. Related topics include land use and transportation coordination and access management.

Eight MPOs responsible for transportation planning in Central Florida formed an informal Regional TSMO Working Group (Working Group) to share strategies on planning for TSMO, including best practices for congestion management (see Appendix A). They include MetroPlan Orlando, Forward Pinellas, Hillsborough TPO, Pasco County MPO, Polk TPO, Sarasota/Manatee MPO, Space Coast TPO, and River-to-Sea TPO. The region includes several international airports, seaports, military bases, universities, intermodal logistics centers, and a variety of major trip attractors, including Disney World and Busch Gardens. Millions of commuter, freight, and recreational trips are made each year on the region's transportation network that includes, I-4, I-95, I-75, I-275, several tolled facilities, and miles of supporting arterials. Central Florida qualifies as part of a megaregion according to the report *Defining U.S. Megaregions* (Hagler, 2009). The Working Group was established in the region and solidified through a memorandum of understanding (MOU) in March of 2021 (see Appendix B).

This report is the culmination of a multiyear collaboration of NICR researchers and the Regional TSMO Working Group to explore the potential of establishing and sustaining a regional entity in Central Florida to advance TSMO and contains a recommended framework for a regional TSMO program for the Working Group. These recommendations are based on findings from a targeted literature review summarized in this report, a case example review of six multi-MPO and multi-state collaborations in TSMO, and a series of interviews conducted with knowledgeable representatives from eight agencies engaged in regional TSMO planning and management activities.

Additionally, on September 13, 2022, a virtual peer exchange with stakeholders and members of existing corridor coalitions throughout the United States was conducted to discuss the value and potential for establishing a more formal MPO-centered entity to advance TSMO governance and collaboration across the Central Florida megaregion. Table 1 lists peer exchange participants and agencies studied and/or interviewed for the peer exchange. During the peer exchange, a draft version of the recommended framework for a regional TSMO program for the Working Group was presented to everyone in attendance and time was given for thoughts and recommendations for the draft. The final set of recommendations housed in this report includes adjustments or additions that came to light over the course of the peer exchange. The proposed framework could serve as a model for other megaregions like Central Florida where several planning agencies are aligned to share economies and travel.

Table 1. List of Peer Agencies

Agency Name	Highlighted by Case Study	Participated in Interviews	Participated in Peer Exchange
Atlantic Regional Commission	✓	✓	✓
The Eastern Transportation Coalition	✓	✓	✓
I-10 Corridor Coalition	✓	✓	✓
North Central Texas COG	✓	✓	
Oregon Metro	✓	✓	✓
Denver Regional COG	✓	✓	
NITTEC		✓	✓
Smart North Florida		✓	
Hillsborough TPO			✓
Forward Pinellas			✓
Space Coast TPO			✓
Sarasota/Manatee MPO			✓
MetroPlan Orlando			✓
Pasco County MPO			✓
River to Sea TPO			✓

2. Current State of the Practice

2.1. Literature Review

A targeted literature and policy review was completed to help inform the development of the framework for a regional TSMO program. Key topics included policy considerations and impediments, best practices for advancing TSMO in the MPO process, and strategies for advancing an MPO-centered TSMO entity across a megaregion.

Multi-MPO Coordination in Megaregional Planning

Several studies have examined collaborative efforts among MPOs and their regional partners in megaregion planning. This section reviews the literature on this topic, documenting the need, motivations, and benefits of collaboration in megaregional planning, as well as ongoing impediments. The literature also includes a number of insights for the study. Interesting findings included the building blocks of regional collaboration and frameworks for thinking about MPO collaboration in planning on a megaregional scale.

Need and Motivation for Multi-MPO Coordination

Morley et. al. (2020) examined the general purpose of MPOs, the existence of megaregions, and the need for multi-MPO coordination in megaregions. Factors relative to the need for MPO coordination in megaregions include:

- More than 70% of MPOs operate in megaregions and nearly 60% share boundaries with at least one other MPO.
- MPOs are a natural forum for collaborative planning, and neighboring MPOs can form the foundation for megaregional planning.
- Transportation system performance is impacted by land use and transportation interactions that extend beyond MPO boundaries and lack of coordination can exacerbate adverse impacts.
- Data sharing agreements, joint committees, and other measures are critical for managing congestion across a region for freight and commuter traffic.
- Regional collaboration helps agencies understand economic trends and take advantage of opportunities.
- Investments to facilitate evacuation and resilience must be consistent: lack of coordination can have “ripple effects across multiple MPO planning areas.”

MPOs are more likely to form megaregional partnerships when there is a topic of shared concern—especially multimodal freight, major transportation corridors, economic development, intercity rail service, and air quality. —Oden et al., 2020

The current scale of government and transportation planning processes poses certain limitations for addressing important large-scale infrastructure and environmental problems (Peckett et al., 2014). Megaregions have the potential to simultaneously address social, economic, environmental, and infrastructural issues, as well as to address links between these sectors within a region. For example, a framework for megaregional planning would support global competitiveness by identifying priority opportunities to enhance economic and infrastructure links between metropolitan regions.

Such linkages are being established, particularly in relation to common priorities. A national survey of collaboration among 192 MPOs found that megaregional partnerships are more likely when there is a topic of shared concern—especially multimodal freight, major transportation corridors, economic development, intercity rail service, and air quality (Oden et al., 2020). Other issues that lend themselves to cross-boundary collaboration include those related to resiliency.

Multi-MPO Coordination Policies and Legislation

Given the emergence of megaregions and the importance of regional coordination in transportation planning, federal law or rules require neighboring MPOs to coordinate their long-range transportation planning efforts under the following conditions:

- Multiple MPOs share authority for planning within a single urbanized area (23 CFR §450.310(e)).
- Multiple MPOs share authority for planning within an air quality control region designated as a nonattainment area for ozone or carbon monoxide under the Clean Air Act (42 USC §7407(c); 23 USC §134(g)(1); 49 USC §5303(g)(1)). (NOTE: this criterion is not currently applicable to Florida as there are no federally designated nonattainment areas.)
- An urbanized area principally located in one MPO planning area extends into another MPO planning area (23 CFR §450.312(h); 23 CFR §450.314(g)).
- A proposed federally funded transportation investment is located within multiple MPO planning areas (23 USC §134(g)(1); 49 USC §5303(g)(2); 23 CFR §450.314(e)).

Florida is unique in that it has a total of twenty-seven MPOs; more than any other state. Rapid growth in Florida has caused many of these urbanized areas to grow together, forming what has been called an “H-shaped megalopolis” extending up and down the coasts and across the center portion of the state. As a result, the Florida legislature has enacted state legislation that authorizes, and in some cases requires, MPOs in Florida to engage in collaborative planning. Florida law:

- Requires contiguous MPOs to develop coordination mechanisms (§339.175(6)(j)1)
- Authorizes MPOs to establish an interlocal agreement for collaborative planning with any other MPO in the state for purposes of coordination (§339.175(6)(j)2);
- Requires MPOs that share planning authority for an urbanized area to prepare a joint list of regionally significant project priorities (§339.175(8)(b)); and
- Requires MPOs to coordinate plans regarding any transportation project that crosses MPO planning area boundaries (§339.175(8)(c)7).

Per Section 339.175(6)(j)2, of Florida Statutes, when an MPO in Florida determines that it is appropriate to join with another MPO or political subdivision to coordinate activities, the participating entities must enter into an interlocal agreement pursuant to s. 163.01, Florida Interlocal Cooperation Act of 1969, which, at a minimum:

- Creates a separate legal or administrative entity to coordinate the transportation planning or development activities required to achieve the goal or purpose;
- Provides the purpose for which the entity is created;
- Provides the duration of the agreement and the entity and specifies how the agreement may be terminated, modified, or rescinded;
- Describes the precise organization of the entity, including who has voting rights on the governing board, whether alternative voting members are provided for, how voting members are appointed, and what the relative voting strength is for each constituent MPO or political

subdivision;

- Provides the manner in which the parties to the agreement will provide for the financial support of the entity and payment of costs and expenses of the entity;
- Provides the manner in which funds may be paid to and disbursed from the entity; and
- Provides how members of the entity will resolve disagreements regarding interpretation of the interlocal agreement or disputes relating to the operation of the entity.

An interlocal agreement established under this section becomes effective when recorded in the official public records of each county in which a member of the entity has a voting member. The section further specifies that it does not require any of the participating MPOs to “merge, combine, or otherwise join together as a single MPO.”

Considering these provisions, many Florida MPOs have created regional alliances. A total of 22 of Florida’s 27 MPOs have entered formal arrangements to coordinate regional transportation planning activities with one or more neighboring MPOs (Kramer et al. 2015). Table 2 summarizes salient governance features of the largest collaborations as documented in a study of Florida’s multi-MPO alliances (Kramer et al. 2015).

Table 2. Summary of Florida’s Major MPO Alliances

	West Central Florida Chairs Coordinating Committee (CCC)	Central Florida MPO Alliance (CFMPOA)	Southeast Florida Transportation Council (SEFTC)
Number of MPOs	6	6	3
Voting Membership	6 (One representative from each MPO)	18 (3 representatives from each MPO)	3 (One representative from each MPO)
Non-Voting Membership	8 (FDOT Districts 1 & 7, Florida Turnpike Enterprise, Central Florida RPC, Southwest Florida RPC, Withlacoochee RPC, Tampa Bay RPC, & TBARTA)	3 (FDOT District 1 & 5, & Florida Turnpike Enterprise)	0
Meeting Frequency	Quarterly	Quarterly	Quarterly
MPO Staff Director Meeting Frequency	Bi-Weekly	As Needed	Monthly
Committees	JCAC, Multi-Use Trails, & Technical Review Team	No	RTTAC, Modeling Subcommittee, Regional Freight Subcommittee, & Regional Public Involvement Management Team
Regional LRTP	Yes	Yes	Yes
Regional Project Priorities List	Yes	Yes	Yes

	West Central Florida Chairs Coordinating Committee (CCC)	Central Florida MPO Alliance (CFMPOA)	Southeast Florida Transportation Council (SEFTC)
Staffing	Support provided by TBARTA	Support provided by a member MPO	Support provided by a consulting firm
Use of Consultants	Yes*	No	Yes
Website	regionaltransportation.org	seftc.org	metroplanorlando.org/board-committees/central-florida-mpo-alliance/

*The CCC (now Sun Coast Transportation Planning Alliance) uses consultants on a project specific basis. The contractors are paid through a balanced cost sharing policy between the voting members that is roughly based on population.

Source: Kramer et al., 2015

These MPO alliances have produced a variety of projects and planning activities, including some involving multi-alliance collaborations. For example, the Central Florida MPO Alliance (CFMPOA) develops a regional long range transportation plan and a Regional Prioritization Priorities and Process document that combines participating MPO priority lists into a regional list, while respecting each MPO's order of priorities. Project cost, scale of magnitude, and cost-benefit factor are considered along with the urbanized population and visitor population served by the project (Kramer et al. 2015). CFMPOA has also supported regionally significant projects, including SunRail—the first commuter rail system developed for Central Florida. CFMPOA includes MetroPlan Orlando, River-to-Sea TPO, Space Coast TPO, Lake-Sumter MPO, Ocala-Marion County TPO, and Polk TPO covering all of East Central Florida.

Impediments to Megaregional Planning

Despite evidence of successful multi-MPO collaborations, MPOs continue to face a variety of challenges in collaborative planning on a megaregional scale. In a study of local and regional long range multimodal planning efforts in megaregions, Read et al. (2017) identified the following impediments to megaregional planning:

1. Lack of federal and state enabling legislation to guide and support megaregion planning.
2. Lack of formal or clear governance mechanisms/structure can impede interregional collaboration and action and joint ownership over megaregional issues.
3. Differences in state regulatory structures create a barrier for operationalizing megaregional initiatives that cross state borders and structural differences in governance between different agencies.
4. Local and regional planning agencies are concerned with a broad range of issues in their jurisdiction and may not have the bandwidth to add megaregional considerations into the mix.
5. Lack of guidance (both broadly and for specific issues) for local and regional planning agencies on how to address/practice megaregion planning.

Similarly, Peckett et. al. (2014) reviewed collaborative efforts among MPOs and their regional partners in megaregion planning, documenting the following challenges and directions.

- Lack of an appropriate means to encourage cooperation among key players at the regional and

local level. MPOs and other regional actors need an incentive for collaboration to overcome competition across all sectors within the metropolitan area.

- The current scales of governance and funding allocations do not directly consider megaregions. government agencies inevitably focus on the priorities within their formally-defined jurisdictions before they consider projects and funding outside their boundaries.
- Megaregional planning will require new types of flexibility and voluntary collaboration that may be challenging for MPOs, state DOTs, and other stakeholders given their focus within their jurisdictions.
- Incentives are critical, as are documented best practices. An incentive could come through a funding structure that incentivizes MPOs and states to cooperate in order to receive federal transportation funding.

Oden et al. (2020) identify two overarching challenges to collaboration at the megaregion scale: (1) pervasive resistance to regional governance and preferences for local control due to perceived risks by local governments in ceding control and opposition by local interest groups, and (2) inadequate institutional capacity and resource constraints. The researchers speculate that local institutions and governments will only engage in meaningful collaboration when there is very little risk involved and a chance of high reward. The basic solution proposed to these challenges are to lower risks and increase benefits of inter-jurisdictional collaboration (largely through the support of higher levels of government). Barriers to megaregional planning and collaboration identified by MPOs responding to the study survey are provided in Table 3 (Oden et al., 2020).

Table 3. Impediments to MPO Megaregional Collaboration

Table 9: Response to “In your view, what are the major barriers to more extensive collaboration with other MPOs and/or other organizations to address transportation and related planning issues at the mega-regional scale? (click all that apply)”

#	Answer	%	Count
1	There are not sufficient financial resources for staff to engage in more extensive collaboration on mega-regional issues.	26.21%	76
2	Working with other MPOs and/or other organizations on issues at the mega-regional scale is not a major priority given other demands on our time and resources	23.10%	67
3	There are not specific funding sources to support joint projects at the mega-regional level with other MPOs and/or other organizations	21.72%	63
4	Working with other MPOs and/or other organizations on issues at the mega-regional scale is not facilitated by the planning framework and requirements of our state Department of Transportation	17.24%	50
5	Working with other MPOs and/or other organizations on issues at the mega-regional scale is not facilitated by the planning framework and requirements of the federal transportation agencies	11.72%	34
Total		100%	290

Source: Oden et al., 2020

Building Blocks of Regional Collaboration

In a handbook of notable regional collaboration practices used by transportation planning entities, Markiewicz et al. (2016) identifies six key building blocks of successful regional cooperation—

relationship building, mutual benefits, flexible formality, culture of cooperation, diversity of options, and equal participation. The guide includes twenty case studies discussing benefits, tools and resources, and information on how and why agencies chose to work together. Building strong relationships between staff across agencies is a key building block. Cooperation is also motivated by common goals (e.g., pooling resources) and can be formal or informal. Formal agreements provide structure and predictability; they are sometimes necessary for cooperative efforts that require joint funding or resource sharing. Some partners start with formal agreements for structure and then transition to informal structures where partners meet only when necessary and can be flexible in how they work together.

The building blocks of successful regional cooperation are relationship building, mutual benefits, flexible formality, culture of cooperation, diversity of options and equal participation.
—Markiewicz et al., 2016

A culture of valuing collaboration was also identified as central to the success of regional collaboration initiatives. When the benefits of working across jurisdictions are recognized throughout the staff and organizational structure, cooperative planning efforts are more likely to be robust and to survive stressful times. Regular collaboration also helps agencies better understand each other’s perspectives that can help them better navigate disagreements and differing views. As stated in the report (Markiewicz et. al., 2016), “agreement and agreeing to disagree are both key aspects of successful regional cooperation.” Finally, because these initiatives often involve agencies of different size and resources, it is important that every partner have an equal voice and opportunity to participate.

Megaregional Planning Frameworks and Continuum for MPOs

Read et al. (2017) developed planning frameworks, highlighting opportunities for local and regional agencies to address megaregional issues in their respective long-range plans. The regional planning framework builds on the ten federal planning factors for MPO long range transportation plans (23 CFR 450.306) and offers specific strategies for each factor relative to inter- or megaregional planning. Megaregional considerations addressed through these frameworks include freight and supply chain management, multimodal connections, economic interconnections, and environmental systems.

Critical action steps for planners to build multi-MPO planning collaboratives for the communities they serve are (Morley et al., 2020):

1. Identify shared priorities
2. Formalize commitments
3. Measure performance

Critical action steps for multi-MPO planning collaboratives are (1) Identify shared priorities, (2) Formalize commitments, and (3) Measure performance. —Morley et al., 2020

Peckett et al. (2014) introduces a framework and the idea of a continuum of stages for planning at a megaregional scale. The framework describes how MPOs can systematically integrate megaregional

issues into transportation planning, including the timing, sequence, and relationship between the stages. The stages include (1) analyzing current and forecasting future trends; (2) setting long-range goals; (3) prioritizing needs to address, problems to solve, and opportunities to pursue; (4) identifying and evaluating costs, benefits, and impacts; (5) selecting policy, strategy, or investment decisions; and (6) monitoring results. The continuum extends to a variety of organizational structures and begins with a recognition that transportation needs extend beyond formal boundaries and that partnerships at the megaregional level are warranted. In later stages, joint plans and megaregional projects may be implemented by the appropriate implementing agencies.

The authors acknowledged that not all megaregion planning entities engage in every activity and later activities may not be undertaken at all depending on the types of organizations represented, level of personnel and the broader organizational structure, which may range from formal institutions with staff, funding, and legal standing to informal voluntary coalitions or alliances or committees that simply provide a forum for coordination (Peckett et al., 2014, p. 72).

Performance Measurement Considerations

In an evaluation of the organizational, operational, and planning documents of five of the seven MPOs that make up the Texas Triangle—Alamo Area MPO (AAMPO), Capital Area MPO (CAMPO), Killeen Temple MPO (KTMPO), North Central Texas Council of Governments (NCTCOG), and Houston-Galveston Area Council (H-GAC)—Loftus-Otway et al. (2019) found that performance measures were not unified or integrated across the megaregion. Based on the analysis, recommendations were provided on how megaregional planning could be conducted within current legal structures.

The result was a lack of ability to readily coordinate data collection and engage in strategic prioritization across the megaregion for performance management and quantitative decision making. The analysis also found an overreliance on outputs in transportation planning that reflects programmatic production (e.g., minutes of delay, miles traveled, lanes added) and suggests redefining and/or refining indicators to measure outcomes relative to larger goals and missions, such as changes in multimodal adoption or overall system efficiency (Loftus-Otway et al., 2019). The report included nine recommendations to allow MPOs in the region to align project selection priorities and advance regionally significant projects and goals in a megaregional framework that adheres to federal performance measure requirements:

1. Formalize a megaregional planning focus between MPOs and state DOT (to facilitate an increase in communication and transfer of data).
2. Expand non-voting memberships on Transportation Policy Boards.
3. Incorporate megaregionalism into Policy Board structural and strategic planning (e.g., adding the term “megaregion” to MPO bylaws or planning documents).
4. Prioritize megaregional scope in long-range planning (and engage in planning “conversations” — particularly for critical corridors).
5. Evaluate weaknesses in MPO organization capacity and develop methods (to leverage resources available to larger organizations for mutual benefit and efficiencies through a combined structure).
6. Ensure regulations are applicable to all MPO sizes (e.g., allowing collaboratively derived performance targets for key corridors).
7. Ensure MPO Boundary adjustment process takes future needs into consideration (to ensure funding is adequate in relation to transportation assets in need of improvement or maintenance).

8. Model for future growth (that initiates greater alignment of methods or data inputs and sets common standards).
9. Identify national, state, and regional goals (and avoid changing performance measures and a corresponding loss of historical data).

TSMO in MPO and Megaregional Planning

The need for a coordinated approach to planning in megaregions is particularly clear with regard to technology applications. The rapid emergence of new technology in transportation has led to a variety of initiatives in Florida and other states aimed at improving coordination in the use of technology for transportation systems management and operations. This section examines these initiatives, with a focus on systems level coordination in TSMO, Regional Concepts of Transportation Operations (RCTO), TSMO program planning, and MPO prioritization and funding. It begins by exploring efforts of the Florida Department of Transportation to advance TSMO in the MPO process.

MPOs and the FDOT TSMO Strategic Plan

The Florida Department of Transportation adopted a TSM&O Strategic Plan (formerly ITS Strategic Plan) “to provide statewide direction and guidance for the FDOT, Florida’s Metropolitan Planning Organizations, and local governments in planning, programming, and implementing integrated multimodal ITS elements to maximize the safety and efficiency of Florida’s Transportation System.” The plan includes a toolbox of TSMO strategies in the Appendix, as well as SMART Action Plans to advance TSMO throughout the state, including Mainstreaming Strategy 4.8: “Work with MPO/TPO liaisons to Include TSM&O in Regional Transportation Plans.” FDOT has actively worked to facilitate the integration and mainstreaming of ITS into the overall MPO planning process through the Strategic Plan for many years. A 1999 Issue Paper developed by FDOT on the topic noted a variety of early challenges, including the tendency for ITS initiatives to be considered secondary to capacity projects and that “the existing transportation planning processes are not well suited to assess how to optimize a mix of infrastructure and operational improvements to address regional needs,” (FDOT, 1999).

The Issue Paper stated that MPOs should assume the primary role for coordination with their urban areas, but that the State should assume this role and responsibility where plans or projects involve rural areas and multiple MPOs (FDOT, 1999). It noted that “ITS as an operational tool, will be a critical new element in the MPO planning process.” Statewide coordination, through MPO and FDOT working relationships, will be required to ensure that regional ITS plans along major corridors between urbanized areas are compatible. Items to define early in the planning process were identified as (FDOT, 1999):

- Funding, design, and staffing support commitments
- Coordination commitments relative to technical issues such as operating protocols
- Agreement among stakeholders to define roles in the collection, sharing, maintenance, and exchange of resources and data

Table 4 summarizes suggested MPO roles in ITS as identified in the Issue Paper (FDOT, 1999). More than two decades after publication, these roles remain relevant. Since this early report, many Florida MPOs have taken steps to advance TSMO, despite the continuing challenges as identified in the issue paper.

Table 4. Suggested Roles of MPOs in ITS

<p>ITS DATA AND INFORMATION</p> <ul style="list-style-type: none"> • Maintaining inventory of current ITS applications • Planning data and information needs determination • Data collection coordination (location, standards, responsible agency) • Special data collection efforts • Planning data/information repository - database management • Data/information reporting • Performance monitoring (using data/information to report on system performance)
<p>ITS PLAN DEVELOPMENT</p> <ul style="list-style-type: none"> • Identifying stakeholders - providing forum for input • Acting as resource/information clearinghouse • Developing plan and regional architecture • For plans developed by others - providing input and coordination • Integrating ITS plan and regional architecture into transportation planning process
<p>ITS PLAN IMPLEMENTATION</p> <ul style="list-style-type: none"> • Priority setting - inclusion in TIP • Funding coordination including public/private partnerships • Ensuring conformance to architecture and standards
<p>INTERJURISDICTIONAL/INTERAGENCY COORDINATION</p> <ul style="list-style-type: none"> • Coordinator • Facilitator • Lead agency • Information provider

Source: FDOT, 1999

Systems Level Planning Approaches to TSMO

The *Planning for TSM&O Guidebook* (FDOT, n.d.) provides a comprehensive description of the programmatic approach of TSMO from transportation planning through construction that includes the fundamentals of TSMO, agency and department roles and responsibilities, information on stakeholder coordination, and the importance of a TSMO Champion.

Large-scale planning efforts benefit from regional goals and objectives, evaluation criteria, proposed alternatives, improvement strategies, and performance measures developed through coordination and collaboration. —FDOT (n.d.)

For the effective management of the transportation system, the Guidebook (FDOT, n.d.) emphasizes the need for collaboration and buy-in from all local agencies that have a project priority list. TSMO shifts the transportation management processes from information exchanges between agencies and departments to continuous collaboration between transportation-related disciplines throughout each process. The Guidebook (FDOT, n.d.) stated that large-scale planning efforts benefit from regional goals and



objectives, evaluation criteria, proposed alternatives, improvement strategies, and performance measures developed through coordination and collaboration.

Interdisciplinary planning is key when incorporating TSMO into systems-level planning, which involves the development of systemwide evaluations, long range plans, and congestion management plans. According to FDOT (n.d.), “[t]he transportation planner is in an ideal position to lead the system-planning process and solicit input from [traffic operations, design, construction, and maintenance professionals], as well as from a broader set of community stakeholders” (p. 41). Table 5 lists the do’s and don’ts for the transportation planner involved in the TSMO program.

Table 5. Do’s and Don’ts of the Planning Role in TSMO

Do’s	Don’ts
<ul style="list-style-type: none"> • Incorporate technical expertise into the planning phase • Base prioritization decisions on agreed-upon goals and objectives, expected outcomes, and known constraints • Provide continuity throughout the TSMO lifecycle by making data and communication available to all experts • Monitor performance beyond the end of the TSMO lifecycle to estimate project- and systems-level payoffs 	<ul style="list-style-type: none"> • Prioritize projects based solely on stakeholder pressure or anecdotal evidence • Forget about the project after the planning-led efforts are complete • Skip performance monitoring at the end of a project • Forget to consider performance measures to incorporate real-time and long-term operational and safety goals

Source: FDOT, n.d.

Two key factors identified by FDOT to ensure the effectiveness of the TSMO program included identifying a TSMO Champion and having a well-defined stakeholder coordination plan and program. The TSMO Champion engages key stakeholders, builds consensus, and ensures project completion. The stakeholder coordination plan ensures early coordination and facilitates collaboration for outcome assessments and the evaluation of returns on investment once a project has been implemented.

Identifying a TSMO Champion and having a well-defined stakeholder coordination plan and program are key to an effective TSMO program. The stakeholder coordination programs are particularly important given the complexity and long timelines of certain transportation projects.

MPO Prioritization and Funding of TSMO

Funding is a key issue in any long-range planning endeavor. Bond et al. (2013) examined processes used by nine MPOs to incorporate TSMO projects into the programming phase of the transportation decision-making process. It included case studies from nine MPOs and identified sources of funding for TSMO strategies, methods for prioritizing strategies for funding, staff resources devoted to TSMO-related activities, and initial lessons learned about effective practices.

Emphasizing TSMO in the long-range transportation plan (LRTP) and related planning documents or processes provides a strong foundation for TSMO in programming. Additionally, operations-focused plans and documents can support the prioritization and selection of TSMO activities for funding. These documents may include a regional operations strategy, a Regional Concept for Transportation Operations (RCTO), or an intelligent transportation systems (ITS) strategic plan.

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Federal and local funding sources can be used for TSMO activities. For example, “in some cases, local taxes are instituted with a commitment to spend a certain share on TSMO projects” (Bond et al., 2013). Federal funding programs that can support MPO TSMO activities include the following (Bond et al., 2013):

- Congestion Mitigation and Air Quality Improvement (CMAQ) Program
- Highway Safety Improvement Program (HSIP)
- National Highway Performance Program (NHPP)
- Surface Transportation Block Grant Program (STBGP)
- Metropolitan Planning (PL)

Metropolitan planning funding programs are particularly useful for collaboration on regional TSMO initiatives. —Bond et al. (2013)

Bond et al. (2013) explained that metropolitan planning funding programs are particularly useful for collaboration on regional TSMO initiatives. Planning funds can be used to enable MPO staff support and program maintenance activities for regional transportation operations coordination, regional operations guideline development, minor studies, and other staff activities to support regional TSMO programs. TSMO efforts observed in the Unified Planning Work Programs (UPWPs) of the case study MPOs included the following:

- Data collection
- Development of regional operations platforms
- Intergovernmental coordination and organization of ITS working groups/committees
- Programs that educate the public (traveler information, commuter information) that are hosted at the MPO
- Programs for use by the public, such as incident response or vanpool matching

TSMO activities that were included in the case study MPOs’ transportation improvement programs (TIPs) relative to these activities are shown in Table 6. Bond et al. (2013) found that “obtaining funding for upfront costs of TSMO projects is much easier than ensuring the long-term commitment by providing

ongoing staffing” (p. 8). For example, the Maricopa Association of Governments requires proof that long-term staffing is available before a project is programmed.

Table 6. TSMO Activities Included in TIP Documents

MPO	Example TSMO Strategies or Programs in TIP	MPO	Example TSMO Strategies or Programs in TIP
DRCOG	<ul style="list-style-type: none"> • ITS • TDM • Traffic Signal System Improvements 	NCTCOG	<ul style="list-style-type: none"> • ITS • Intersection Improvements • Signal Upgrades and Timing • TDM
GTC	<ul style="list-style-type: none"> • Highway Emergency Local Patrol • RTOC Staffing • ITS • Roundabouts • Traveler Information • Traffic Signal Improvements • Weather Sensors 	PPACG	<ul style="list-style-type: none"> • Signal Synchronization • Roundabouts • Regional TDM Programs • Intersection Improvements • Incident Detection • Signal Installation/Replacement • Variable Message Signs (VMS)
MAG	<ul style="list-style-type: none"> • Freeway Management System • Freeway Service Patrol • Transportation Management Centers • Cameras • Dynamic Message Signs (DMS) 	PSRC	<ul style="list-style-type: none"> • ITS • Active Traffic Management • Congestion Pricing • Upgraded Traffic Signalization • Incident Management • TDM
MetroPlan Orlando	<ul style="list-style-type: none"> • Road Rangers • Signal Retiming • Intersection Improvements • TDM • Incident Management 	Metro	<ul style="list-style-type: none"> • ITS Communication Infrastructure Improvements • Regional ITS Communications Master Plan • Regional Data Archive Maintenance • Signal System Upgrade • Regional ITS Architecture Upgrade
		SANDAG	<ul style="list-style-type: none"> • ITS • TDM • Traffic Signal Improvements • Managed Lanes

Source: Bond et al., 2013

Programming TSMO activities can be done in one of three ways: (1) Set aside dedicated funding for TSMO projects, (2) allow TSMO projects to compete with other types of projects for funding, or (3) combine a set-aside with the ability for TSMO projects to compete for other funding. Each of these procedures are explained as follows (Bond et al., 2013):

- Set-aside – a portion of funding is segregated and spent only on TSMO projects.
- Open competition – all projects, including TSMO activities, compete for funding.

- Combination – some funds are segregated for use on TSMO projects. However, TSMO projects are also eligible to compete for the general pool of funds.

A variety of project selection processes can be used for TSMO activities. Some strategies that may be applied include the following (Bond et al., 2013):

- Operational performance measures enable TSMO strategies to compete effectively for funding.
- MPOs may use measures of cost-effectiveness to evaluate TSMO projects.
- Collaboration between member agencies, including use of TSMO committees, can be a key element of TSMO project selection.

Formal, collaboratively developed operations objectives and priorities in the RCTO, LRTP, and ITS Strategic Plan carry over into the programming phase in the form of project selection criteria and project prioritization in the TIP. For example, Portland Metro and DRCOG host regional TSMO committees that provide input to the evaluation and selection of TSMO projects (Bond et al., 2013). Additionally, some MPO committees are delegated project selection authority over TSMO projects. This is usually found in conjunction with a set-aside funding system.

2.2 Case Examples

For additional insight into the organizational structures, roles, activities, and success factors of regional transportation entities in the United States, eight multi-MPO and multi-state collaborations in TSMO were identified for further study. These organizations were Atlanta Regional Commission (ARC), The Eastern Transportation Coalition (TETC), I-10 Corridor Coalition, North Central Texas Council of Governments (NCTCOG), Portland Metro, and Denver Regional Council of Governments (DRCOG). Key findings are presented below.

Atlanta Regional Commission

Background

The Atlanta Metro area is the ninth largest metropolitan statistical area in the United States with a population of over 6 million according to the latest data from the 2020 Census. The Atlanta Regional Commission (ARC) is the regional planning and intergovernmental coordination agency for the 11 counties and 75 municipalities (including the City of Atlanta) that make up the bulk of the Atlanta Metro Area. ARC was designated by Georgia state law to be the area-wide planning agency for all federal and state programs that require or encourage area-wide planning. ARC is also the MPO for a 20-county area that includes the 11 counties represented in the Regional Commission and as well as an additional 9 counties in Georgia (Atlanta Regional Commission [ARC], 2020a).

The predecessor to ARC, the Metropolitan Planning Commission, was created by act of the Georgia state legislature in 1947. At that time membership in the commission was limited to only two counties and the City of Atlanta. The focus of the commission was primarily on transportation and open space. In 1960, as the population grew in the region and as the land area for planning purposes grew, a new organization was formed called the Atlanta Region Metropolitan Planning Commission. Finally, in 1971 at the urging of Governor Jimmy Carter, the Georgia General Assembly voted the ARC into existence. At its inception, ARC oversaw the preparation of region-wide plans, monitored development activity, and provided expert technical assistance to local governments within the five county Atlanta metropolitan area (Basmajian, 2010).

Elements of TSMO have been addressed by ARC in its plans and projects for many years. One example of this is the Advanced Transportation Management System (NaviGator), which was developed in preparation for the 1996 Olympics held in Atlanta. This system used video detection, radar detectors, and 450 CCTV cameras to monitor traffic flow (ARC, 2021a). The NaviGator system has undergone advancements over the years and is still in use currently as a web-based Advanced Transportation Management System (ATMS) application that provides real time monitoring of traffic on Georgia state roads (ARC, 2020a).

ARC is governed by a 41-member board that consists of the county commission chair from each of the 11 member counties, the mayor and a council member from the City of Atlanta, the mayors from each of the 11 member counties, a representative from the Georgia Department of Community Affairs, and 15 citizen members who are selected by the ARC board’s elected officials. The ARC TSMO Steering Committee is composed of members from ARC, the Atlanta-Region Transit Link Authority, the Georgia Department of Transportation, the Georgia Regional Transportation Authority, and the State Road and Tollway Authority (ARC, 2021a).

Role in TSMO

ARC provides vision, goals, initiatives, and activities regarding TSMO for the Atlanta Metro Region. ARC is also responsible for developing, updating, and maintaining the Atlanta Regional ITS Architecture, which creates a regional framework that ensures institutional agreement and technical integration for the implementation of ITS projects.

In 2020, ARC produced a TSMO Strategic Plan that lays out a vision for TSMO in the Atlanta region and identifies a ten-year strategic course of action. This TSMO vision focuses on achieving five overarching goals: safety, reliable travel times, efficient travel, environmental benefit, and equitable access. This goal is achieved through the use of eight strategic initiatives (Figure 1) that each include actionable steps or activities that are recommended for advancing the initiative (Figure 2). The actions depicted are defined as program-level actions to be conducted by many entities across the region often working collaboratively (ARC, 2020a).



Figure 1. Framework of ARC's 8 TSMO strategic initiatives

Source: Atlanta Regional TSMO Strategic Plan, 2020

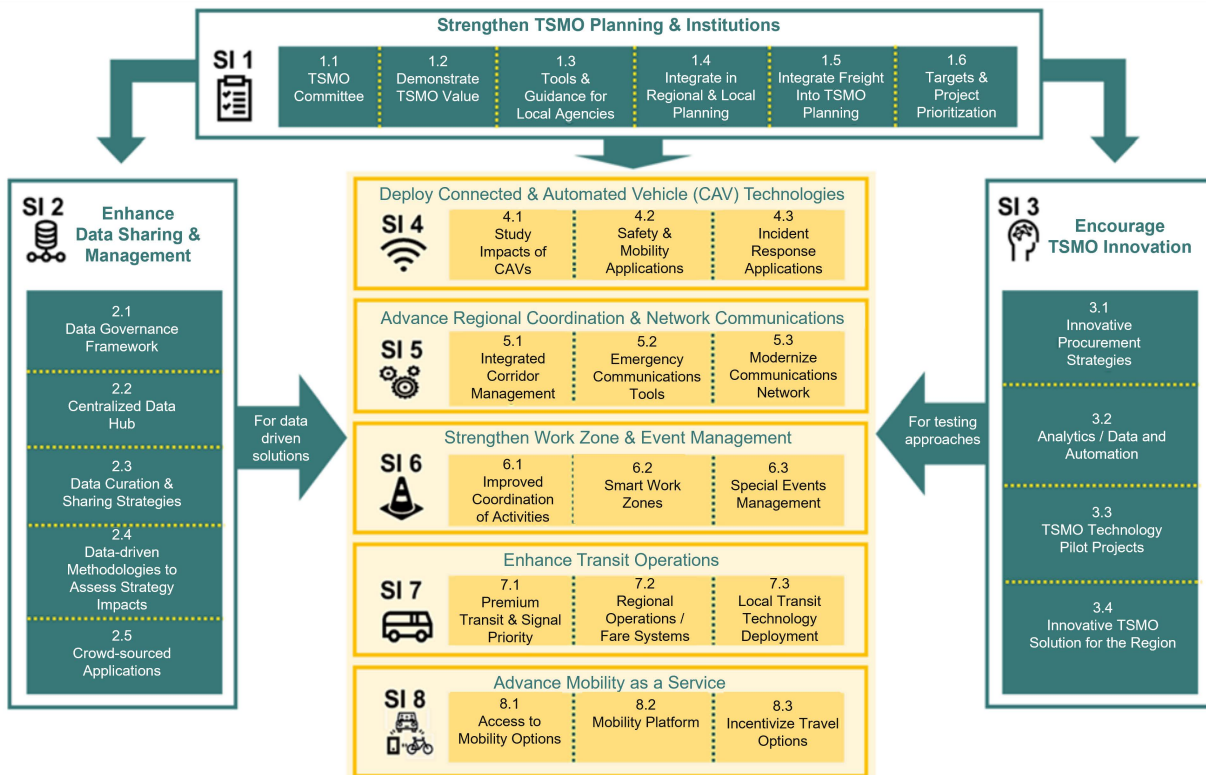


Figure 2. Connections across ARC’s initiatives and actions

Source: Atlanta Regional TSMO Strategic Plan, 2020

Additionally, in 2020 ARC produced the ARC TSMO Local Agency Deployment Guide to help local agencies integrate the larger strategic Atlanta Metra Area TSMO goals and initiatives into their local plans (ARC , 2020b).

Current Activity

On top of the ARC TSMO Strategic Plan and the ARC TSMO Local Agency Deployment Guide, which were both published in 2020, ARC has been involved in creating regional products and databases accessible to partner agencies with the purpose of improving TSMO within the region. In 2019, ARC produced their Data Governance Best Practices and Recommendations Report, which analyzes methodologies promoting a framework for people, processes, and technologies to manage their data. ARC also hosts the Atlanta Regional ITS Architecture, which is a repository for all documents relating to the system architecture for existing and planned ITS system projects that are or will be deployed in the Atlanta region over the next 5 to 10 years (ARC, 2021b). This repository includes an inventory of all regional ITS assets and transit assets.

ARC continues to implement the Navigator Intelligent Transportation System program as well as the Highway Emergency Response Operators (HERO) program. A HERO Unit is dispatched to traffic-related incidents with a primary duty to clear roads and reduce congestion. HEROs also assist stranded motorists with flat tires, dead batteries or in need of fuel or coolant free of charge. ACT also employs the Regional Traffic Operations Program (RTOP), which is an innovative arterial traffic management program

that dedicates signal timing and maintenance staff to critical arterials in the metro Atlanta region (Georgia DOT, 2020).

Eastern Transportation Coalition

Background

The Eastern Transportation Coalition (TETC) includes 18 state and district departments of transportation, 22 transportation-related associations and organizations (such as the American Public Transportation Association and the E-ZPass Interagency Group), and 164 federal, regional, and local public transportation agencies (including MPOs, city governments, and other public agencies). The coalition began as an informal highway-focused group that was concerned with managing highway incidents along the I-95 Corridor that impacted travel across state lines. When it was formally established in 1993, it was called the I-95 Corridor Coalition and primarily worked towards shorter-term operational improvements in the corridor generally at the sub-regional scale. The current mission is to connect public agencies across modes of travel, increase the safety and efficiency across all aspects of the multimodal transportation system, and enhance mobility of people and freight throughout the Eastern United States. This mission is pursued through three core programs: Transportation Systems Management and Operations (TSMO), Freight, and Innovation (<https://tetcoalition.org/about-us/>).

TETC is governed by an Executive Board that makes policy and provides guidance for development of the Coalition's program and future strategies. The Executive Board is made up of the Chief Executive Officer (or their designee) from each of the Coalition's 18 full member agencies (<https://tetcoalition.org/organizational-structure-and-committees/>). TETC utilizes workshops, peer-to-peer exchanges, and working groups to coordinate among its members. The three core programs are each guided by one or more committees of active members that oversee studies and projects related to their topic. Funding for each program is primarily supported through member dues; coalition members, including MPOs, provide matching funds, often in the form of staff resources, for studies (Peckett et. al., 2014). Some programs also include special projects funded through grants from federal or other sources (TETC, 2021a).

Role in TSMO

As one of the core programs of TETC, the Coalition's TSMO program focuses on operations improvements to maximize the safety, mobility, and reliability of the transportation system. The improvements address incident management, traveler information, emergency operations, and congestion management. Strategies employed include in-person events, webinars, and the development of data tools to address reliability, mobility, and congestion challenges amongst the member states (TETC, 2021a). The TETC TSMO program is broken into three regional Highway Operations Groups (HOGs) that host in-person events, TSMO webinars, summits, round tables, data exchanges, and produces newsletters two to three times per year (<https://tetcoalition.org/projects/tsmo-events-webinars/>).

Current Activities

Each year the coalition produces a Coalition's Fiscal Year Workplan, as well as a Year in Review report. The annual Workplan lists TETC's priorities identified by the Executive Board. For 2022, the priorities are as follows: (1) continue the core programs; (2) expand emphasis on truck movement, disruption management, connected, automated, and electric vehicles, traveler information, and mileage-based

user fees; (3) focus on implementable solutions; (4) demonstrate value to member agencies; and (5) identify opportunities to provide national leadership.

The Fiscal Year 2021 Year in Review report listed TSMO deliverables, which include COVID reporting, WAZE state data profiles and evaluations, and results from their transportation management and operations training program called Operations Academy (TETC, 2021b). The TETC website provides resources and access to their study reports such as the final report for using connected vehicle data for emergency management during a hurricane, a report called Transportation Disruption and Disaster Statistics that uses real time data to quantify transportation disruption and perform multifactor cause analysis, and results from a project aimed at learning how probe data can be used to estimate volumes throughout a highway network for operations and planning purposes (https://tetcoalition.org/project_category/transportation-systems-management-resources/).

I-10 Corridor Coalition

Background

Interstate 10 (I-10) is major highway corridor that traverses California, Arizona, New Mexico, and Texas. Approximately 700 miles of this corridor travel through urban areas and over half of these areas are heavily congested. I-10 is also the primary trucking route connecting southern California and Texas with international shipping. Commercial vehicle permitting and inspection practices vary among the states that share the I-10 corridor, causing some friction in the efficient movement of goods.

In 2016, the state transportation agencies (DOTs) of these states formed the I-10 Corridor Coalition in response to these transportation issues and rapid emergence of new technologies. The primary goal of the coalition is to promote safer and more efficient travel options for people and freight along the I-10 corridor. The Coalition works to achieve this goal by sharing resources and expertise, jointly testing technology, and implementing innovative transportation practices (i10connects.com).

Each coalition member is represented by its Director, Cabinet Secretary, or a designee. These individuals constitute the I-10 Corridor Coalition Steering Committee. The Steering Committee is required to meet at least once annually and has the authority to appoint additional committees. The Coalition also has a defined set of operating procedures, adopted by the Steering Committee. Each Steering Committee member has one voting seat, and a majority is required to pass a decision.

Additional Coalition members may be added if approved by the Steering Committee. Members that commit to the Coalition must have the support of their agency's highest level of executive authority. Additionally, members must be active in the Coalition's Steering Committee and provide joint funding through interagency agreements or financial participation in a Transportation Pooled Fund Program. The members are expected to contribute to the costs of the work plan, task orders, and deliverables to the best of their ability. Some states may be required to provide additional staff and administrative support.

Role in TSMO

The Coalition was formed in part to develop transportation agency expertise to prepare for "the growing technology wave and demand for intelligent transportation systems to be deployed on the nation's highways." (i10connects.com) Other objectives included resource sharing, cost savings by avoiding duplication and achieving economies of scale, engaging in joint testing and piloting of technology and operations activities, and sharing best practices with other members. A vision is to coordinate

technology applications on the I-10 corridor through a model of regional cooperation and “interoperability” for others to emulate, and to share best practices and lessons learned.

Current Activities

In 2019, the Coalition collaborated with the Texas A&M Transportation Institute through a FHWA pooled fund study to develop planning strategies for improved and connected freight movement on I-10 (Rutter et al., 2019). Five strategies were identified in this study, and this composes the Coalition’s planning framework for more efficient freight movement. These strategies for safer and more efficient freight include:

- Truck parking availability systems
- Freight traveler information systems
- Freight technology environment
- Roadside safety communication
- Oversize/overweight permit standardization

The Coalition selected the Truck Parking Availability System (TPAS) to be the first freight project for the Coalition, for which they received a \$6.85 million USDOT Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) grant in 2019. The ATCMTD was established under the Fixing America’s Surface Transportation Act funds. The Texas DOT applied for and was awarded the grant on behalf of all four states. This grant also requires a 50% match by the four states. The funding will be used to implement a truck parking availability detection and information dissemination system at 37 public truck parking locations along I-10 from California to Texas. The system will make real-time truck parking information available to truck drivers and dispatchers to assist them in making informed parking decisions. A primary goal is to reduce the number of drivers parking on freeway shoulders and along ramps.

The four state DOTs will develop and deploy an integrated regional Truck Parking Information and Management System (TPIMS) that collects and broadcasts real-time parking availability on dynamic message signs, as well as being accessible online and on dedicated smartphone applications. The framework for this initiative is shown in Figure 3.

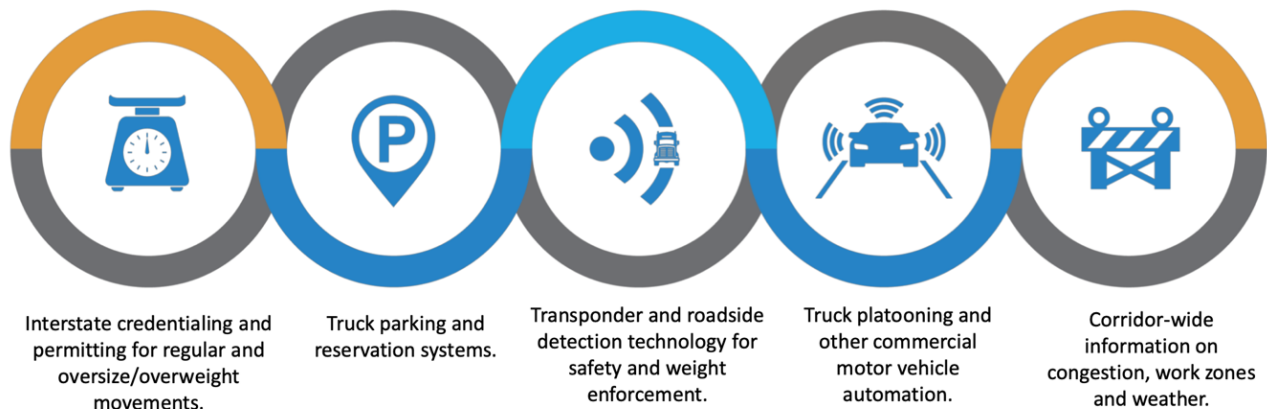


Figure 3. I-10 Corridor Coalition framework for freight movement

Source: *i10Connects.com*, 2017

Prioritization and Funding

A single member is designated as the Program Administrator, serving as the fiscal agent for the coalition. This individual also serves as the sponsor of the Transportation Pooled Fund program.

They are responsible for administering a Management Budget, which is detailed in the operating procedures. Annual funding amounts will be addressed in the Operating Agreement, which is a separate agreement between states. Members of the coalition contribute funds to support activities such as administrative and operational costs, meeting costs for the Steering Committee, and costs associated with completing any jointly funded projects identified in the Work Plan. Private sector partners also contribute funding contributions to the project to minimize costs.

North Central Texas Council of Governments

Background

The North Central Texas Council of Governments (NCTCOG) serves 16 counties, 235 political jurisdictions, and approximately 7.8 million people in North Central Texas (NCTCOG, 2021). NCTCOG is served by an Executive Board comprised of local elected officials. There are several advisory committees for projects and programs comprised of local government subject matter experts. NCTCOG's transportation department serves as the MPO for the 12-county Dallas–Fort Worth region. Additionally, a Regional Transportation Council, comprised of 44 local elected officials and representatives of North Texas transportation providers, serves as the transportation policy body for the MPO.

The NCTCOG Transportation staff directory identifies 175 staff members. Three staff members are dedicated to ITS, one of whom is dedicated to TSMO. Even though staff is dedicated to various transportation areas, FHWA (2013) describes the staff as “highly integrated”, explaining that project teams are assembled as needed for TSMO activities.

Role in TSMO

NCTCOG facilitates interagency cooperation and the coordination of TSMO efforts between FHWA, Texas DOT (TxDOT), toll authorities, and local governments. Through this coordinating role, NCTCOG is able to consolidate all of the information generated by these agencies and use it in the planning process (FHWA, 2013).

Current Activities

NCTCOG is involved in several TSMO projects to mitigate congestion by improving traffic flow, air quality, the movement of vehicles and goods, and system accessibility and safety. Current projects include a Thoroughfare Assessment Program (TAP)/Traffic Signal Integration and Monitoring Program and a Regional Traffic Signal Retiming Program (RTSRP) (NCTCOG, n.d.a.).

Prioritization and Funding

Federal, local, and public-private funding sources are available for TSMO projects. Federal funds include STBGP and CMAQ, with local funds obtained through local sources, state match, or toll credits. The Regional Toll Revenue (RTR) Program provides local funding for TSMO projects. The RTR program was created through an inter-local agreement with NCTCOG, Texas DOT, and the North Texas Tollway Authority (NTTA). Money is collected from private-sector partners through concessionaire contracts, debt repayment, toll collection, and interest on the RTR pool.

Capital and operations projects are included in the TIP (FHWA, 2013). When regional funding pools are used for projects or programs, funds are set aside in advance and the cost of the project is deducted from the regional funding pool. When a project is identified, the TIP is amended to include the project information. TSMO projects are led by NCTCOG staff using funding in the UPWP, including projects that are federally funded, such as data collection and special events coordination, and items that are not federally funded, like vanpool matching (FHWA, 2013). In the FY2022 and FY2023 UPWP for Regional Transportation Planning, TSMO is included under Task 5.05 – Special Studies (Congestion Management Planning and Operations) (NCTCOG, n.d.b).

Success Factors and Lessons Learned

FHWA (2013) describes two primary lessons learned from NCTCOG’s TSMO program. First, public-private partnerships can provide funding for non-tolled facilities but can also complicate management roles for TSMO. Second, funding pools in the TIP can be used to defer project decision-making until needs become more apparent.

Oregon Metro

Background

Metro is the MPO for the Portland, OR region and serves more than 1.5 million people across 24 cities and three counties. Collaboration on TSMO in the Portland region dates back to the early 1990s (FHWA, 2013). The TSMO strategy for Metro was created through a partnership with the Oregon DOT (ODOT), and the counties and cities in the Portland region (Oregon Metro, 2021a). Metro’s first TSMO strategy was developed in 2010 and has been supported by several plans including the Regional Transportation Plan (RTP), Metro’s Safety Strategy, and ODOT’s TSMO Performance Management Plan. The TSMO Performance Management Plan 2010-2020 plan is being updated with TSMO strategies over another 10-year horizon. While the TSMO strategy was developed collaboratively, implementation is based on ownership. For example, TSMO strategies on state-owned roadways are implemented by ODOT.

Oregon’s Transportation Planning Rule (TPR) OAR 660.012 is described by Metro as being fundamental to TSMO in the region. TPR “stipulates that coordinated land use and transportation plans should increase transportation choices and make more efficient use of the existing transportation system through transportation system management and demand management measures” (Oregon Metro, 2021a, p. 8).

Role in TSMO

Metro hosts regional TSMO committees that provide input to the evaluation and selection of TSMO projects. TransPort, a subcommittee of the Transportation Policy Alternatives Committee (TPAC), was developed to advance TSMO in the region. The subcommittee is comprised of lead transportation systems engineers from ODOT, TriMet, Clackamas County, Multnomah County, Washington County, and the City of Portland (Oregon Metro, n.d.). The TransPort bylaws state that the subcommittee “will work to implement the Regional Transportation Plan (RTP), advise the Transportation Policy Alternatives Committee (TPAC), and serve the greater Portland region” (Oregon Metro, 2019).

Current Activities

Portland Metro’s TSMO activities and investments are coordinated through a 10-year Regional TSMO plan. An important goal of Metro is to integrate social equity in transportation planning and decision making. To ensure that social equity is incorporated into the updated TSMO strategy, the plan is being

built using the community priorities identified during the development of the 2018 Regional Transportation Plan and other transportation plans. This approach is described as a way to better understand and advance social equity through TSMO. Toward that end, an equity decision tree was developed to guide the TSMO strategy through various actions, strategies, and plans (Oregon Metro, n.d.b.).

Prioritization and Funding

Metro combines a set-aside model and an open competition model when funding TSMO projects. This means that there are dedicated TSMO funds, but TSMO projects are also eligible to compete for the general pool of funds. According to FHWA (2013), Metro's Metropolitan Transportation Improvement Program (MTIP) includes a line item for the TSMO Program, which is funded by a combination of STP, STBG, and local dollars. The 2021-2024 MTIP investments by mode show \$52 million for TSMO (Metro, 2020). These funds include the TSMO program for 2018, TSMO/ITS for 2019, 2020, and 2021, TSMO administration for 2022, 2023, and 2024, and TSMO program sub-allocation funds for 2022, 2023, and 2024. The UPWP identifies several programs that support TSMO. For example, the UPWP identifies that the regional transportation planning TSMO task is funded through STBG funds and STBG match from Metro (Oregon Metro, 2021b).

Success Factors and Lessons Learned

Metro created support at the initiation of the TSMO Program by including line items in the MTIP TSMO Program funds for support to manage the TSMO Program. For example, the 2021-2024 MTIP includes TSMO projects for the (Oregon Metro, 2020):

- Strategic and collaborative program management, including the coordination of activities for the TransPort TSMO committee, and
- Administration of the regional TSMO program; providing program strategy and administration of grant allocations and staffing of the TransPort committee.

In 2007, a Regional Concept for Transportation Operations (RCTO) was developed in the Portland Metropolitan area to engage Metro in the deployment of ITS (Bauer et al., 2011). The Metro RCTO is currently unpublished. The TSMO Plan was guided by the collaborative efforts of TransPort, the Regional Travel Option (RTO) Subcommittee, and a newly formed TSMO Policy Work Group (Bauer et al., 2011). The RCTO increased institutional support in the region and helped to formalize relationships between partner agencies. A temporary staff position, funded by the Portland grant, was created to organize the development of the RCTO. The RCTO was championed by the Portland City Commissioner in charge of Transportation.

The RCTO led to an update of the MTP that recognized the need to create a more detailed strategy for managing and operating the transportation system over the next 10 years. The 2010–2013 MTIP included projects to develop RCTOs on arterial performance measurement and active traffic management. *The Portland Multimodal Arterial Performance Management Regional Concept of Transportation Operations (RCTO)* is a regional guidance document for collecting automated multimodal performance measures on arterial roadways (ODOT & Oregon Metro, 2013). *The Active Traffic Management Regional Concept of Transportation Operations (RCTO)* provides guidance to analyze regional corridors and prioritizes investments in active traffic management (Oregon Metro, 2010).

Denver Regional Council of Governments

Background

The Denver Regional Council of Governments (DRCOG) is the MPO for the Denver region. It serves 9 counties, 48 municipalities (towns and cities), and approximately 2.8 million people. DRCOG's Board of Directors includes 58 members composed of elected officials from each member government. Since the late '80s, DRCOG's Traffic Operations Program has reduced traffic congestion and improved air quality. Through this program, regional traffic signal coordination is achieved with collaborative efforts between DRCOG, CDOT, and local governments (DRCOG, n.d.g.).

Role in TSMO

Collaboration between member agencies is facilitated through committees, including a Regional Transportation Operations Working Group (Bond et al., 2013). The DRCOG Regional ITS Architecture identifies the roles and responsibilities of stakeholders in the regional system operations. According to this resource, DRCOG's role is to participate in the ongoing review of corridor performance measures to identify and prioritize the needs for system improvements. DRCOG also provides multimodal traveler information to advance TDM strategies in the region (DRCOG, 2018a).

Current Activities

The Traffic Signal System Improvement Program (TSSIP) is a federally funded "pool" project administered by DRCOG. The purpose of the TSSIP, as described in the 2013 update, is to "implement cost-effective traffic signal timing and coordination improvements that reduce travel time and harmful auto emissions within the DRCOG Transportation Management Area (TMA)" (DRCOG, 2013). It is updated every 3 to 4 years through a collaborative planning process involving representatives from the region's operating agencies. The TSSIP includes a capital improvement program and a traffic signal timing improvement program (Bond et al., 2013).

Prioritization and Funding

The RTP identifies plans for TSMO projects, including strategies for voluntary options for collaboration on TSMO projects (DRCOG, 2018b). The 2040 fiscally constrained RTP revenues identify CDOT Administered funds for TSMO: Congestion Relief, other revenue for the regional system including local funding for regional operations and preservation, and general transportation activities including operations and maintenance. The Metro Vision transportation system unconstrained costs and 2040 fiscally constrained RTP expenditures include line items for management, operations, and air quality.

The 2022-2025 TIP includes a set-aside for Regional Transportation Operations and Technology. This set-aside is "[a] pool to fund capital improvements to traffic signal systems, traffic signal timing and coordination work, traffic signal system engineering and design, intelligent transportation systems projects, and technology integration" (DRCOG, 2021a). Objective 5 of the 2022-2023 UPWP addresses transportation system operations and includes a regional transportation operations and technology set-aside (DRCOG, 2021b).

Projects are selected through a consensus-based collaborative process. For example, the ITS program pool projects are selected through a consensus-based process led by DRCOG's Regional Transportation Operations Working Group...Projects submitted for ITS funding are scored using a unique set of criteria" (DRCOG, 2013, P. 13). The operations investment priorities identified in the RCTO and Regional ITS Strategic Plan are used during the selection process.

Success Factors/Lessons Learned

In 2012, DRCOG developed an RCTO. The RCTO was developed to promote long-range plan goals related to safe and reliable operations in a collaborative manner (Bond et al., 2013; DRCOG, 2012). The RCTO includes four elements: 1) a plan to collaborate, 2) the expansion of monitoring capability and capacity, 3) managing operations, and 4) measuring impact (DRCOG, 2012). Activities identified by the RCTO include managing traffic conditions, improving incident response, and increasing non-single occupant vehicle travel (Bond et al., 2013). The DRCOG Regional Transportation Operations (RTO) Working Group uses the operations investment priorities specified in the RCTO and the Denver Regional ITS Strategic Plan to make decisions about funding priorities.

DRCOG strategies foster consensus rather than competition. Bond et al. (2013) explains that “DRCOG has witnessed individual regions delaying project deployment in favor of neighboring jurisdictions in an effort to work together” (p. 17), although some local governments have found it challenging to collaborate on operations projects and project applications. As a result, DRCOG staff assists with collaborative project development.

2.3 Peer Interviews

Interviews were conducted with knowledgeable representatives from eight agencies engaged in regional TSMO planning and management activities. These organizations were selected for interviews based on prior research indicating that the agency excels in TSMO capabilities and/or exemplifies certain success factors in regional collaboration related to TSMO. The interviews included:

- Three coalitions comprised of multiple agencies
 - The Eastern Transportation Coalition (TETC)
 - Niagara International Transportation Technology Coalition (NITTEC)
 - I-10 Corridor Coalition)
- Four regional planning agencies that include MPOs
 - Atlantic Regional Commission (ARC)
 - North Central Texas Council of Governments (NCTCOG)
 - Denver Regional Council of Governments (DRCOG)
 - Oregon Metro
- One nonprofit agency that works closely with an MPO
 - Smart North Florida

These organizations included the six described in the peer assessment section of this report (ARC, TETC, I-10 Corridor Coalition, NCTCOG, Portland Metro, and DRCOG) as well as two additional agencies engaged in regional TSMO activities—NITTEC, and Smart North Florida (see Appendix C for details about each agency interviewed). During the interview process the topics of staffing, governance, and funding were stand out subjects, the discussion of which was used to inform the formation of the framework for a regional TSMO program covered in section 3 of this report.

Staffing

Among the regional agencies interviewed, staff dedicated to TSMO activities are typically administratively housed at the regional agency. Other staff members from regional agencies who are not dedicated to TSMO are at times tasked to perform duties related to TSMO either explicitly or indirectly (Figure 4). Consultants are hired to perform specific tasks on a case-by-case basis, typically for studies and plans. Staff are funded through the agency’s funding channels, which generally includes

federal funding (80-90%), state DOT funds (0-5%), and the agency’s local match funds (10-15%). Alternative staffing methods highlighted during the literature review and peer interviews include the following:

- The Eastern Transportation Coalition (TETC) staff are employees of the University of Maryland. This includes their pay, pension, and the physical location where they are administratively hosted.
- The I-10 Coalition does not employ dedicated staff. An Arizona Department of Transportation (ADOT) engineering manager works part-time on I-10 Coalition TSMO activities, and occasionally other employees from ADOT get involved when projects are underway. The multimodal planning division at ADOT maintains the I-10 Coalition website.
- The Niagara Frontier Transportation Authority (NFTA) hosts the Niagara International Transportation Technology Coalition (NITTEC) staff both physically and financially and is reimbursed in full by the New York State Department of Transportation (NTSDOT).

TSMO SPECIFIC STAFFING PROFILE

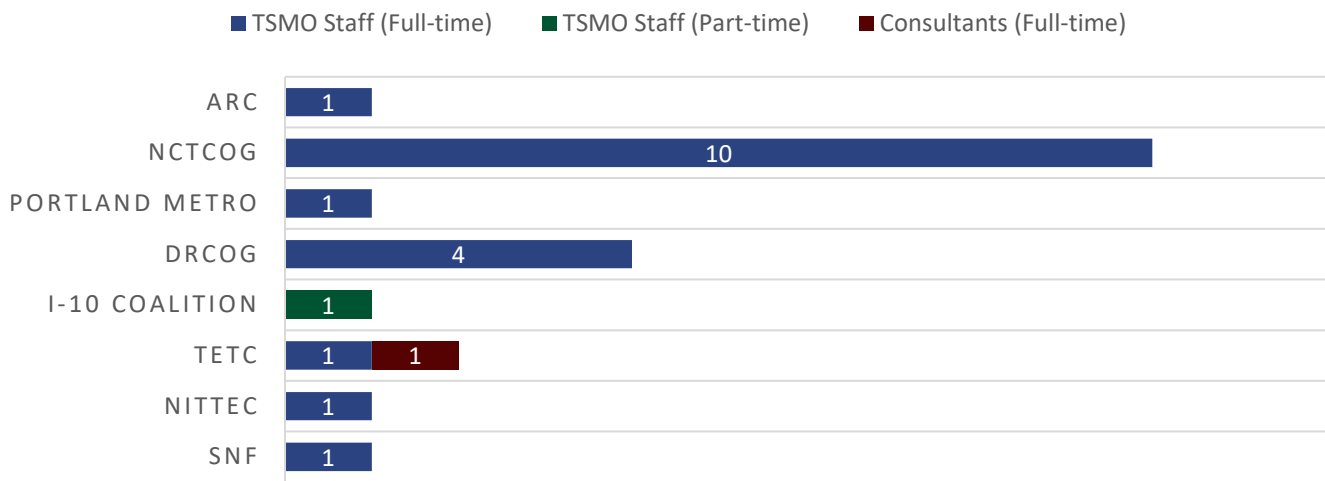


Figure 4. TSMO specific staffing profile of interviewed agencies

Governance

Table 7. Comparison of Organizational Governance

	Final approval authority	Decisions are made based on...	Input for recommendations comes from...	Governance is formalized through...
ARC	<i>ARC Board</i>	<i>Recommendations from Transportation and Air Quality Committee (TAQC).</i>	<i>The Transportation Coordinating Committee (TCC) and subcommittees to the TCC (such as TSMO and other niche topics)</i>	<i>State Legislature; bylaws</i>
NCTCOG	<i>Executive Board makes fiscal decisions. RTC Policy Board approves programs.</i>	<i>Recommendations from RTC Policy Board.</i>	<i>Surface Transportation Technical Committee (STTC). Advisory committees related to TSMO (such as the ITS Advisory Committee and the Traffic Signal Advisory Committee)</i>	<i>State Legislature; bylaws</i>
Oregon Metro	<i>Metro Council & Joint Policy Advisory Committee on Transportation (JPACT) have joint decision-making authority</i>	<i>Recommendations from Joint Policy Advisory Committee on Transportation (JPACT)</i>	<i>TransPort – a subcommittee for Transportation Policy Alternatives Committee (TPAC) focuses on technical side of TSMO/TDM planning and programs from across the region and makes recommendations to TPAC. TPAC sends input to JPACT.</i>	<i>State Legislature; bylaws</i>
DRCOG	<i>Board of Directors</i>	<i>Recommendations from Regional Transportation Committee</i>	<i>Transportation Advisory Committee (TAC)</i>	<i>State Legislature; bylaws</i>

	Final approval authority	Decisions are made based on...	Input for recommendations comes from...	Governance is formalized through...
TETC	<i>Executive Board</i>	<i>Recommendations from committees/full members/working groups.</i>	—	<i>No legal document. States request membership – present case for inclusion and then EB approves. Runs on good relationships.</i>
I-10 Coalition	<i>Steering Committee</i>	<i>Recommendations from subcommittees.</i>	—	<i>Charter</i>
NITTEC	<i>Board of Directors</i>	<i>Recommendations from Strategic Planning Committee</i>	<i>Upon consensus at the committee level, work plans are sent to the Strategic Planning Committee.</i>	<i>MOU beginning in 1995; updated/signed every 2 years. Latest MOU signed in 2020</i>
Smart North Florida	<i>Board of Directors</i>	<i>Recommendations from Executive Director</i>	—	<i>Nonprofit 501(C)(3)</i>

Funding

Table 8. Organizational Funding Sources

	Member Dues	Matching Funds	Competitive Grants	Dedicated Funds	Other
ARC	✓ ¹		✓	✓	
TETC	✓ ²	✓ ³	✓	✓	✓ ⁴
NCTCOG			✓	✓	✓ ⁵
Oregon Metro			✓	✓ ⁶	
DRCOG		✓ ⁷		✓ ⁸	
I-10 Coalition		✓ ⁹		✓ ¹⁰	
NITTEC				✓ ¹¹	✓ ¹²
Smart North Florida					✓ ¹³

Table 8 Notes:

1. All ARC members pay dues.
2. The 18 TETC member states pay dues; a sliding scale is used.
3. Coalition members provide matching funds for studies.
4. TETC launched a pilot of Mileage-Based User Fees (MBUF) in 2020.
5. NCTCOG uses toll funds, RTC local dollars, and local funds.
6. Dedicated funds used by Oregon Metro include CMAQ, STBG, and TA funds.
7. Local match is required for signal coordination and broader ITS projects funded through call for projects.
8. Dedicated funds used by DRCOG include CMAQ and STBG.
9. When a grant is secured for a joint project; member states contribute to fund the project.
10. Dedicated funds used by the I-10 Corridor Coalition include State Planning and Research (SP&R) funds.
11. NITTEC receives dedicated funding through NYSDOT.
12. NITTEC accrues interest from their Revolving Loan Fund program.
13. Smart North Florida received seed money from the North Florida Transportation Planning Organization.

2.4 Common Themes

The case studies, interviews, and the literature review brought to light several themes that appeared throughout our research among transportation planning entities working across jurisdictions or traditional disciplines at the regional and megaregional scale to employ TSMO. These themes were summarized into the following success factors and/or lessons learned.

1. TSMO planning and budgeting is often limited to specific projects or initiatives based on funding programs and therefore tends to be narrow in scope or somewhat ad hoc rather than comprehensive in relation to the planning effort. Successful agencies developed “critical processes and institutional arrangements that enable TSMO to be seen as on par with infrastructure and capacity improvements.” This can be achieved by establishing priorities that can feed into LRTPs and TIPs and by developing processes and procedures to ensure more sustainable funding for TSMO activities (Grant et al., 2017).
2. Local and regional planning agencies are concerned with a broad range of issues in their jurisdiction and may not have the bandwidth to add megaregional considerations on to their agenda. Several successful case studies reviewed used visioning and aligning priorities across the region to identify issues that can be addressed at the megaregional level. Aligning long range planning schedules and priorities facilitates data sharing, joint planning activities and work products. This action also allows MPOs to leverage the megaregion concept to solve problems within their jurisdiction, helps them to identify shared legislative and funding opportunities, and provides the ability to respond to federal and state priorities or emphasis areas and pursue federal grants (Morley et al, 2020; Peckett et al., 2014; Read et al., 2017).
3. Agencies involved in TSMO programs participate throughout the program, but the level of involvement may fluctuate depending on the project phase. Success factors to address this issue are to identify a TSMO Champion, have a well-defined stakeholder coordination plan and program, and to obtain buy-in from all local agencies that have a project priority list (FDOT, n.d.).
4. Agencies that oversee geographically large, diverse, and populous regions may experience mistrust, which can impede collaboration. Some agencies in the case studies found that an incremental approach through small-scale, project- or issue-specific agreements allowed them to formalize their relationship and pave the way for more ambitious joint goals and plans for the emerging megaregion. Another success factor for building trust in large-scale planning efforts is a coordinated and transparent approach to identifying, tracking, and reporting project progress and performance. Tracking results demonstrates the benefits of conducting joint projects, provides all partners with consistent information and helps in demonstrating the long-term benefits of multi-MPO planning efforts (Grant et al, 2017; Markiewicz et al., 2016).
5. A common barrier among case studies was lack of institutional authority, governance structure, governance support, and/or political will. Formalizing structure, roles, and commitments through agreements (such as Intergovernmental Agreements, MOUs, or charters) and forming MPO councils, forums, working groups and high-level steering committees helps to ensure that the institution has management support, is formally recognized by other organizations in the megaregion, and that the institution has defined roles and responsibilities for participants. The scope and level of specificity in these agreements is often influenced by the size of the individual MPOs, geographic extent of the collaborative, and number of signatories (Markiewicz et al., 2016; Read et al., 2017).

3. Framework for Regional TSMO Program

The recommendations that follow represent the elements of a successful framework for a formal MPO-centered entity to advance TSMO collaboration in planning across the Central Florida megaregion. They are based on the findings from the literature review, case examples, and interviews conducted with knowledgeable representatives from eight agencies engaged in regional TSMO planning and management activities.

The key elements of the recommended framework for a regional TSMO program are:

1. Developing a strategic TSMO plan
2. Publishing a work plan
3. Publishing an annual review
4. Identifying stable and dedicated funding mechanisms
5. Providing dedicated staff for TSMO activities
6. Establishing a clear governance structure that includes political support
7. Developing a plan for education and communication activities

A detailed description of each element is outlined below, and examples from the interviewed agencies are provided when applicable. Special consideration was given to opportunities to address equity within the regional TSMO framework and any examples of how these agencies had approached equity in this regard.

3.1. Develop a TSMO Strategic Plan

One key element that consistently appears within organizations that excel in regional TSMO planning is the existence of a strategic TSMO planning document. The strategic plan establishes the organizational vision, mission, and goals, presents objectives that define how progress towards the desired outcomes will be achieved, and identifies actions needed to achieve the goals and vision. This document should also contain clear performance measures to monitor progress toward meeting goals. The plan is built on stakeholder input from transportation agencies, local governments, transportation service providers, the private sector, interested members of the public, and other partners to create an agreed upon set of goals and foundations for achieving a desired future for the region.

Importantly, the TSMO Strategic Plan answers the question, why do we exist as a group. For example, Atlanta Regional Commission's (ARC's) TSMO Strategic Plan includes a section titled, "Why does the Atlanta Region Need TSMO?" that succinctly asserts TSMO's purpose, significance, and worth in the region (Atlanta Regional Commission [ARC], 2020). Specifically, ARC answers this question by presenting compelling reasons why transportation is important to the region (survey results from residents, annual measures of freight performance, and data on congestion, air pollution, and health concerns), provides an explanation of funding limitations, and presents TSMO as a cost-effective method of addressing transportation issues while enhancing the traveler's experience and quality of life (ARC, 2020, pp. 2-5). For example, the anticipated benefit to cost ratios of signal timing strategies versus traditional road expansion is shown in Figure 5.

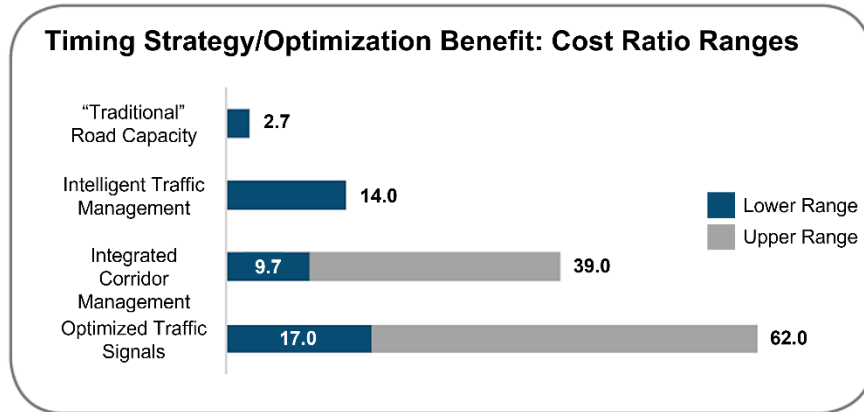


Figure 5. ARC chart demonstrating TSMO benefits in relation to capacity expansion

Source: ARC TSMO Strategic Plan: <https://cdn.atlantaregional.org/wp-content/uploads/arc-tsmo-strategic-plan-final-2020.pdf>

3.2. Publish a Work Plan

An official work plan supports priorities identified by the strategic plan and defines the core activities of the organization over the next few years. This document focuses on attainable goals, sets a deadline for achieving them, and communicates to members and stakeholders how money is to be spent on specific activities. The goals in an effective work plan are specific and achievable, and the objectives are measurable using performance measures established in the strategic plan or elsewhere.

This document builds on the successes and activities outlined in the annual review and justifies continued investment in activities that help the agency achieve the vision expressed in the strategic plan. Additionally, a work plan helps the organization achieve public outreach goals by communicating what it expects to accomplish over the life of the work plan and how it anticipates doing so. The work plan can also include and/or support the organizational budget by allocating specific amounts of funding for specific work tasks and outlining what is hoped to be achieved by performing that work task. The TETC 2022 Work Plan exemplifies this type of core document (The Eastern Transportation Coalition [TETC], 2021a).

3.3. Publish an Annual Review

An annual review describes TSMO accomplishments achieved in the previous year, how much money was spent, and the impact of the TSMO program activities relative to member and stakeholder wants, needs, and concerns. This document justifies the organization’s activities over the previous year and makes a clear argument for its continued existence. Organizational activities should be assessed in the annual review using performance measures identified in the strategic plan or elsewhere. TETC, for example, lists all deliverables provided to their Coalition members during the last year and paints a clear picture of how the Coalition brings valuable solutions to their members in their Year in Review document (TETC, 2021b). NITTEC also produces an annual report and adds details about participation by member agencies in specific initiatives, completed tasks, and ongoing activities (Niagra International Transportation Technology Coalition [NITTEC], 2021). The Annual Review should be linked to both the work plan and the strategic plan.

3.4. Identify Stable and Dedicated Funding Mechanisms

Successful regional TSMO organizations have both stable and dedicated funding mechanisms for planning, administrative activities, and for support of TSMO projects. Planning activities that may benefit from stable and dedicated funding include studies and other document development. Examples of administrative activities that may require funding include staff pay and benefits, meeting space, or office space. Funding support for TSMO projects may include equipment, websites, technology installations, databases, construction projects and other non-planning or administrative items for either the organization itself or for a member or partner organization. It is recommended that any regional TSMO organization strive to identify both stable and dedicated funding mechanisms for specific purposes.

Stable Funding Mechanisms

Stability in the funding mechanism provides the organization with the ability to carry out established and planned work tasks and programs with confidence that the funding will be available for those purposes for the foreseeable future and reduces staff time dedicated to seeking out new funding for already planned activities. For example, both ARC and TETC receive formula-based member dues from certain members. This technique of pooling funds through the collection of dues has allowed both agencies to build strategic plans with a high level of confidence in the stability of their future funding stream.

Stability in funding can also be achieved through diversification of funding sources. For example, the regional planning agencies interviewed (ARC, NCTCOG, DRCOG, and Oregon Metro) each receive funding through multiple funding sources such as various dedicated state and federal funds and competitive grants. While the amounts of funding, particularly competitive grant funding, may rise and fall over time, changes in any one source of funding can be mitigated by stability in other sources of funding.

Dedicated Funding Mechanisms

Dedicating funding for specific purposes (planning, administrative activities, and/or TSMO projects) through a work plan and/or budget allows the organization to carry out various established and planned work tasks and programs in an orderly and efficient manner. Some agencies interviewed set aside funding for TSMO, thereby ensuring that a portion of available funding is spent only on TSMO projects. Setting aside funds for TSMO projects and vetting those projects through pre-established selection criteria informed by a strategic plan allows organizations to systematically advance their TSMO vision and mission.

For example, every three years Oregon Metro conducts a process, known as Regional Flexible Funds Allocation (RFFA), to select specific TSMO projects for the region (Oregon Metro, 2021b). When a TSMO project is selected, the project information and funding allocation are added to the Transportation Improvement Program (TIP) as a TIP amendment. DRCOG similarly sets aside funds in their TIP at \$5 million a year to fund signal coordination and other ITS projects through a call for projects.

Another innovative dedicated funding mechanism that has been used for TSMO projects is a revolving loan fund established by NITTEC in the great Buffalo, NY region. According to the loan form, to be eligible for revolving loan funding, agencies must be a participating NITTEC Member Agency or sponsored by a NITTEC Member Agency, and the project must:

- Support the mission/vision of NITTEC

- Have a sound fiscal repayment plan
- Have a member partner/sponsor
- Have an implementation plan that addresses Operations and Maintenance issues
- Have a service life that exceeds the term of the loan

The NITTEC Revolving Loan Fund was developed to achieve the goals and objectives of NITTEC in Western New York and Southern Ontario and was capitalized by a \$5 million Federal Aid Grant. The borrowing interest rate is a fixed rate equal to 75% of the previous month-end's prevailing U.S. Treasury note rate or as otherwise authorized by the NITTEC Board of Directors. Through their revolving loan fund, NITTEC is able to implement their policy goals by setting specific TSMO related criteria on project selection and conditions that must be met to receive funding.

3.5. Provide Dedicated Staff

Having at least one full-time staff position dedicated to the TSMO organization will be critical to its success. Relying on member agency, state transportation agency, or other agency staff to take on tasks associated with a TSMO organization as an additional duty was repeatedly identified in the interviews as unsustainable. Staff in this situation indicated an inability to dedicate the time necessary to the needs of a more formal regional TSMO organization as they are fully engaged in their primary position. Activities such as those identified above require staff that can manage and monitor performance for the organization, as well as prepare needed updates to strategic plans, work plans, and annual review reports. Additionally, work conducted voluntarily due to a personal interest or passion in TSMO may end when that person changes positions or retires. For these reasons, a dedicated position for TSMO with dedicated funding mechanisms for salary, benefits, and associated activities is important to program stability and effectiveness over the long term. More than one of the agencies interviewed highlighted this as an issue they struggle with in their own regional TSMO organization.

3.6. Establish a Clear Governance Structure

Produce a Formation Document

A formation document solidifies the governance of any newly formed regional TSMO organization and preferably takes the form of an interlocal agreement. Many of the agencies interviewed for this report further solidified their agency through a document that clearly defines the organization. The purpose of this document would be to create a common understanding of the group, its structure, and the roles and responsibilities of all parties involved. For example, ARC, NCTCOG, and Oregon Metro's TransPort Subcommittee each have Bylaws (ARC, 2021b; NCTCOG, 2018; Oregon Metro, 2019), NITTEC uses a Memorandum of Understanding (MOU), and the I-10 Coalition outlines their organizational structure and duties in a charter (I-10 Corridor Coalition, 2016). For NITTEC, the MOU sets expectations that members come to meetings and participate on committees. NITTEC tracks meeting attendance and reports this information in the NITTEC Annual Review.

Establish a Policy Board

A policy board responsible for making policy decisions and establishing a vision for the agency is another identified aspect of successful regional governance for TSMO. An effective policy board consists of individuals with authority to make decisions on behalf of their agency, such as elected officials, executive directors, and other high-level staff. Agencies interviewed as part of this project indicated that part of the success of their program was the involvement of executive or senior level staff that have

decision making authority. Organizations that involved only technical or mid-level staff struggled to get their TSMO projects and activities approved or funded. Furthermore, organizations are more likely to find success advancing their TSMO mission and vision when they have a policy board that represents the organization’s members. The policy board could build on the alliance structure already in place and could even be a standing item on alliance agendas.

Identify TSMO Champions

Effective champions are typically high-level individuals that are either senior staff or policy board members, or someone easily able to reach and influence decision-makers, opinion leaders, and managers. Additionally, TSMO champions should be knowledgeable and interested in TSMO as a policy issue and willing to commit time to communicating TSMO concepts, networking, and selling ideas to decision-makers. Most of the agencies interviewed indicated that they did not have a specific TSMO champion and yet identified this as something that would be of clear value to their organization. Those with a TSMO champion generally indicated that their champion was a senior-level staff member.

Utilize a Technical Committee

A common denominator among many of the high performing agencies interviewed was the use of technical committees in the decision-making process. These technical committees help to guide technical aspects of the organization’s work and meet regularly to oversee the work of staff and consultants. They also provide input and recommendations to a policy body who makes final decisions. Examples include NCTCOG’s Surface Transportation Technical Committee (STTC) and Oregon Metro’s TransPort—a subcommittee for the Transportation Policy Alternatives Committee (TPAC) that focuses on the technical side of TSMO and Travel Demand Management (TDM) planning and programs from across the region (see Table 7. Comparison of Organizational Governance).

3.7. Develop an Education and Communication Program

Successful organizations are able to clearly communicate the purpose for their existence and benefits they provide to their community. It is recommended that the regional TSMO organization develop an education and communication program. This program would inform stakeholders, the public, businesses, policy makers, and local staff what TSMO is, why it is important, and how it can be used to improve mobility, safety, and reliability of the roadway network, while making it environmentally sustainable. The education and communication program could also inform the public and stakeholders on the status of performance measures established in the TSMO organization strategic plan and by member agencies. For example, NITTEC publishes a Strategic Plan, Annual Review, and Work Plan to communicate the TSMO program and progress with stakeholders and the community at large. These documents, as well as a continually updated dashboard that provides commuter and traffic information in the region, are available publicly on their website and provide information of value to the broader community.

3.8. Opportunities to Address Equity within the Regional TSMO Framework

Strategic Plan

According to Williams et al., organizations that include equity as a vision and goal “are more likely to ensure that the planning process addresses the needs of disadvantaged populations” (2019, p. 14). A strategic plan provides an opportunity to build equity into the foundation of TSMO planning through

agency strategic goals and objectives. An example is the 2021 Portland Metro Region TSMO Strategy, which states, “This Strategy is rooted in equity with both Goals and Objectives that aim to correct past disparities and undue burdens experienced by Black, Indigenous, people of color, and people with low incomes” (Oregon Metro, 2021a, p. 1). Oregon Metro asserts that the perspective of TSMO as simply “solving congestion” should be expanded to “solving disproportional impacts of congestion and transportation by including the context, choices, and voices that lead to well-defined problems, solutions and [in a manner that] is accountable for outcomes.”

Oregon Metro employed what they refer to as an “Equity Tree” as a discussion guide in developing the Regional TSMO Strategy to ensure equity was considered throughout (Figure 6). In addition, this equity decision tree is meant to foster careful examination of equity considerations in the development of policies and projects moving forward. The tree applies four key steps in the equity decision process as follows (Oregon Metro, 2022, p. 1):

1. Start at the root and define the problem.
2. Follow the branches and leaves of the tree through the Plans level to identify keys to solving a problem.
3. Continue through the Strategies level to develop a solution step to a problem.
4. At the tree top, evaluate and refine actions, being accountable to the result.

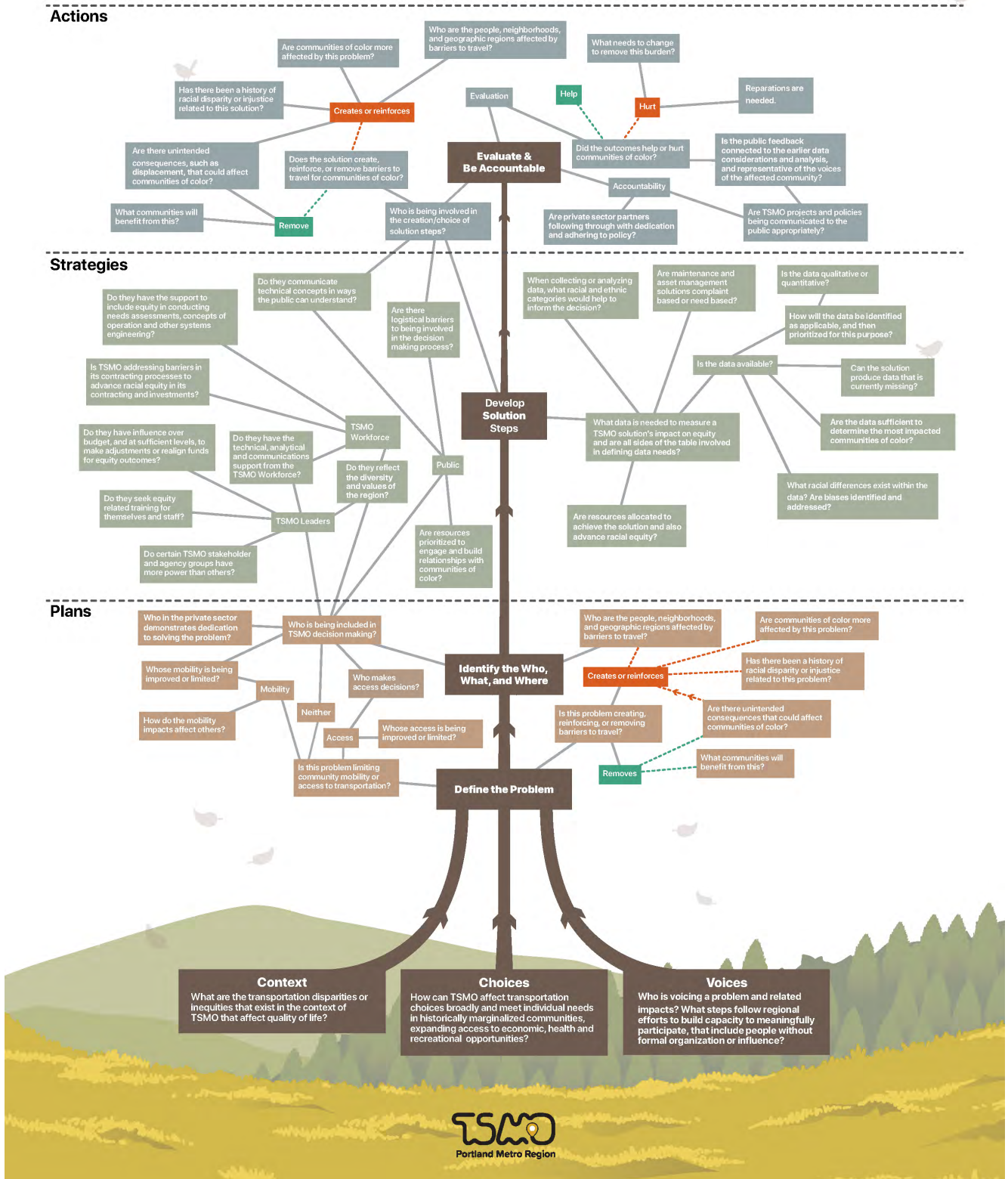


Figure 6. Portland Metro Region TSMO Strategy equity tree

Source: Portland Metro Region TSMO Strategy, 2021a, p. 16 available at

<https://www.oregonmetro.gov/sites/default/files/2022/03/11/TSMO%20Equity%20Overview%202022.pdf>

Equity can also be incorporated into the strategic plan by highlighting equity in priority action items. For example, ARC’s Strategic Plan identifies “Equitable Access” as one of the five overarching TSMO goals and identifies action items such as “develop data-driven methodologies to assess equity and environmental conditions and impacts of TSMO strategies” (ARC, 2020, p. 30).

Implementation / Defining Documents

Another way to promote equity as a core value of an organization is to include diversity, equity, and inclusion principles and language into the organization’s bylaws, MOUs, or other defining documents. As a manual for the directors and officers in governing the organization, bylaws that include equity provisions ensure that the organization will devote meaningful resources to advancing those values. For example, Oregon Metro’s TransPort subcommittee included in their bylaws seven questions related to equity and charge the subcommittee’s Chair, Vice Chair, Members, and TSMO Program Manager with actively seeking answers to those questions to advance equity in the region (Oregon Metro, 2019). Questions include:

1. Are perspectives from historically underrepresented individuals included?
2. Who else needs to be included as a stakeholder in discussions before making decisions?
3. Have efforts been made to get information out in advance?
4. What support is needed to explain technical items that affect people directly in nontechnical ways?
5. Is there an opportunity to lead in reversing inequities experienced in historically marginalized communities?
6. Has the decision-making process included discussions and analysis to know if impacts are disproportionate across demographics and if so, what mitigations are advisable?
7. If data and analysis does not exist to assist TransPort in answering these questions, what efforts are being made to build a body of knowledge to help?

Funding Criteria

Including language that highlights a commitment to diversity, equity, and inclusion in the development of an agency’s strategic plan and implementation documents is the first step to addressing systemic underrepresentation of disadvantaged populations; however, funding allocation is where actual progress is made. For example, Oregon Metro has put equity into practice through their Regional Flexible Funds Allocation (RFFA) Program and Regional Transportation Plan. Oregon Metro Council specified four main near-term capital and program investment priorities in the Regional Transportation Plan: Equity, Safety, Climate and Congestion Relief. These four priorities represent the framework for how funding is to be prioritized through the 2025-2027 RFFA. During technical evaluation, project proposals seeking RFFA program funds are reviewed, rated, and given a technical score based on the four priorities. For a high equity rating, the project must demonstrate significant and measurable plans to “reduce barriers and disparities faced by historically marginalized communities, particularly for communities of color and people with low incomes” (Oregon Metro, 2021a, p. 11).

Likewise, ARC identifies equity as a key component for project evaluation and selection. For example, during TIP project evaluation, all submittals are weighted using four main scoring categories: Mobility & Access, Equity, Safety, and Resiliency (ARC, 2021a). Projects are evaluated on whether, “the project serves historically underserved populations based on where the project physically is located, who the project serves, and the kinds of outreach the sponsor has conducted” (ARC, 2021a, p. 13) and points are allocated to projects for specific equity related criteria as show in Figure 7.

5. Social Equity (15 possible points):

Projects that are located in or connect to census tracts with the highest concentrations of racial and ethnic minorities and low-income populations (using ARC's equity analysis tool), or which serve residents of public or subsidized housing, will receive priority. Connecting people and communities to economic and educational opportunities, with safe, reliable and affordable transportation, is a key goal of the Atlanta Region's Plan, ARC's Transportation Equity Advisory Group, the Atlanta Regional Workforce Development Board, ARC's Regional Housing Strategy and ARC's regional economic competitiveness strategy known as CATLYST. To receive maximum points, the project must support and benefit these historically underserved populations, not displace them or adversely affect them. Guidance on points:


- 15 pts: Highest concentration of racial/ethnic minorities and low-income populations
- 12.5 pts: High concentration of racial/ethnic minorities and low-income populations
- 10 pts: Moderate concentration of racial/ethnic minorities and low-income populations
- 10 Pts: Outside of three highest concentrations of equity analysis factors (race, ethnicity, income), but serves public or low-income housing (or households). See housing HUD subsidy property database: <https://resources.hud.gov/#>.
- 0 Points: Outside of three highest concentrations of equity analysis factors (race, ethnicity, income) and does not serve a low-income housing or household.

Figure 7. ARC TIP social equity evaluation criteria

Source: The ARC TIP Project Evaluation Framework, 2021a, p. 22.

Performance Measures

Another important step to ensure that equity is addressed in any regional TSMO organization is to adopt performance measures that evaluate the organization's progress in meeting equity objectives defined in the adopted strategic plan, work plan, or other planning documents. For example, Part 4 of the 2021 Portland Metro Region TSMO Strategy is Performance Measures & Targets. Each performance measure supports documented TSMO goals, one of which is to "Eliminate Disparities" (Figure 8). The document describes a definition of success for each performance measure and relates that to specific TSMO goals. One key Portland Metro performance metric is "percent of TSMO Investments benefiting key corridors" (Oregon Metro, 2021a, p. 35). To meet the stated goal of eliminating disparities, the document states that 50% of total TSMO investments in the region must benefit corridors/geographies that have been identified as Equity Focus Areas (Figure 9).



Eliminate the disparities in the transportation system experienced by Black, Indigenous, people of color, and people with low incomes.

Objectives

3.1 Prioritize reaching underrepresented groups when providing traveler information and community outreach and ensure that modal access and traveler information is free from technological and financial barriers.

3.2 Identify and correct disparities when planning, operating, and maintaining the transportation system (e.g., transit access, exposure to air toxics, allocation of funds).

3.3 Identify and increase awareness of the unique travel experiences of Black, Indigenous, people of color, and people with low incomes.

3.4 Reduce the transportation cost burden experienced by Black, Indigenous, people of color, and people with low incomes.

Figure 8. Portland Metro Region TSMO Strategy Goal 3: Eliminating disparities

Source: 2021 Portland Metro Region TSMO Strategy, p. 21.

Targeted TSMO Investments
Distribution of investments regionally and on key corridors for modal efficiency.

This performance measure supports the following TSMO goals:

- Free From Harm
- Collaboration & Partnerships
- Eliminate Disparities
- Prepare for Change
- Reliable Travel Choices
- Connected Travel Choices

Key Performance Metrics

Percent of TSMO Investments benefiting key corridors.

» Where TSMO investments are made is an indication of who is benefiting from the efficiencies that result from this strategy. To ensure those efficiencies are realized in an equitable way, and to match the priorities and values of the region, the distribution of the investments should be measured through the life of the strategy. This strategy will track where investment benefit the following types of corridors as defined by other regional plans.

- Frequent bus routes
- Arterials serving equity focus areas
- Freeway Segments and Mobility Corridors
- Regional Intermodal Freight Connectors

Targeted TSMO Investments » TSMO investments benefiting the identified key corridors/geographies make up at least 50% of total TSMO investments in the region.

Figure 9. Targeted TSMO investment performance measure

Source: 2021 Portland Metro Region TSMO Strategy, p. 35.

4. Conclusion

This research sought to explore the potential and feasibility of establishing and sustaining an entity comprised of the MPOs in Central Florida to advance TSMO, to explore the characteristics of such a collaboration, and to outline a framework for a regional TSMO program. The methods used to investigate these topics included a literature review of regional planning frameworks and models, case studies that highlighted lessons learned for advancing an MPO-centered TSMO entity, and semi-structured interviews with regional and megaregional agencies engaged in TSMO activities.

The result of this research is the creation of a framework for establishing a regional TSMO program, which contains approaches for establishing an entity that integrates TSMO strategies over a megaregion, including funding, staffing, and governance. This research also highlights opportunities to integrate equity consideration into the development of a regional TSMO strategy.

Following this framework for a regional TSMO program will improve the coordination of TSMO decision-making in the Central Florida Region. The use of this framework is not limited to Central Florida. It has been designed to be universal and can serve as a guide for other regions and MPOs in the country that wish to enhance coordinated TSMO decision-making in their area, especially in regions where several planning agencies are aligned to share economies and travel.

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Appendix A: Roles and Activities of the Regional TSMO Program Working Group (Draft 3.19.21)

The Working Group shares strategies on planning for operations, including best practices for the Congestion Management Process that is required by federal and M/TPOs of the Regional TSMO Program (RTSMOP). The following draft content was assembled as reference for use in discussions for formalizing activities of the Working Group.

Working Group Meeting Logistics

1. Working Group to conduct standing monthly meetings.
2. Meetings to be chaired by MetroPlan Orlando staff.
3. Working Group activities to be supported by MetroPlan Orlando staff.
4. The support team will record and circulate decisions and action items of meetings.

Working Group Membership Composition

Members of the Working Group will be determined by the RTSMOP Directors to represent their planning agency, FDOT Districts One, Five and Seven TSMO Engineers, FTE, CFX and THEA.

Management & Operations Working Group Goals

1. Knowledge Transfer: Provide a venue for transferring Transportation Systems Management and Operations (TSMO) knowledge, experiences, and best practices among members and partners.
2. Policy Coordination: Advocate for integrating TSMO strategies into local planning and management-related policies, initiatives and regulations through the use of data, identifying safety improvement, community outreach and coordination with local road networks.
3. Coordinate Planning Initiatives for Emerging TSMO Issues: Facilitate a uniform planning approach to emerging issues in the TSMO field among RTSMOP by coordinating TSMO-related initiatives across member agencies.
4. Transportation Management Plans (MTP): Support member MTPO efforts to integrate TSMO supportive commentary and recommendations into their MTPs.
5. Congestion Management Process (CMP): Support member agency efforts to integrate TSMO-oriented congestion management strategies into their CMP, including the use of performance measures to monitor congestion and inform those strategies

Tasks

1. Knowledge Transfer

- A. Conduct monthly meetings with presentations by subject matter experts. Report on Working Group at quarterly meetings of the CFMPOA and CCC.
- B. Distribute pertinent information (TSMO-related publications, websites, training opportunities, etc.) to members via e-mail.
- C. Work with member agencies and other Working Groups and FDOT to host training sessions for MTPO staff and other interested stakeholders on technical topics related to TSMO programs and activities, including associated materials.
- D. Coordinate with Universities in Central Florida on TSMO related research initiatives.

2. TSMO Policy Coordination

- A. Prepare comment letters on the anticipated impacts of federal and state TSMO and congestion management–related policies, initiatives, and legislation for consideration by the RTSMOP Directors Group on an as-needed basis.
- B. In coordination with other Working Groups and FDOT, monitor and provide input on state legislation to support the advancement of innovative transportation mobility solutions on an as-needed basis.
- C. Connect with the TSMO Champion for your agency.
- D. Identify opportunities to address the equitable impact of transportation technology and data in underserved communities, recognizing the impacts of transformative technology on underserved and unbanked communities.

3. Coordinate Planning Initiatives for Emerging TSMO Issues

- A. Promote a common approach to emerging issues where feasible and practical, and support member agency actions to implement TSMO-related programs and projects, especially those of statewide and/or inter-regional significance.
- B. In coordination with other Working Groups and FDOT, identify emerging issues in the TSMO field that are of broad interest and significance across the state.
- C. In coordination with other Working Groups and FDOT, convene roundtables of MPO staff and subject matter experts to discuss how MPOs can best prepare for these emerging issues.
- D. Prepare fact sheets and supporting materials outlining how MTPOs can prepare for emerging issues.
- E. Identify appropriate existing funding sources for TSMO strategies and develop additional funding requests to bring to appropriate funding source.

4. Metropolitan Transportation Plans

- A. Support member MPO efforts to integrate TSMO-supportive commentary and recommendations into their MTPs including, but not limited to:
 - Importance of interagency and multi-jurisdictional coordination and collaboration;
 - Identification of desired future capabilities that regional TSMO partners want to develop and the associated ITS field instrumentation deployments needed to support those capabilities; and
 - Impacts of recent trends and emerging technologies.
- B. Provide TSMO resources for member agencies to use when revising/updating their MTPs.
- C. Produce a fact sheet listing key TSMO-supportive concepts for MTPOs to consider integrating into their MTPs.
- D. Review and comment on member agency draft TSMO-related materials on an as- needed basis.

5. Congestion Management Process (CMP)

- A. Provide congestion management–related TSMO resources for MTPOs to refer to when revising/updating their CMPs.
- B. Produce a fact sheet discussing key TSMO-oriented congestion management strategies for MTPOs to consider integrating into their CMP.
- C. Review and comment on member agency draft CMP-related materials on an as-needed basis.
- D. Collaborate with other Working Groups, FDOT and member agencies in support

Appendix B: Central Florida TSMO Working Group MOU

REGIONAL TRANSPORTATION MANAGEMENT AND OPERATIONS PROGRAM MEMORANDUM OF UNDERSTANDING

THIS MEMORANDUM OF UNDERSTANDING (MOU) dated the 1st day of March, 2021, is made by and between MetroPlan Orlando, and Forward Pinellas, Hillsborough MPO, Pasco County MPO, Polk County TPO, Sarasota/Manatee MPO, Space Coast TPO, and River-to-Sea TPO, all metropolitan planning agencies created by separate interlocal agreement and all operating pursuant to Section 339.175, Florida Statutes (hereafter referred to as the “the M/TPOs”).

RECITALS:

WHEREAS, this MOU is for the purpose of facilitating cooperation and coordination of Regional Transportation Systems Management & Operations (TSMO) Program RTSMOP; and

WHEREAS, TSMO is the application of multimodal transportation strategies and technologies intended to maximize the efficiency, safety, and utility of the existing transportation network; and

WHEREAS, TSMO includes a set of projects and strategies that use technology and real-time operational procedures, that when integrated at the state, regional and local levels, enhances the movement of people and goods, all with a positive impact on individual and national economic prosperity such as Work Zone Management; Traffic Incident Management; Special Event Management; Transit Management; Traffic Signal Coordination; Congestion Pricing; Active Transportation and Demand Management; and Integrated Corridor Management; and

WHEREAS, the application of Information and Communication Technologies (ICT) to manage and operate transportation systems will expand and evolve as more innovative solutions appear in transportation operations and planning, including connected and autonomous vehicles; and

WHEREAS, for transportation systems in the 21st Century, M/TPOs will need to advance, further, and increase their capacity in this area through workforce development and understanding of TSMO applications to improve the safety, efficiency and performance of transportation systems; and

WHEREAS, collaborating with the M/TPOs to plan and fund TSMO strategies in RTSMOP will increase efficiency and improve regional mobility; and

WHEREAS, the M/TPOs each have the power to execute and implement an MOU for regional cooperation with regard to TSMO; and

WHEREAS, Section 339.175(6)(j)1., Florida Statutes (2020), requires MPOs to develop coordination mechanisms with one another to expand and improve transportation within the state; and

WHEREAS, the M/TPOs have determined that this MOU is a flexible method of coordination for a transportation project, namely the RTSMOP.

NOW, THEREFORE, in consideration of the covenants herein to the other and of the mutual benefits to be realized by the parties hereto, the parties hereto agree as follows:

SECTION 1. Recitals. Each and all of the above recitals (“WHEREAS”) are hereby incorporated herein.

SECTION 2. Process.

(a) MetroPlan Orlando has been actively collaborating with its partners to advance TSMO strategies for several years by: establishing TSMO as a business unit; enriching staff’s abilities to integrate TSMO alternatives investments; maintaining a formal TSMO Advisory Committee represented by planners and traffic engineers in the planning area; allocating resources to deploy projects in MetroPlan Orlando’s Transportation Improvement Program (TIP); mainstreaming TSMO in the transportation planning process; and cultivating local, state and federal “Champions”.

(b) As the agency initiating this process, MetroPlan Orlando proposes to advance their TSMO planning activities as described below (hereinafter the “Program.”).

1. A Work Plan, attached as Exhibit “A” to this MOU and incorporated herein by this reference into this MOU, provides a high-level description of the activities for the first year of this Program, terminating on December 31, 2021. The Work Plan will be modified, as needed, to suit each of the M/TPO that is a party to this MOU. The Work Plan will be used to monitor the activities and progress on performance of the Mid/Central Florida Corridor Coalition Regional Transportation Systems Management & Operations Program.

2. The parties to this MOU agree that each individual M/TPOs shall continue to have the authority to maintain autonomy to direct and to oversee their own TSMO activities, planning and strategies.

3. MetroPlan shall provide overall operational and administrative guidance for this Program pursuant to this MOU. Technical and/or additional administrative support will be provided by existing staff from each respective M/TPOs. This MOU is not a commitment of funds by or to any M/TPO that is a party to this MOU. When funding is needed by any M/TPO that is a party to this MOU to pursue an agreed upon project, program or activity within the spirit of this MOU, then the expectation and requirement is that the funding may be pursued by the one M/TPO only with the endorsement and support of another M/TPO, only if such endorsement and support has been approved by the M/TPO. Additionally, this MOU does not commit any M/TPO to any project or financial obligation. The M/TPOs understand that any and all approvals of a project, program and activity must first be obtained by each M/TPO that is going to participate in said project, program, or activity, prior to any funding and commitment to any project, program or activity.

SECTION 3. The Director. The Director of TSMO pursuant to this MOU shall be unilaterally appointed, suspended, or removed by MetroPlan Orlando as it shall choose. Upon resignation, suspension or removal of any person as the Director, MetroPlan Orlando shall provide notice within ten (10) days to the other M/TPOs that are a party to this MOU. Thereafter, MetroPlan Orlando shall appoint a new person to serve as the Director and shall provide notice within ten (10) days to the other M/TPOs that are a party to this MOU. The initial Director pursuant to this MOU shall be Eric Hill.

SECTION 4. Notice.



(a) A notice or communication, under this MOU by one party, on the one hand, to other parties to this MOU shall be sufficiently given or delivered if dispatched by hand delivery, or by nationally recognized overnight courier (*i.e.* – Federal Express, United Parcel Services, electronic delivery, *etc.*) providing receipts, or by U.S. certified mail, postage prepaid, return receipt requested to: (list addresses of participants here)

(b) Notices; Addresses; Time. Any M/TPO that is a party to this MOU may unilaterally change its addressee or address by giving written notice thereof to the other M/TPOs but the change is not effective against another M/TPO until the change notice is actually received by the other M/TPO. Notice given by U.S. certified mail, return receipt requested, properly addressed and with postage fully prepaid, is deemed given when deposited in the United States mails within the continental United States, if the notice is thereafter delivered in due course at the address to which properly sent. Notice given by overnight courier, service prepaid, properly addressed is deemed given when deposited with the courier within the continental United States, if the notice is thereafter delivered in due course at the address to which properly sent. Notice given by manual delivery is deemed given only when actually received by the recipient.

(c) Relay of Official Notices and Communications. If any M/TPO that is a party to this MOU receives any notice from a governmental body or governmental officer that pertains to this MOU, or receives any notice of litigation or threatened litigation affecting the MOU or a project, program, or activity being conducted pursuant to this MOU, the receiving party shall promptly send it (or a copy of it) to all other M/TPO parties to this MOU.

SECTION 5. Term of MOU; Admission to or Withdrawal from MOU.

(a) This MOU shall have an initial term of one (1) non-calendar year, from March 1, 2021 to February 28, 2022. This MOU shall automatically renew in each subsequent year, unless terminated at least sixty (60) days prior to any renewed term; provided, that in no event shall this MOU have a term beyond September 30, 2025. During 2025, the parties to this MOU may review, revise, and sign a new MOU, if so desired.

(b) Notwithstanding sub-section (a), any party may terminate its participation as a party to this MOU for its convenience at any time.

(c) Notwithstanding other provisions in this MOU, additional parties may be admitted as parties to this MOU by amendment to the MOU approved and executed by all parties then a party to this MOU.

SECTION 6. Effective Date; Counterpart Signature Pages.

(a) This MOU shall become effective upon full and proper execution of each of the parties hereto.

(b) This MOU may be executed in counterparts, each of which shall be deemed an original. Any such counterparts shall constitute one and the same instrument. This MOU shall become effective only upon Effective Date and delivery of by the parties hereto.

IN WITNESS WHEREOF, the parties hereto have caused this Memorandum of Understanding to be signed in their respective names by their authorized representatives.
Revised 1.29.21

Appendix C: Overview of Agencies Interviewed

Consortium of Agencies

The Eastern Transportation Coalition (TETC)

Characteristics: The Eastern Transportation Coalition (TETC) is comprised of 19 full members (18 state transportation agencies and the District of Columbia Department of Transportation), 22 associate members, and 172 affiliate members. Full members have a seat on the Executive Board, have voting authority, and pay dues. Associate and affiliate members do not have voting authority, however they may send representatives to committee and working group meetings and have access to TETC shared data.

Governance: There are no formal agreements in place that govern TETC. States may request membership by presenting a case for inclusion that the Executive Board can approve or disapprove. The Executive Board is the decision-making body for TETC for planning and funding. They rely on associate and affiliate members to provide input and recommendations by participating in committees and working group meetings. There are three coalition program committees. Each year the full members participate in each of the three coalition program committees and recommend and prioritize activities and initiatives. The three committees meet jointly to coordinate activities across programs. Coalition staff compile input from the Executive Board and program committees and draft a work plan. At the conclusion of this annual process, the Executive Board approves the work plan and budget.

Staff: TETC has nine full-time staff members, but only one full-time staff member is devoted to TSMO—the TSMO Director. Other full-time staff members may be tasked with TSMO projects as needed; approximately 20% of their time goes towards TSMO. Additionally, the TSMO Director employs an on-call consultant who works approximately full-time on TSMO related projects. All TETC full-time staff members are employees of the University of Maryland and work out of the University of Maryland owned Technology Ventures Building.

Funding: Funding for TETC comes from grants, membership dues, and the pilot Mileage Based User Fee fund. Staffing and administrative expenses are paid through both member dues and grants. Funding sources for projects is project dependent, though most project expenses are paid through grants, membership dues or a combination thereof. Coalition members, including MPOs, also provide matching funds, often in the form of staff resources, for certain studies and projects.

Products & Services: The Regional Integrated Transportation Information System (RITIS) is an automated data sharing, dissemination, and archiving system of real-time traffic, incident, and weather data obtained from agencies and communicated through dashboards and visual analytic tools. RITIS is hosted and administered by the University of Maryland CATT Lab and made available to TETC members through a sponsorship umbrella provided by TETC.

TETC produces reports and white papers on grant and member dues funded projects that are publicly available through their webpage. Additionally, TETC staff produces a Work Plan and a Coalition Year in Review each year, which is also available publicly on their website.

I-10 Coalition

Characteristics: The I-10 Coalition is comprised of four state transportation agencies and 26 Auxiliary Members. The geographic boundary of the Coalition encompasses the corridor along Interstate 10 throughout the states of California, Arizona, New Mexico, and Texas.

Governance: An Organizational Charter signed in 2016 and an Operational Agreement signed in 2017 by each of the four-member state DOT representatives outlines the duties and expectations of each member. The I-10 Coalition's Steering Committee, which is made up of the directors of the four-member state DOTs, is the decision-making body for the I-10 Coalition. The Steering Committee makes broad decisions based on the recommendations from three subcommittees. The three subcommittees meet quarterly to discuss technical issues related to their topics and identify potential joint efforts. They provide the Steering Committee technical support and justification for funding certain projects and topics. The Steering Committee meets annually and votes to fund projects. The group of 26 I-10 Coalition Auxiliary Members is composed of non-state DOT members who are affiliated with the Coalition but do not have representation on the Steering Committee and do not have voting authority.

Staff: The I-10 Coalition does not employ any full- or part-time staff. Arizona DOT serves as the host agency and provides administrative support for the Coalition's activities. This support comes largely from a single engineering manager who performs I-10 Coalition TSMO duties on top of his full-time ADOT employment. Additional staff from ADOT work on I-10 Coalition projects on a case-by-case basis. Staff within the multimodal planning division at ADOT maintain the I-10 Coalition website on top of their full-time ADOT duties.

Funding: Funding for the I-10 Coalition generally comes from grants linked to specific projects and subsequent member contributions for matching. An example of this is the I-10 Coalition Truck Parking Availability System (TPAS) project. The Texas Department of Transportation (TxDOT), as project lead, received a \$6.85 million U.S. Department of Transportation (USDOT) Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) grant in April 2019. Each of the four I-10 Coalition member states committed to match the grant 1:1 with other available non-federal funds or in-kind match allowing the Coalition to leverage \$13.7 million for the TPAS project.

There are no membership dues and no general pooled funding. There is no funding for administrative work; work performed by DOT staff is considered voluntary.

Products & Services: The I-10 Truck Parking Availability System (TPAS)—a real-time automated system of roadside signs, a smartphone application, and a website—is scheduled to “go live” in Spring 2023.

Niagara International Transportation Technology Coalition (NITTEC)

Characteristics: NITTEC is comprised of 42 agencies, authorities, municipalities and other entities in Western New York and Southern Ontario. Membership is separated into three categories: Policy Members, General Members, and Affiliate Members. Policy Members each have one representative that sits on the Board of Directors and has voting authority on all matters brought before the Board of Directors. General Members and Affiliate Members participate in committee meetings, but do not have voting authority.

Governance: All members of NITTEC sign a memorandum of understanding that is updated every two years. The latest MOU was signed in 2020.

NITTEC's Board of Directors, which is made up of representatives from the Ministry of Transportation Ontario (MTO), New York State Department of Transportation (NYSDOT), New York State Thruway Authority (NYSTA), Niagara Frontier Transportation Authority (NFTA), and Erie County, is the decision-making body for NITTEC. General Members must assign representatives to serve as active participants in at least two committees. They can also send representatives to attend the Board of Directors meetings as non-voting participants. Affiliate Members are not required to but may send representatives to participate in Committees and can send representatives to attend the Board of Directors meetings as a non-voting participant. Annually, the eight committees within NITTEC each establish a work plan. Once there is consensus at the committee level, work plans are sent to the Strategic Planning Committee. The Strategic Planning Committee provides comments and recommendations on the eight committee work plans to the Board of Directors. The Board of Directors then vote on work plan items and approve a consolidated work plan for NITTEC as well as the annual budget.

Staff: NITTEC employs 17 full-time staff members including an Executive Director. Consultants are hired occasionally for specific tasks such as assembling a strategic plan. The Niagara Frontier Transportation Authority (NFTA) hosts all NITTEC staff both physically and financially but is reimbursed in full by New York State Department of Transportation (NYSDOT).

Funding: Funding for NITTEC comes from NYSDOT, a Revolving loan fund, and federal, state, and other grant programs. NYSDOT funds the operation of the NITTEC Traffic Operations Center (TOC) including the salaries of NITTEC staff through an agreement with the Niagara Frontier Transportation Authority (NFTA). This means that NFTA is the administrative and physical host for NITTEC and NYSDOT reimburses NFTA for all direct operational costs including employees' salaries, benefits and any liabilities resulting from employment, telephone costs, furniture, equipment, and supplies. NYSDOT also pays NFTA an annual "soft match fee" of \$55,000.

In 2000, FHWA and NYSDOT established a NITTEC Revolving Loan Fund program worth \$5 million. In 2013, the fund was no longer subject to federal approval and funds from this program are now issued at the discretion of the NITTEC Board of Directors to NITTEC Member Agencies or those sponsored by a NITTEC Member Agency. The borrowing interest rate is generally 75% of the U.S. Treasury note rate or otherwise authorized by the Board of Directors. Additionally, the NITTEC Board of Directors can authorize the use of accrued interest from the Revolving Loan Fund to be used as direct grants to fund NITTEC sponsored capital projects.

Products & Services: NITTEC provides a free NITTEC mobile app, a website, and a push notification system to registered users. Regional Initiatives include the I-190 Integrated Corridor Management (ICM) Project and Advanced Transportation Congestion Management Technologies Deployment (ATCMTD). NITTEC provides project and initiative funding through its Revolving Loan and Grant programs. NITTEC staff runs the Traffic Operations Center and contributes data to The Buffalo-Niagara Bi-National Regional Intelligent Transportation Systems (ITS) Architecture. Additionally, NITTEC produces a Strategic Plan, Performance Measures Plan, and annual reviews that are publicly available on their website.

Regional Agencies & MPOs

Atlanta Regional Commission (ARC)

Characteristics: ARC is a regional planning and intergovernmental coordination agency that serves over 6 million people across 11 counties and 75 municipalities including the city of Atlanta. ARC is a nonprofit quasi-governmental organization that employs approximately 275 people across multiple

departments. Subordinate to ARC is the Transportation & Air Quality Committee (TAQC), which functions as the transportation policy committee of the ARC Board and represents the 18-county Atlanta Metropolitan Planning Organization (MPO). It develops consensus among ARC, the Metropolitan Atlanta Rapid Transit Authority (MARTA), the Georgia Department of Transportation (GDOT), the Georgia Environmental Protection Division (GA EPD), the Georgia Regional Transportation Authority (GRTA), and the jurisdictions in the 18-county area. TAQC submits recommendations directly to the ARC.

Governance: ARC was created through state legislation in 1971. GA Code § 50-8-80 through 103, GA Code § 50-8-30 through 47, and a summary document titled The Bylaws of the Atlanta Regional Commission dictate the function, duties, membership, officers, and committees that make up ARC. The Bylaws are reviewed by the ARC Board every five years and amended as necessary. The most recent version of the Bylaws was adopted January 1, 2021.

The decision-making body for ARC is the ARC Board. The ARC Board has 41 members comprised of the county commissioner and mayor from each county, the mayor and a council member from Atlanta, a representative from the Georgia Department of Community Affairs, and 15 citizen members. The decision-making process for TSMO items starts with The Transportation Coordinating Committee (TCC) and subcommittees to the TCC (such as TSMO and other niche topics). The TCC makes recommendations to the TAQC and the TAQC makes recommendations to the ARC Board. The ARC Board has final voting authority on all decisions.

Staff: ARC employs one full-time staff member dedicated to TSMO, however, projects with TSMO elements spread throughout the organization and are worked on by various staff members. Consultants are at times hired for specific items, such as a study or plan.

Funding: Funding for TSMO projects is dependent on the project. No money is specifically set aside for TSMO; each TSMO initiative is planned separately, and they are funded from a variety of sources. About 80% of ARC staff salaries (includes the TSMO Project Manager) are funded through federal funds (FHWA PL and FTA 5303). GDOT matches 5% with the use of their Motor Fuel Excise Tax and ARC matches the rest using ARC membership dues.

Products & Services: In 2020, ARC published the Atlanta Regional TSMO Strategic Plan, which provides the region with a 10-year actionable framework. ARC also provides a comprehensive intelligent transportation systems (ITS) inventory, Data Governance Best Practices and Recommendations Report, and a TSMO deployment guide for local agencies, holds stakeholder workshops focused on TSMO, and hosts a Regional ITS Architecture Website.

North Central Texas Council of Governments (NCTCOG)

Characteristics: North Central Texas Council of Governments (NCTCOG) is a voluntary association of, by and for local governments, established to assist in regional planning and is the MPO for the region. NCTCOG serves 16 counties, 235 political jurisdictions, and approximately 7.8 million people in North Central Texas (NCTCOG, 2021).

Governance: NCTCOG is a political subdivision of the State of Texas created through state legislation although it does not have the regulatory power or authority possessed by cities, counties, or other local governments. Membership in the Council of Governments is voluntary. When an eligible entity decides to formalize its membership with NCTCOG, it must pass a resolution of intent and pay the appropriate amount of annual dues. NCTCOG's General Assembly is composed of one elected or appointed official from each governmental member of the Council. The General Assembly annually elects the Executive

Board. The Board is supported by technical, study, and policy development committees and a professional staff headed by an Executive Director. The Executive Board is the fiscal agent and administrative host of the MPO. Bylaws describe how both members of the Executive Board and the MPO Policy Board are selected.

The decision-making body for all fiscal decisions is the Executive Board, while the MPO Policy Board approves decisions related to transportation programs and policies. Advisory committees related to TSMO (such as the ITS advisory committee and the traffic signal advisory committee) send recommendations to the Surface Transportation Technical Committee (STTC). The STTC, in turn, approves items to be brought before the MPO Policy Board, the Policy Board has final approval.

Staff: There are 184 full-time positions in the NCTCOG transportation department, however, only 10 of those are dedicated to TSMO activities. All TSMO staff are NCTCOG employees and are administratively housed in NCTCOG. Consultants are hired as needed to produce certain plans and studies. Additionally, NCTCOG will partner with other public agencies to complete TSMO projects.

Funding: Funding for TSMO projects comes from multiple funding sources. The MPO has a team that assesses all potential funding sources and decides which projects should be funded with which source to maximize use of all funds. Seven percent of the total MPO budget is prioritized for TSMO designated projects (TSMO is second in priority for MPO funding, behind infrastructure maintenance). All TSMO-related staff are administratively NCTCOG employees and paid by NCTCOG.

Products & Services: NCTCOG's current TSMO designated projects include the Thoroughfare Assessment Program (TAP)/Traffic Signal Integration and Monitoring Program, Regional Traffic Signal Retiming Program (RTSRP), and 511DFW Traveler Information System. Information on all programs is publicly available of the NCTCOG website. NCTCOG also hosts the regional ITS architecture website.

Denver Regional Council of Governments (DRCOG)

Characteristics: The Denver Regional Council of Governments (DRCOG) is one of the nation's three oldest councils of governments and the MPO for the Denver region. It serves 2.8 million people in nine counties and 49 municipalities.

Governance: The DRCOG Board of Directors is the federally recognized MPO board and final approval authority for the MPO, but only acts on recommendations from the Regional Transportation Committee (RTC). The DRCOG Board of Directors consists of 58 elected members plus 3 non-voting appointees, while the RTC consists of a mix of senior staff and board members from the Colorado Department of Transportation, the Regional Transportation District (the regional transit provider), DRCOG, and gubernatorial appointments.

RTC creates plans and established prioritization for the allocation of funding. Once they create this body of work, they send it to the DRCOG Board of Directors. The DRCOG Board of Directors can either accept and approve what is brought before them or they can send it back with corrections. The RTC can then revise their work and send it back to the Board of Directors for approval. There is no line-item veto, and the Board of Directors cannot edit and approve documents. Both RTC and the DRCOG Board of Directors must agree for the body of work to go through. Bylaws dictate the function, duties, membership, officers, and committees that make up this decision-making process.

Staff: There are approximately 60 staff members in the MPO portion of DRCOG. Four staff members are assigned to interjurisdictional signal timing, a TSMO related activity. One additional member of

DRCOG staff is responsible for the day-to-day administrative activities of a (partially) TSMO focused working group called Advanced Mobility Partnership (AMP). These staff members are administratively part of DRCOG. DRCOG also utilizes on-call consultants to assist with capital projects and projects related to signal timing.

Funding: All TSMO related activities are funded through the MPO. During the funds allocation process, DRCOG sets aside funds in the Regional Transportation Plan (their strategic 30-year planning document) for multimodal capital projects and programs. Set-asides include transportation demand management, community mobility, air quality, operations and technology, and human services transportation. DRCOG also utilizes a Transportation Improvement Program (TIP) set-aside of \$5 million a year, which is allocated to projects selected through a call for projects assigned to either the Traffic Signal System Improvement Program or the Intelligent Transportation Systems (ITS). In the past, the source for this set-aside has been federal CMAQ funds.

Products & Services: DRCOG produced a Regional Concept of Transportation Operations in August 2012. They use this document to define and develop strategic planning and implementation for TSMO in their region. Also related to TSMO, in 2013 DRCOG produced a Traffic Signal System Improvement Program to implement traffic signal timing and coordination improvements in the DRCOG Transportation Management Area. In 2019, in a joint effort between DRCOG, the Denver Metro Chamber of Commerce, the Colorado Department of Transportation, and the Regional Transportation District, a document called Mobility Choice Blueprint was published as a roadmap for keeping pace with new technologies related to transportation. While not exclusively devoted to TSMO, the document, as well as the working group Advance Mobility Partnership, is used to help collaborate and coordinate on TSMO objectives in the region.

Portland Metro

Characteristics: The Metro Council is a directly elected regional government that provides a variety of public services including regional planning and is the MPO for Portland, Oregon. It serves 1.5 million people across 24 cities and three counties: Clackamas, Multnomah, and Washington.

Governance: The TSMO Program is housed administratively within the MPO. The MPO Board is a joint responsibility carried by both Metro Council and the Joint Policy Advisory Committee on Transportation (JPACT). Metro Council consists of seven elected members covering three counties in Oregon while JPACT consists of a 17-member mix of elected and appointed officials covering three counties in Oregon and one in Washington. JPACT creates plans and establishes priorities for the allocation of funding for consideration by the Metro Council, which can either accept and approve it or send it back with corrections. JPACT can revise their work and send it back to Metro Council for approval. There is no line-item veto and Metro Council cannot edit and approve directly. Both JPACT and Metro Council must agree on the final documentation. For TSMO-related projects, TransPort (a subcommittee for Transportation Policy Alternatives Committee (TPAC)) focuses on the technical aspects of TSMO planning and programs from across the region and makes recommendations to TPAC. TPAC sends recommendations to the JPACT. Bylaws define the function, duties, membership, officers, and committees that make up this decision-making process.

Staff: There are 40 staff members in the Portland MPO transportation planning and development and research center. Only one of these staff members is designated as devoted full-time to TSMO activities. These staff members are all administratively part of Portland Metro.

Funding: All TSMO activities are funded through the MPO. Funds for staff, administrative costs, and projects, come from federal funding (90%) and local match funds from Metro Council (10%). During the funding allocation process, Portland Metro sets aside a certain amount of funds three years at a time into a pool of funds they refer to as the ‘regional flexible plan.’ When projects are selected to receive those funds, they are added to the TIP as TIP amendments.

Products & Services: Portland Metro produced a Transportation Systems Management and Operations (TSMO) Strategy in December 2021. Current TSMO designated projects include the Arterial Measures Guide Poster, the Portland Multimodal Arterial Performance Management Implementation Guidance, and Concepts for TSMO Corridors. Information on all programs is publicly available of the Portland Metro website. Portland Metro also hosts the regional ITS architecture website.

Nonprofit Organizations

Smart North Florida (SMF)

Characteristics: Smart North Florida began as an outgrowth of the North Florida Transportation Planning Organization (TPO) Intelligent Transportation Systems program for Clay, Duval, Nassau, and St. Johns counties. In September 2021, SNF became a 501(c)(3) and a separate entity from the North Florida Transportation Planning Organization. The organization is comprised of an Executive Director, four board members, and 45 “Coalition Members.” The purpose of Smart North Florida is to pair municipalities with startups in order to help government leaders use data to make informed decisions in the North Florida region, often focusing on transportation.

Governance: SNF is a nonprofit organization that falls under the 501(c)(3) IRS code for the federal government and is governed by state and federal regulations. One distinction that the Executive Director noted regarding this was that Sunshine laws, also known as open records laws and the Freedom of Information Act (FOIA), which are designed to ensure public access to government meetings, decisions, and records, does not apply to this organization due to its nonprofit status.

The decision-making body for SNF is the Board of Directors. The Board of Directors is made up of the Executive Director of the North Florida TPO, the Vice Chairman-Director of IT Strategy and Solution Development for JEA (the eighth-largest community-owned electric utility company in the United States and the largest in Florida),

the director of Public Works for the City of St. Augustine, and a representative from Local Initiatives Support Corp (LISC) Jacksonville. SNF also has their own MOUs with clients when they enter into a consultant agreement.

Staff: The executive director of SNF is the single staff member for Smart North Florida. The North Florida TPO hosts SNF at their physical location.

Funding: SNF received initial seed funding from the North Florida TPO. The most recent NFTPO Unified Planning Work Program (UPWP) document lists the Smart North Florida Coalition as Task 7.4, which through the TPO received \$175k from FHWA (surface transportation block grant) and \$75k from local sources. Seed funding is used to pay the Executive Director’s salary and other organizational expenses. The NFTPO provides office space for SNF at their physical location.

Products & Services: Prior to SNF branching off as a nonprofit, the NFTPO produced a “Smart Region Master Plan” and several reports that focused on initiatives listed in that master plan were

created with the SNF logo present on the document. The Smart Regional Master Plan has been removed from public view (all links to the plan are broken), but the related reports remain. No reports have been published since SNF became a nonprofit. The SNF website claims to host a Data Exchange, however, this goal does not appear to have been realized as of yet.