IMPROVING TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS (TSM&O)

Capability Maturity Model Workshop White Paper

Collaboration

U.S. Department of Transportation
Federal Highway Administration

April 2015

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Executive Summary

Background

Research done through the Second Strategic Highway Research Program (SHRP 2) determined that agencies with the most effective transportation systems management and operations (TSM&O) activities were differentiated not by budgets or technical skills alone, but by the existence of critical processes and institutional arrangements tailored to the unique features of TSM&O applications. The significance of this finding has been validated in 40 State and regional self-assessment workshops using the Capability Maturity Model (CMM) and its six dimensions of organizational capabilities. This white paper focuses on Collaboration as one of the central dimensions of capability needed to support effective TSM&O, including collaboration with public safety agencies, MPOs, local governments, and public-private partnerships. It summarizes the TSM&O state-of-the-practice based on the workshops and subsequent implementation plans developed at 23 sites selected by FHWA and the American Association of State Highway and Transportation Officials (AASHTO) as part of the SHRP 2 Implementation Assistance Program.

Scope

This white paper includes the following material:

- A description of the SHRP 2 research and workshop process related to the institutional and process aspects of TSM&O including a description of the CMM self-assessment framework and its application to the Collaboration dimension.

- A discussion of the state-of-the-practice regarding Collaboration in terms of its key elements including capability levels self-assessed at the workshops.

- A description of key synergies between Collaboration and the other dimensions of capability and evaluation of managers' spans of control to effect improvement.

- Best practice examples and references.

- Suggested actions to address Collaboration needs on a national level.

- An Appendix presenting common implementation plan priority actions for the Collaboration dimension.

State of the Practice Findings for TSM&O Collaboration

Key findings from the workshops included:

General

Agency staff recognize the criticality of external collaboration to several TSM&O strategies. Some formal memoranda of understanding with other public sector agencies have been developed, especially for traffic incident management, but interagency collaboration is still substantially informal and based on personal relationships, which are sensitive to staff turnover. Key challenges in collaboration include the definitions of common performance objectives and relative capacity and resources of partner entities. Co-training is beginning to have a positive effect. Public-private partnerships are widely used and appear to be increasing for the more technical functions.

Public Safety Agency Collaboration

- **Leading from behind.** In some cases, State DOTs find themselves needing to take the initiative in raising awareness among their application delivery partners (especially with public safety agencies) about the mobility aspects of incident response and through promoting cooperative activities such as MOUs, co-training, and after-event debriefings.

- **Building collaboration habits from major events and more complex applications.** The experience in coping with significant crashes, major weather emergencies, and planned special events, where extensive collaboration is essential to public safety, often spotlights issues that need to be addressed in routine procedures and organizational changes. A focus on Integrated Corridor Management and greater emphasis on public agency performance measurement are spurring a greater focus on interagency collaboration.

- **Formal team building.** Multiagency teams or committees are a key to successful regional collaboration, including after-incident debriefings, co-training, and collocation. A focus on Integrated Corridor Management and greater emphasis on public agency performance measurement are spurring a greater focus on interagency collaboration.

- **Challenges with smaller local governments and rural areas.** Multijurisdictional regions with many local agencies (sometimes including limited operating hours and volunteer staff) present special challenges to establishing interoperability, common procedures, real-time coordination, and co-training.

- **Championing.** Collaborative activities such as interagency teams are often informal and based on individual TSM&O staff member "champions" for "outreach" and regular person-to-person reinforcement. This type of collaboration is, however, vulnerable to staff turnover.

- **Formal agreements.** Stimulated by the SHRP 2 and FHWA-sponsored National Traffic Incident Management Responder Training, more than one-half of the States indicated that they have formal memoranda of understanding with public safety agencies. The need for continual renewal and reference was mentioned as essential to maintaining their value.

- **Cooperative use of performance measurement and data.** Collaboration between State DOTs and their public safety partners on performance measure definition, analytics, and their routine use was largely absent. In most workshop locations, after-action debriefings were confined to major incidents, and secondary incidents were rarely addressed.

- **Resource sharing.** Collocation appears to substantially enhance collaboration. In addition, there are a few instances of State DOT financial support for law enforcement incident management positions, as well as funding of incentive payments to towing and recovery entities.

Metropolitan Planning Organization/Regional Transportation Planning Agency/Local Government Collaboration

- **Collaborative planning.** In a few instances, MPOs have taken the initiative developing a TSM&O regional plan and program, often building on their Congestion Management Process and coordinating their regional architecture with a statewide architecture developed by State DOTs. MPO ITS or TSM&O technical committees are the common method for coordination and collaboration.

- **Common architecture and technology.** Data sharing across modes or between State and local governments for arterial traffic operations remains a challenge. It lacks routine center-to-center communications or sharing of CAD data and camera feeds.

- **Collaboration in operations.** Interagency collaboration is increasing in two specific application areas: State DOTs contracting arterial signal improvements and maintenance to MPOs and development of integrated corridor management programs with MPOs and local governments.

Public-Private Partnerships

- **Outsourcing.** State DOTs are outsourcing an increasing number of the more "technical" TSM&O functions, including systems planning and engineering, TMC staffing, ITS device maintenance, traveler information program development, and project delivery. Expansion of outsourcing is introducing its own set of management challenges and opportunities related to procurement, contract management, standardization, performance-based oversight, and use of incentives.

- **Innovative contracting with incident management partners.** To overcome the constraints and uncertainty of legacy towing and recovery arrangements, a few states/regions have achieved dramatic incident clearance time improvements through the development of incentive-based contracting.

Synergism

TSM&O Collaboration is especially dependent on capabilities in the Culture dimension for supporting institutionalization of interagency working relationships; and the Organization and Staffing dimension, as reflected in a dependency on well-defined organizational structure. The Collaboration dimension itself is critical to other TSM&O dimensions requiring both internal and external close working relationships with Systems and Technology and Business Processes.

State DOT and Regional Implementation Plan Priorities

The leading participant-suggested actions included in TSM&O implementation plans for advancement to the next level of capability in Collaboration include:

- Establishing a forum to build better interagency relationships and improve TIM practices, including updating TIM strategic plans and co-training.

- Conducting outreach to partners for improved transportation management, including platforms/forums for improved collaboration/operations strategies on a corridor basis.

- Creating a formal institutional structure to enhance reliability performance measurement collaboration and coordination.

- Conducting a Regional Operations Forum to enhance cross-site collaboration.

Best Practices and National Needs

This white paper describes example best practices and reference material related to the identified implementation plan priority needs. The paper also suggests supportive national actions to improve TSM&O Collaboration – development of a program of webinars, guidelines, and lessons-learned to disseminate best practice – but also the need to develop new custom-tailored approaches to the issues raised by workshop participants in their implementation plan priorities. Important roles are seen for FHWA, AASHTO, and the National Operations Center of Excellence in supporting these efforts.

1.0 TSM&O Capability Maturity Self-Assessment Program: General Background

Many State DOTs and regions have recognized the importance of more effective TSM&O to improving customer service and system performance. Best practice TSM&O is being developed as an integrated program to optimize the performance of existing multimodal infrastructure through implementation of systems, services, and projects to optimize capacity and improve the security, safety, and reliability of the transportation system.

1.1 TSM&O and the Capability Maturity Model

The Second Strategic Highway Research Program (SHRP 2) included a Reliability Focus Area that produced research and products on many important data, analytic, and design issues, as well as process and applications improvements. One project identified the institutional characteristics of the agencies with the more effective TSM&O activities.[1] This research determined that agencies with the most effective TSM&O activities were differentiated not by budgets or technical skills alone, but by the existence of critical processes and institutional arrangements tailored to the unique features of TSM&O applications. These processes and institutional arrangements are defined by six critical dimensions: business processes; systems and technology; performance measurement; agency culture; organization and staffing; and collaboration.

Using these critical dimensions, the research project adapted concepts from the Capability Maturity Model (CMM) – widely used in the Information Technology industry – to develop a self-assessment framework designed to help transportation agencies identify their current strengths and weaknesses and related actions needed to improve their capabilities for effective TSM&O – in effect, a roadmap for "getting better at getting better."

1.2 CMM Self-Assessment Workshops

The TSM&O CMM framework has been used as the basis for the development of a facilitated one-day self-assessment workshop process for State DOTs and regions. The CMM workshops are intended to improve the effectiveness of TSM&O applications and activities by assisting the unit managers and key technical staff with day-to-day oversight of TSM&O-related activities, as well as DOT partners, including public safety agencies, MPOs, local governments, and the private sector.

The workshop framework provides a structured focus on the six dimensions of capability, together with a facilitated self-assessment process in which participants evaluate their current activities and arrangements according to criteria from the CMM framework defining levels of

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[1] *Institutional Architectures to Improve Systems Operations and Management*, SHRP 2 L06, 2012.

capability. The current challenges and problems identified by workshop participants are used to identify actions needed to improve capability, which are subsequently embodied in an implementation plan to improve the effectiveness of TSM&O.

Senior agency leadership is involved in a pre-workshop briefing and their approval of the implementation plan is required as a precondition of Federal financial assistance for the SHRP2 Implementation Assistance program sites.

1.3 The Capability Maturity Self-Assessment Framework

The CMM self-assessment framework is structured in terms of six dimensions of capability. Three dimensions are process oriented:

- **Business Processes,** including planning, programming, and budgeting (resources);

- **Systems and Technology,** including use of systems engineering, systems architecture standards, interoperability, and standardization; and

- **Performance Measurement,** including measures definition, data acquisition, and utilization.

Three dimensions are institutional:

- **Culture,** including technical understanding, leadership, outreach, and program legal authority;

- **Organization and Staffing,** including programmatic status, organizational structure, staff development, and recruitment and retention; and

- **Collaboration,** including relationships with public safety agencies, local governments, MPOs, and the private sector.

For each of these six dimensions, the self-assessment utilizes four criteria-based "levels" of capability maturity that indicate the direction of managed changes required to improve TSM&O effectiveness:

- **Level 1 – "Performed."** Activities and relationships largely ad hoc, informal, and champion driven, substantially outside the mainstream of other DOT activities.

- **Level 2 – "Managed."** Basic strategy applications understood; key processes' support requirements identified and key technology and core capacities under development, but limited internal accountability and uneven alignment with external partners.

- **Level 3 – "Integrated."** Standardized strategy applications implemented in priority contexts and managed for performance; TSM&O technical and business processes developed, documented, and integrated into DOT; partnerships aligned.

- **Level 4 – "Optimizing."** TSM&O as full, sustainable core DOT program priority, established on the basis of continuous improvement with top-level management status and formal partnerships.

This structure of critical key dimensions of capabilities and their levels as self-assessed was used as the basis for the determination of the current state of the practice in the Collaboration dimension as discussed in the sections that follow.

1.4 CMM Self-Assessment Workshops Analyzed

This white paper synthesizes findings, as of December 2014, from 23 of 27 sites selected by FHWA and AASHTO in 2013 as part of the SHRP 2 Implementation Assistance Program. These 23, listed in Table 1.1, include 19 State DOTs (statewide or district focus) and four regional entities (including two MPOs).[2]

Table 1.1   Self-Assessment CMM Workshop Locations Analyzed in this White Paper

Arizona	NOACA (Cleveland, OH)
California	Ohio
Colorado	Oregon
Florida District 5 (Orlando)	Pennsylvania
Georgia	Rhode Island
Iowa	South Dakota
Kansas District 5 (Wichita)	Tennessee
Maryland	Utah
New Jersey	Washington, D.C.
Michigan	Washington State
Missouri	Whatcom (Whatcom County, Washington)
NITTEC (Buffalo, NY)	

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[2] For a detailed discussion of prior workshops and those selected for the SHRP 2 Implementation Assistance Program, see the Organizing for Reliability – Assessment and Implementation Plan Development Final Report.

2.0 Summary of All Capability Dimensions

As background to this discussion of the Collaboration dimension in this white paper, it is useful to understand all the CMM dimensions in terms of the comparative capability levels and related initiatives. Table 2.1 presents the range of self-assessment levels by CMM dimension and capability level for the 23 workshop locations analyzed in this white paper.

Table 2.1   Workshop Self-Assessment Levels Distribution by Dimension (23 Workshops)

Dimension	Capability Self-Assessment			
	Level 1 Performed	Level 2 Managed	Level 3 Integrated	Level 4 Optimizing
Business Processes	11	10	2	0
Systems and Technology	7	12	3	1
Performance Measurement	9	11	3	0
Culture	8	11	4	0
Organization and Staffing	8	9	6	0
Collaboration	4	12	6	1

Note: Workshop self-assessment scores were often augmented with a "plus" or "minus" or given as a fraction (e.g., 1.5). For the purpose of the exhibit, "pluses" and "minuses" were ignored and all fractions were rounded to a whole number (with one-halves rounded down).

Self-assessment "scoring" is subjective, is specific to each state/region, and represents the consensus of workshop participants. The scores cannot be used for cross-site comparison, as some states/regions were tougher self-graders than others were. Nevertheless, within a given state/region, the scores for each dimension appear to reflect the relative level of capability among the dimensions. However, certain general conclusions can be drawn:

• Most locations assessed themselves at the "performed" or "managed" level (often somewhere in between) for most dimensions.

• Only two locations rated themselves as Level 4 in specific dimensions.

• Only a few agencies indicated reaching the level of "integrated" on more than two dimensions.

• While the aggregate distributions among several dimensions were similar (see Figure 2.1), this result masks very different distributions within individual agencies; that is, strengths and weakness differed among agencies responding to varying conditions.

- Collaboration and Systems and Technology are the strongest dimensions; for Collaboration, this reflects in part the impact of recent FHWA incident management training and other collaboration outreach; for Systems and Technology, this reflects an advancement in technology deployment over the past 10–15 years.
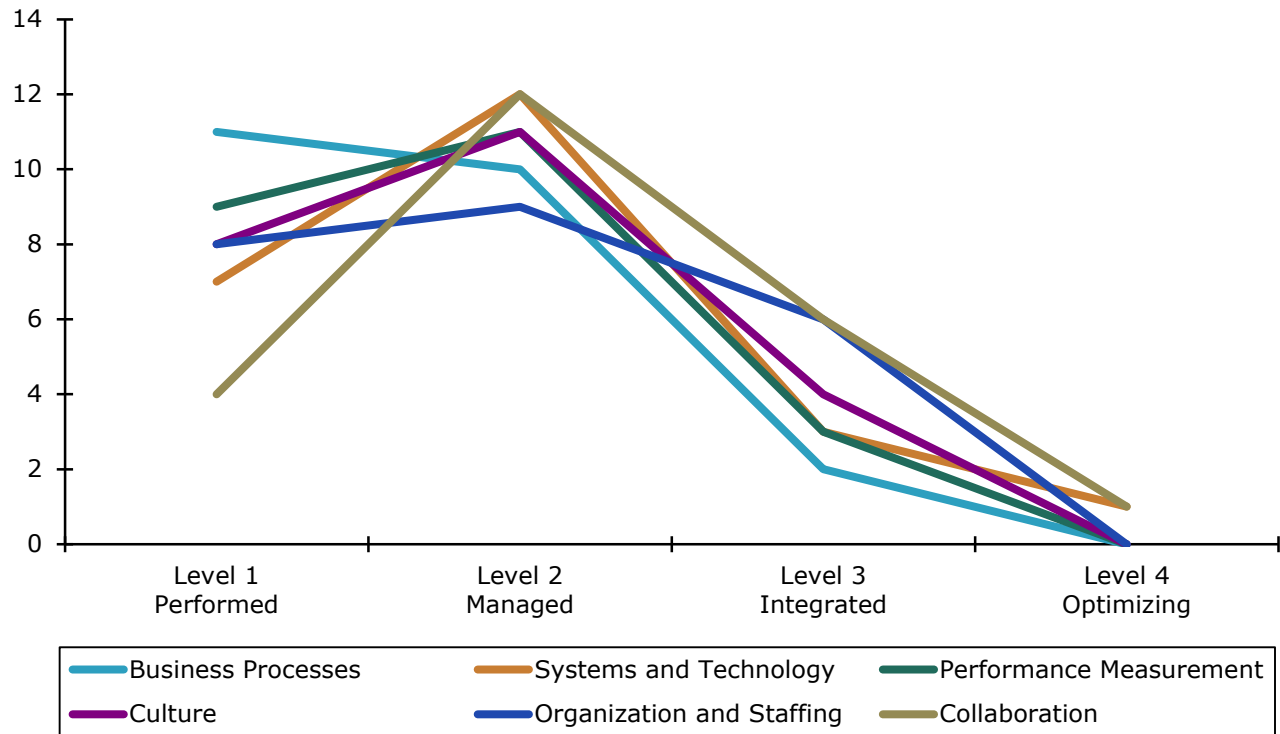
Figure 2.1 Graph. Distribution of Self-Assessments (23 Workshops)

(Source: Cambridge Systematics, Inc. and Parsons Brinckerhoff.)

Within a given dimension, there is often a significant gap between best practice and average practice among states/regions. Even within individual states/regions, progress in improving capabilities across the six dimensions is uneven. In many cases, however, there is visible change and strong staff leaders that are fully aware of what best practice is and are working within their institutions to develop essential capabilities.

2.1 Synergies among Dimensions of Capability

One of the most important findings of the SHRP 2 research, clearly validated in the workshops, was the apparent synergy among technical and institutional dimensions, as suggested in Figure 2.2. The dimensions of capability appear to be highly interdependent, such that it is difficult to improve a current level of capability in one dimension without simultaneously improving other dimensions that support it. This is reflected by the narrow spread in capabilities found among all workshops. As examples, workshop participants noted that

strategic planning is hampered by lack of performance data; business processes were hampered by lack of staff capabilities; and reorganization was impossible without top management buy-in (Culture).
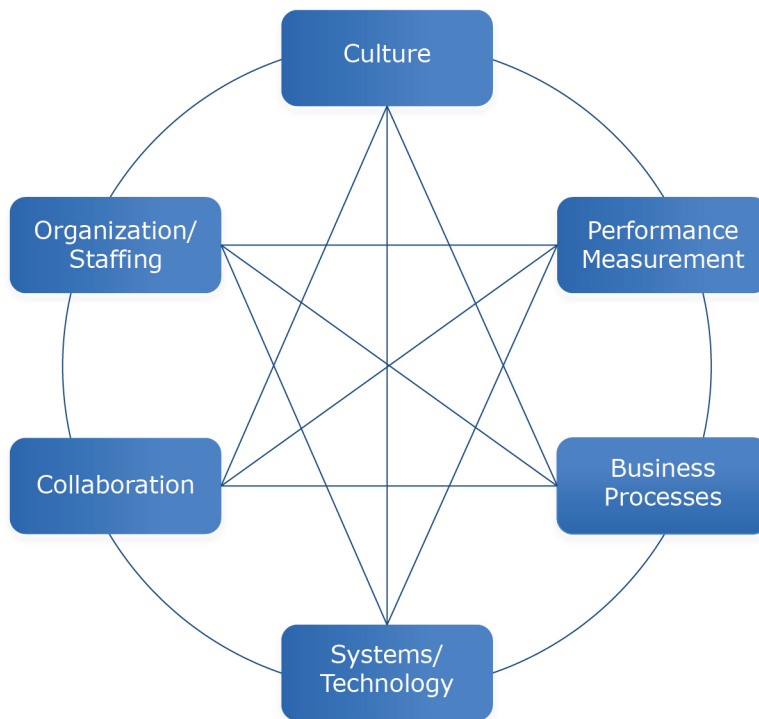
Figure 2.2 Graph. Synergy Among Dimensions of Capability

(Source: Cambridge Systematics, Inc. and Parsons Brinckerhoff.)

2.2 General Implementation Plan Priorities for All Six Dimensions

Essential actions and products identified through the workshop and implementation plan process are presented below to establish some context regarding consideration of implementation plan recommendations for all six dimensions from the 23 workshops. A wide variety of actions are recommended across the six dimensions, including plans, processes, agreements, business cases, and organizational and staffing recommendations, each of which has a mutually reinforcing effect on overall capability.

Business Processes

- Develop a statewide/regional TSM&O program plan

- Integrate TSM&O into the conventional State and metropolitan planning process

Systems and Technology

- Update both regional and statewide system architectures for new/emerging TSM&O applications

- Improve ITS systems procurement process and/or relationships with agency IT unit

Performance Measurement

- Develop a plan for performance measures, data, and analytics

- Secure agreement from the public safety community on measures for incident management

Culture

- Develop a persuasive business case for TSM&O

- Develop a communications/outreach plan/branding for stakeholders

Organization and Staffing

- Define an appropriate organizational structure for the TSM&O program

- Identify core capabilities needed and develop related staffing and training plan

Collaboration

- Improve collaboration related to TIM including participating in TIM training and establishing a forum for building interagency relationships

- Align partners' TSM&O objectives and interact on a regular basis

3.0 State of the Practice for the Collaboration Dimension

3.1 The Collaboration Dimension

Collaboration refers to cooperative arrangements between two or more entities working together to achieve shared goals, including public-public cooperation with other levels of government and the public safety community as well as public-private partnerships. (Note that "Collaboration" in this white paper refers to *external* agency cooperation, whereas *internal* agency collaboration is addressed in the Organization and Staffing dimension white paper.)

The capability-level criteria used in the self-assessments for this dimension are shown in Table 3.1.

Table 3.1 Self-Assessment Workshop Levels of Capability Maturity for Collaboration

	Collaboration Criteria for Level Achievement
Capability Level 1	Relationships ad hoc and on personal basis (public-public, public-private)
Capability Level 2	Objectives, strategies, and performance measures aligned among organized central players (transportation and public safety agencies) with after-action debriefing
Capability Level 3	Rationalization/sharing/formalization of responsibilities among central players through co-training, formal agreements, and incentives
Capability Level 4	High level of TSM&O coordination among owner/operators (State, local, private)

Among the 23 workshops, the average self-assessed capability level for Collaboration is 2.27 – the highest of all dimensions – with only four sites less than Level 2, 12 sites at Level 2, and seven sites at Level 3 or more. Figure 3.1 depicts the scoring distribution relative to the other dimensions. Across all workshop locations, Collaboration was the dimension least frequently included in implementation plans.
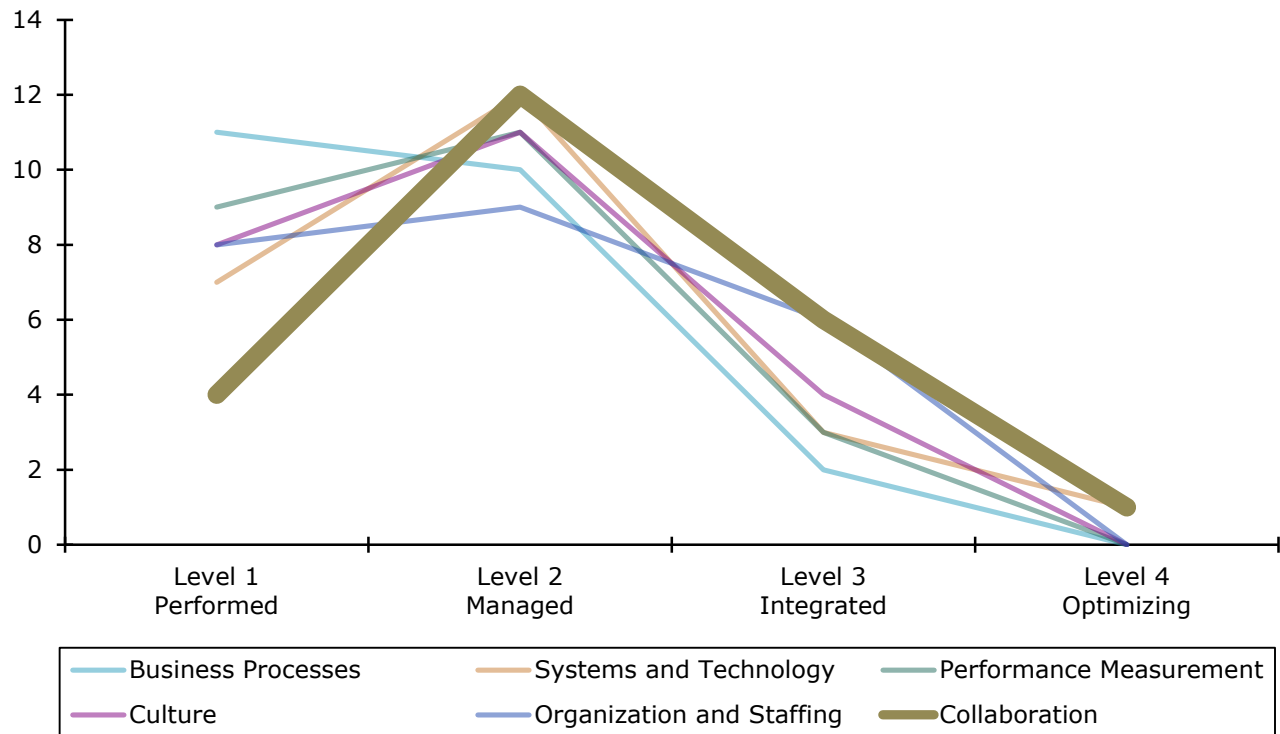
Figure 3.1 Graph. Collaboration Compared to Other Dimensions of Capability

(Source: Cambridge Systematics, Inc. and Parsons Brinckerhoff.)

The discussion of the state of the practice regarding the Collaboration dimension is divided into key elements based on the approach used in the *AASHTO Guide to Transportation Systems Management and Operations*:

• Public Safety Agency Collaboration

• Metropolitan Planning Organization (MPO)/Regional Transportation Planning Agency (RTPA)/Local Government Collaboration

• Outsourcing/Public-Private Partnerships

The following section discusses key observations regarding the current state of play in each element.

3.2 Public Safety Agency Collaboration

Much of the collaboration discussion in the workshops focused on the real-time collaboration with other agencies – especially public safety – required for effective implementation of incident, emergency, and special event management, as well as metropolitan planning and interjurisdictional corridor operations. A few states/regions operate with a legacy "business as

usual approach," often exhibiting modest collaboration or narrow definitions of their own jurisdictional responsibilities, simply informing the other party as necessary. This scenario appears to constrain the performance for those TSM&O applications requiring involvement of several parties for practical or legal reasons. Workshop participant discussions illuminated the following issues related to collaboration.

- **The challenge of "leading from behind."** Many key TSM&O mobility-related strategies of special interest to DOTs, such as incident and planned special event management, require collaboration with other service delivery partners. These partners, especially State and local law enforcement and fire/emergency management, have their own objectives, of which mobility is not the primary one; furthermore, leading responsibility for legal activity typically rests with these non-transportation entities. In some cases, as a result, DOTs find themselves needing to take the initiative in raising awareness among these partners about the mobility aspects of incident response and engaging in cooperative activities such as co-training and after-incident debriefings. This is not to say that transportation agencies place a lower priority on responder safety and the priorities of their traffic incident management partners, but focused coordination can help to raise awareness of all priorities.

- **Building collaboration habits from major events.** Assessment of the current level of collaboration at the State DOT leadership level seems to be colored by the high level of cooperation applied to visible planned special events and maintenance of traffic where there are well-established procedures and roles. Conventions, major sports events, and recurring major weather challenges have produced very effective traffic management and traveler information collaboration, as well as improved incident management supported by State legislation and law enforcement. Nonetheless, TSM&O workshop participants' discussions of strengths and weakness and identification of priority actions indicates that the level of collaboration is lower when it comes to the more routine day-to-day incidents – the ones that have less agency and public visibility.

- **Formal team building.** Multiagency teams or committees are often cited as a key to successful regional collaboration where they come together to conduct after-incident debriefings and/or co-training. Traffic Incident Management (TIM) "teams" and transportation management center (TMC) collocation have led to strong collaboration, centralizing incident management command and facilitating the sharing of data, resources, and experience. Two trends appear to be fostering greater collaboration. First, a focus on major corridors (Integrated Corridor Management) necessarily involves collaborations among multiple jurisdictions. Second, there is some indication that an explicit focus on performance (post-incident debriefings and performance reporting) in State administration and Federal programs is stimulating increased alignment.

- **Challenges with smaller local governments and rural areas.** Special challenges are presented by States with strong home-rule governance or multijurisdictional rural regions. In these scenarios, multiple law enforcement agencies and fire and emergency services can operate and respond at State DOT facilities without notifying the State DOT or without regard to the broader implications of an incident beyond their relatively narrow

jurisdictional boundaries. These issues are exacerbated by the fact that many rural services are staffed by volunteers who are often not as experienced or well-trained in notification processes and procedures as full-time employees. (In some instances, these processes and procedures might not be documented or integrated into incident response practices.) At the level of smaller local governments, State DOTs often must coordinate with several local police departments, each of which has responsibility for incident response at facilities within their jurisdictional boundaries, even when the incident occurs on an interstate road.

- **Championing.** Strong and committed individual staff member outreach seems to be a crucial ingredient for TSM&O program success and sustainability in States with the more effective programs. This observation from the workshops is based on the typical State DOT characteristics of TSM&O not being a formal agency "program," the fragmentation of TSM&O-related activities in many States, and the lack of formal long-standing agency-to-agency relationships. Workshop anecdotes suggest that collaborative activities such as formation and leadership of interagency teams – those related to post-incident debriefings and performance measurement – require significant individual TSM&O staff member "outreach" and regular person-to-person reinforcement to sustain. TSM&O "champions" are therefore key players in external collaboration whether in state DOTs or their public agency partners. As a result, effective collaboration sometimes does not survive turnover in personnel who are the champions. For example, career opportunities in law enforcement appear to draw key regional players away from highway patrol to other parts of law enforcement or to other geographic regions/precincts, requiring DOT staff to continuously rebuild interagency personal relationships that are critical to effective cooperation. This underscores the importance of formal agreements, as discussed below.

- **Formal agreements.** Many of the participating State DOTs recognize the importance of developing formal sustainable agreements with law enforcement and fire and emergency service organizations regarding roles and procedures for incident management and other emergencies. Memoranda of Understanding (MOU) and co-training appear to have been significantly stimulated by the SHRP 2 and FHWA-sponsored National Traffic Incident Management Responder Training Program. Although more than one-half of the States indicated that they have formal MOUs with public safety agencies, it appears that while the execution of the MOUs may be influential with those directly involved in their preparation, they tend to be ignored by successor staff. In many cases, existing MOUs, executed by staff who are no longer serving, are often out of date and not widely referenced in connection with current activities and relationships. The need for continual renewal and reference was mentioned as essential to maintaining their value.

- **Co-training for Traffic Incident Management Responders.** Several of the workshops' discussions reflected a more aggressive approach to collaboration, especially for incident management, that align objectives and performance measures, define effective procedures and protocols, and repeat co-training. Almost all the workshop States have participated in the SHRP 2/FHWA TIM Responder training in the last three years– especially in urban areas– and are aware of standard practice and the need to develop common procedures

and protocols. This co-training itself has often played an important role in bringing law enforcement and fire and emergency services together with DOTs. In rural areas, there may be many dispersed police/law enforcement, volunteer fire, and emergency response units. This large number of smaller units presents a major collaboration and co-training and retraining challenge, even with the help of State public safety-related associations. For example, volunteer fire departments already have crowded training schedules in their home disciplines.

- **Cooperative use of performance measurement and data.** Collaboration between DOTs and their public safety partners on performance measures and their routine use was largely absent. In most workshop locations, after-action debriefings were confined to major incidents, and secondary incidents were rarely addressed. A few workshop DOTs and partners reported difficulty agreeing on definitions of incident stages (where either had a key role), which are crucial for analyzing performance; nevertheless, there are an increasing number of locations with strong teams and task forces that increasingly combine measurement, debriefing, training, outreach, and equipment specification related to both incident management and performance measurement.

- **Resource sharing.** Some workshop participants indicated that maximum coordination and mutual understanding between state DOTs and the law enforcement community was enhanced by physical collocation of DOT TMC and police dispatch activities in major metro areas or in statewide TMCs (which also may be part of statewide emergency management centers). In addition, there are some innovative examples of partnering regarding resources, including instances of State DOT financial support for law enforcement incident management positions and use of incentive payments to towing and recovery entities to encourage timely towing and recovery.

3.3   Metropolitan Planning Organization/Regional Transportation Planning Agency/Local Government Collaboration

A few workshop locations were pursuing collaboration with local government in the areas of planning, programming, and operational coordination, often through MPOs or special coalitions. Several regional entities that hosted a workshop were aggressive in pulling together both State and local transportation entities.

- **Collaboration in planning.** Collaboration between State DOTs and regional planning entities varies widely in the degree of formality by which TSM&O is treated in planning and programming at either the State DOT or regional level. Very few State DOTs have fully developed TSM&O plans or programs at the regional scale. In addition, there are only a few MPO TSM&O planning activities in workshop states with implementation plans. In the few instances where MPOs have taken the initiative to develop a TSM&O regional plan, they have involved the state DOTs and often a range of other agencies and jurisdictions: transit and toll authorities, local governments, public safety agencies, emergency response, and private-sector entities. In these regions, State DOTs often participate through membership in the MPO's "Operations" or "ITS" technical committees, even if the State DOT itself does

not have a formal TSM&O program. The larger MPOs conduct a congestion management process, and State DOTs often support and make use of this data. Regional architectures also have been developed by many of the larger MPOs, often working with State DOT staff to achieve consistency with the State's architecture.

- **Common architecture and technology.** Several States identified communications interoperability and Computer Aided Dispatch (CAD) data access as issues. Data sharing across modes (as with transit agencies) or at the arterial level (as with traffic control devices) remains a challenge, although several workshops identified existing data sharing relationships between State DOT and State police/law enforcement, either through integrated data exchange or TMC access to CAD data. Multiple layers of bureaucracy, lack of an appropriate platform or forum for sharing information across multiple jurisdictions, incompatible systems/software (such as CAD data and video sharing), and data privacy concerns contribute to these issues. A few workshop participants have developed teams to address this issue.

- **Collaboration in operations.** Effective application of many TSM&O strategies such as arterial operations, incident management, or integrated corridor management are dependent on a number of collaborative factors among state DOTs and one or more local governments. These include establishing appropriate roles, relationships, procedures, and protocols and to mobilizing staffing, operating, and maintenance resources. Most workshop locations indicated that their levels of collaboration vary widely. The visibility of special events usually incentivizes strong collaboration and the focus on corridor-specific programs does the same. Collaboration for incident management is less well-developed. For example, diversion plans have not been developed in many areas, TMC communications are not established with local governments, and many local jurisdictions have not obtained quick clearance and move-it authority. Recently, as State DOTs "build out" their freeway operations and begin to focus on arterial operations and corridors, interagency collaboration discussions are increasing. This occurs in several contexts, such as the following:

  - State DOTs contracting to local governments or MPOs to handle signal improvements and maintenance

  - State DOTs recognizing the impact of arterial operations on freeway level of service and undertaking selected arterial operational improvements

  - MPOs undertaking arterial signalization initiatives

  The concept of Integrated Corridor Management (ICM) also provides a particular focus on the need for jurisdictional network collaboration. Some workshop States are undertaking ICM pilots, and several other locations are considering major projects that are, in effect, integrated corridors. Collaboration in these projects moves beyond planning to real-time operational coordination, involving multiple or shared TMCs, agreed-upon decision support systems for diverting freeway traffic onto arterials, and agreed-upon field protocols.

3.4   Public-Private Partnerships

There was limited discussion of public-private partnerships in the workshops, but attendees at several included State DOTs' private-sector support consultants, especially those supporting planning, TMC operations, and related technical specialty areas. Several issues were addressed.

- **Outsourcing.** In an increasingly high-tech data-rich environment, public-private partnerships are common to access specialized private sector expertise. These arrangements capitalize on specific private-sector resources and capabilities, such as proprietary traveler information or highly specialized technical expertise needed only on an ad hoc basis. A majority of the workshop locations outsource two or more key TSM&O functions, and several outsource many functions. These functions often include planning, systems engineering, and architecture development, and in several cases include TMC staffing, ITS device maintenance, and traveler information program development or delivery. The trend toward outsourcing is continuing as State DOTs cope with staffing and budget constraints, lack of key technical capabilities, and the occasional need for specific support.

  New forms of contractual arrangements with the private sector, beyond conventional outsourcing of products and services, include "in-sourcing" consultants as in-house staff to supplement agency staff, as well as new forms of contracts for external "public-private partnership" provision of functions. New technical challenges, such as those presented by deployment and operations of connected vehicle infrastructure and systems, are expanding the need for specialized technical capabilities. A few states/regions have identified the core staff capabilities that need to be retained or developed as part of systematic thinking about what expertise must be maintained in-house, even as outsourcing proceeds. Expanding outsourcing is introducing its own set of staffing and management challenges related to procurement, contract management training, standardization of contracting procedures, and the need to develop performance-based oversight.

- **Innovative contracting with incident management partners.** States/Regions indicated that legacy towing and recovery arrangements are often an important constraint on incident management performance owing to towing rotation agreements, field personnel making calls, lack of standardized equipment, and dependency on lead agency initiative. Several workshops described their new forms of collaboration with the private towing and recovery community via the use of incentive and disincentive contracts, and a few locations indicated that they were in the process of pursuing such arrangements. These arrangements appear to have dramatic impacts on improving clearance times. Most workshop participants, however, indicated that they did not have the authority to initiate such arrangements and upper management appeared reluctant to disturb the legacy arrangements. In many instances, State police/law enforcement are the lead for towing program oversight and operations, and DOTs must work closely with them to effect changes. DOTs and transportation agencies have more direct contracting influence with freeway/safety service patrols, and a variety of public-private partnership arrangements are used, ranging from outsourcing to branded sponsorship.

4.0 Relationships to Other Capability Dimensions

The workshop illuminated important interdependencies among the Collaboration dimension and other dimensions of capability.

4.1 Synergy

As noted in Section 3.1, the synergies among the six TSM&O CMM dimensions are key defining characteristics of their critically. Each dimension is directly dependent on other specific dimensions to support improving capabilities. The three process dimensions are interdependent, but they, in turn, are also dependent on supportive institutional dimensions.

As suggested in Figure 4.1, it was observed in the workshop discussions that within the State DOT framework, Collaboration is uniquely important to TSM&O since several of the key strategies (corridor management, incident management, work-zone traffic management, and traveler information) are substantially dependent on the level of collaboration with outside players, both public and private. This includes the need for interoperable systems across jurisdictions. Effective collaboration, as noted by workshop participants, depends on acceptance within the State DOT culture that key responsibilities of the agency depend on formal institutionalization of interagency working relationships on an effective and sustainable basis, including accountability for that interdependence. The needed collaboration includes not only stable public agency-to-agency cooperation, but also effective approaches to maintain a structure of public-private partnerships that is sustainable. It was also noted that sustainable interagency collaboration cannot simply be dependent on personalities but must include specific reflection in the agency's organizational responsibilities and accountability. Embracing this interdependency was reflected on the high level of consciousness (and assessment scores) accorded collaboration in many DOTs (14 of the 23 States rated the Collaboration dimension as their highest level of capability, typically between Levels 2 and 3).
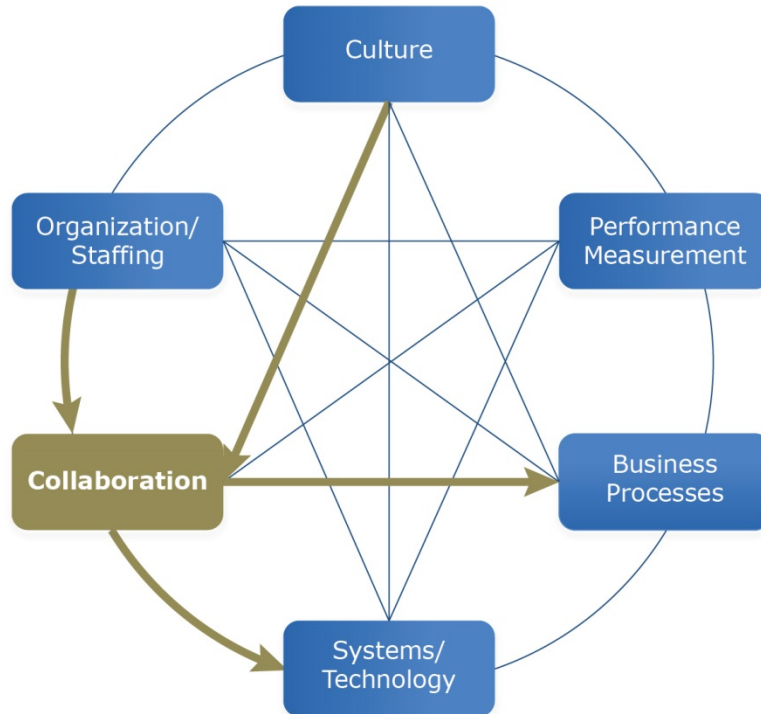
**Figure 4.1 Graph. Key Synergisms between Collaboration and
Other Dimensions**

(Source: Cambridge Systematics, Inc. and Parsons Brinckerhoff.)

4.2 Span of Control

The workshops focused on middle management involved with TSM&O. This kind of staff is typically positioned at the third or fourth level within a State DOT central office, at the second or third level in DOT districts/regions, and is specialized staff in MPOs.. These individuals have direct responsibility for visible TSM&O functions, such as TMC operations, incident management, ITS device maintenance, or snow and ice control on a day-to-day basis in real time. Day-to-day external collaboration is substantially within the span of control of middle management who establish and maintain good working relationships with key staff from external entities. However, formalizing external relationships (such as through agency-to-agency memoranda of agreement and public-private partnerships) requires direct senior interagency contacts and a clear delegation of responsibility and authority to appropriate managers. TSM&O managers can propose strategies but typically do not have the authority to carry them out.

5.0 Implementation Plan Capability Improvement Actions

More than half of the workshop sites included some aspect of Collaboration in their implementation plans to improve agency capability. Within these states/regions, the highest priorities related to improving incident management – easily the most visible form of TSM&O collaboration. Several states/regions focused on the need to improve collaboration with MPOs and local governments. Typical participant-suggested actions for advancement to the next level of capability in Collaboration are presented below in order of frequency of inclusion:

- Execute MOU with State police/fire/public safety agencies for TIM practices

- Establish a forum to build better interagency relationships and improve TIM practices

- Update/implement TIM strategic plan

- Institute corridor platforms/forums for improved collaboration/operations strategies

- Participate in/advance TIM training

- Conduct outreach to partners for improved transportation management

- Disseminate incident management best practice to local jurisdictions

- Perform overall assessment of stakeholder groups' ability to advance TSM&O

- Create a formal institutional structure to enhance reliability performance measurement collaboration and coordination

- Identify best practices in overcoming risk and liability issues pertaining to TSM&O

- Conduct a Regional Operations Forum

- Leverage university relationships.

The appendix presents the key implementation plan work tasks commonly identified for these priorities. The highlights of these priority actions are discussed below.

5.1 Improve the Collaborative Aspects of Multiagency Transportation Incident Management

Most of the workshop focus on collaboration was in the context of incident management and planned special events. State DOT managers recognize that their ability to affect delay and safety is substantially dependent on alignment and cooperation with public safety agencies with incident command. SHRP 2 and FHWA-sponsored incident management training has been

conducted widely and has exposed State DOT staff and their public safety partners to incident management state of the practice, including the value of more formal collaboration. Implementation plan suggestions targeted the need to develop working memoranda of understanding and more formal working arrangements, including setting up a "forum" (e.g., TIM Task Force), executing a formal agency-to-agency agreement, developing a joint interagency TIM strategic plan, and conducting co-training.

5.2   Other Forms of Collaboration

Individual states/regions identified other specific areas for improved collaboration related to other activities beyond incident and planned special event management. These include the need to develop common performance measure on an interjurisdictional basis with MPOs, local governments, and transit and toll authorities to support a collaborative focus on key performance objectives. While the need for collaborative planning was widely acknowledged, participants also recognized the need to make adjustments to the conventional planning process at both the metropolitan and state level to more clearly accommodate TSM&O's special characteristics. In addition, several states/regions who are undertaking major corridor development programs also noted the importance of real-time operational collaboration including interoperable technology and standard decision-support systems. Several states/regions noted that the advent of additional technology such as connected vehicles may require entirely new forms of public-private partnerships with a range of new information and service providers.

6.0 Best Practice Examples

Widespread and improved collaboration is most evident in incident and planned special event management among State DOTs and public safety entities. These activities often involve local government and private towing and recovering companies, stimulated by the National Traffic Incident Management Responder Training Program and related TIM coalition activities. Among workshop participants, there also were a few instances of limited collaboration in systems development and planning with local governments, often through MPOs or special coalitions. This collaboration is increasing as State DOTs become more involved in arterial network development and ICM.

AZTech – Phoenix Metropolitan Area. AZTech is a regional traffic management partnership in the Phoenix Metropolitan Area involving all the major governmental transportation agencies in the region, as well as public safety agencies and several private technology and media companies. AZTech is led by the Maricopa County Department of Transportation and the Arizona DOT. AZTech has no operational responsibilities but acts as a forum for policy development and collaboration via a series of committees and working groups that develop and coordinate TSM&O activities through their members. AZTech has several key programs:

- Regional Emergency Action Coordinating Team (REACT), a regional traffic management response team focused primarily on emergency traffic management support for arterial incidents. REACT collaborates with ADOT's freeway response team (ALERT) for major incidents.

- The development of regional operations guidelines, including a shared concept of operations, regional architecture, center-to-center standards, and data sharing and archiving.

- Traveler information support, including advancing arterial-focused traveler information and implementing a unique travel-time initiative at the Phoenix Sky Harbor Rental Car Center.

The AZTech Timeline summarizes the major initiatives completed by the partnership.[3] Recently, AZTech has been developing a regional performance measurement program and developing an ICM pilot and connected vehicle initiative. AZTech also has hosted its own CMM workshop and TSM&O summit.

http://www.aztech.org/

Freeway and Arterial System of Transportation (FAST) – Las Vegas Metropolitan Area. The FAST organization is a partnership of the Regional Transportation Commission of Southern Nevada (RTC) and Nevada DOT (NDOT) that focuses on freeway and arterial management. FAST operates under the policy jurisdiction of the RTC-elected board that

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[3] http://www.aztech.org/docs/AZTech_timeline.pdf.

initiated the program, and serves as the Southern Nevada freeway operations entity through a contractual agreement with NDOT. Transportation strategies are set by the Operations Management Committee (OMC), comprising the RTC, Clark County, NDOT, and the cities of Henderson, Las Vegas, and North Las Vegas. The organization coordinates regional development and operations of TSM&O programs across multiple jurisdictions working through the FAST TMC. It focuses on signal coordination, ramp metering, incident detection, surveillance and response, and traveler information reporting. The FAST OMC recommends policy, establishes operational procedures and principles, and monitors the day-to-day operations of the freeway and arterial system.

http://www.nvfast.org/aboutfast2.html

CHART – Maryland State Highway Administration. CHART (Coordinated Highways Action Response Team) was initiated in the mid-1980s as an initiative to improve summer beach traffic conditions and has evolved into the Maryland State Highway Administration's (SHA) freeway operations program. CHART is governed by a board consisting of senior technical and operational personnel from SHA, Maryland Transportation Authority, Maryland State Police, FHWA, the University of Maryland Center for Advanced Transportation Technology, and various local governments. CHART has a long-standing program of short- and long-range plans and develops capital, operating, and maintenance budgets that are approved by the legislature. The Board meets periodically to review progress and planning activity.

http://www.chart.state.md.us/

Delaware Valley Regional Planning Commission (DVRPC) Region Traffic Incident Management. DVRPC's TIM Program is one of the few regional programs organized by an MPO. It currently administers and supports a set of largely corridor-oriented, county-based incident management task forces that are collaborative efforts with the Pennsylvania and New Jersey DOTs and Pennsylvania and New Jersey State Police Departments. DVRPC also serves as the regional clearinghouse for incident management activities and provides software to improve incident management responses and support interagency collaboration. DVRPC sponsors quarterly meetings among incident and emergency responders to improve personal relationships. To date, DVRPC has offered training to nearly 1,000 responders in the region. DVRPC's TIM program also is integrated into DVRPC's planning processes through the long-range plan, the congestion management process, and a transportation operations master plan.

http://www.dvrpc.org/Operations/IncidentManagement.htm

Niagara International Transportation Technology Coalition (NITTEC) – Buffalo-Ontario Region. NITTEC's mission is to maintain a regional, cooperative approach to transportation management and improve regional and international transportation mobility, promote economic competitiveness, and minimize adverse environmental effects related to the regional transportation system. It coordinates a number of regional operations functions among its member agencies, including traveler information; border traffic management; traffic and congestion management; incident management; planned special event planning and management; transportation system monitoring; emergency management; weather system

monitoring; construction coordination; performance measures reporting; and multiagency collaboration. Member agencies, which include New York State DOT, Ontario Ministry of Transportation, cities, counties, and other transportation agencies, cite NITTEC's strong ability to engender a collaborative environment in which to address regional operational issues and acknowledge its absence would make reaching solutions far more challenging. Both agency-specific and regional considerations are applied to decisions on operational project implementation. A strategic plan, regional concepts of operations, and planning for ICM provide sound direction and priorities among member agencies.

http://www.nittec.org/

Rapid Incident Scene Clearance (RISC) Program – Florida DOT. Florida DOT, in conjunction with Florida Highway Patrol, manages an incentive-based public-private partnership for heavy-duty towing and recovery processes design to substantially improve incident clearance time. The program is based on Florida's Open Roads Policy, which establishes a 90-minute goal for clearance of a motor vehicle crash or incident on Florida's roadways. It was pioneered by the Florida Turnpike Enterprise. RISC is an incentive-based program that pays qualified, participating tow companies with monetary bonuses for meeting quick-clearance goals for the rapid removal of heavy-vehicle incidents, which often cause complete roadway closure. The program is being applied statewide on major freeways. To participate in the program, private towing and recovery companies must meet specialized towing equipment and training standards and be available on a 24-hour basis. Like conventional towing programs, the program works on a rotational basis among qualified entities. To receive an incentive payment of $2,500, the RISC contractor must arrive within one hour and open all travel lanes within 90 minutes. If the RISC contractor fails to perform the recovery within 90 minutes, no performance payment will be issued. If the incident is not cleared in 180 minutes, liquidated damages may be assessed. The program is considered highly cost effective, and the department recovers some of the costs from the responsible parties' insurance companies. The implementation of the program has resulted in dramatic reductions in heavy-vehicle incident clearance times, averaging almost 30 minutes. The program is now being expanded to cover major arterials.

http://www.dot.state.fl.us/
trafficoperations/Traf_Incident/pdf/2010_2011AnnualRISCReportFINAL.pdf

7.0 Addressing Needs on National Level

The weakness and related implementation plan actions identified in common by many State DOTs and their partners suggests an agenda of needs for research, guidance, and training. Consistent with the capability dimensions, this agenda is focused on process and institutional improvements that are not substantially addressed by existing support materials developed among peers or by AASHTO, FHWA, or other entities. The focus of collaboration within TIM fits well with the ongoing FHWA/SHRP 2 TIM Responder Training. Other potential national responses are indicated in Table 7.1.

Table 7.1 Suggested National Activities to Support Improvements in Collaboration

Activity	Collaboration Element	Sponsor(s)	Comments
Develop guidance for formal TIM agreements with a special focus on aspects that improve their long-term viability	Public Safety Agency Collaboration	FHWA	There is no available guidance that directly addresses preconditions for more effective agreements
Develop case study document regarding incentive-based towing and recovery agreements	Public Safety Agency Collaboration Outsourcing/public-private partnership	FHWA	There are consultants who specialize in these arrangements
Poll State DOTs to determine extent of outsourcing; document current practices	Outsourcing/public-private partnership	Operations Academy™, NOCoE, FHWA	There is a clear trend toward greater outsourcing that implicates issues such as maintenance of core capacities and performance contracting
Develop methods for accommodating TSM&O activities and their resource requirements in both conventional statewide and metropolitan planning	MPO/RTPA/Local government collaboration	FHWA, NOCoE	FHWA and NCHRP have developed important guidance material
Identify promising examples of collaborative operational management involving State and local entities	MPO/RTPA/Local government collaboration	FHWA, AASHTO, AMPO, NOCoE	Real-time operational management involving different jurisdictions (ICM) is becoming more important, bridging an operational gap between traditional freeway and arterial operations silos

NOCoE   National Operations Center of Excellence

AMPO   Association of Metropolitan Planning Organizations

8.0 References

AASHTO TSM&O Guidance: Collaboration Dimension. AASHTO's web-based TSM&O Guidance follows the six dimensions of TSM&O capability described in this white paper, including Collaboration. It is designed for transportation agency managers whose span of control relates to the operations and management of the roadway system, including policy makers and program managers for ITS and TSM&O at both the State and regional level. It incorporates insights from a review of the state of the practice in TSM&O among transportation agencies into a well-accepted change management framework that identifies doable steps toward mainstreaming TSM&O on a continuously improving basis. Specific guidance for collaboration is cited here for advancing an agency currently at Level 1 to Level 2 within the CMM framework. Other level changes within the framework can be found on the AASHTO TSM&O Guidance web site.

http://www.aashtotsmoguidance.org/guides/Coll_L2.pdf.

The Collaborative Advantage: Realizing the Tangible Benefits of Regional Transportation Operations Collaboration – FHWA. This FHWA manual is intended to help public agencies identify the specific benefits that they can realize through collaboration. It illustrates the benefits of collaboration, including access to funding and other resources, improvements in agency operations, and productivity. It includes case studies and a six step process that can be used by agencies to estimate these potential benefits.

http://ops.fhwa.dot.gov/publications/benefits_guide/index.htm

FHWA Office of Operation Traffic Incident Management. This web site contains many resources on TIM including a TIM Outreach Toolkit to help TIM programs promote their purpose and benefits, best practice material, and publications to help advance certain capabilities of TIM programs and analysis of their application.

http://ops.fhwa.dot.gov/eto_tim_pse/about/tim.htm

National Traffic Incident Management Responder Training Program. This program developed through SHRP 2 and supported by FHWA offers a multiagency and multidisciplinary course to impart a common set of core competencies among traffic incident first responders. The training promotes a shared understanding of the requirements for achieving the safety of responders and motorists, quick response, and effective communications at traffic incident scenes and aligns with the objectives of the traffic incident management national unified goal (NUG).

http://www.fhwa.dot.gov/everydaycounts/edctwo/2012/firstresponder.cfm

P3 Toolkit – FHWA. The public-private partnership (P3) section of the FHWA Innovative Project Delivery web site provides a toolkit that includes analytical tools and guidance to inform policy makers and legislative, top management, and transportation professionals about

implementation of P3 projects. It is part of FHWA's capacity-building program, which includes a curriculum of courses and webinars covering legislation and policy, planning and evaluation, procurement, and monitoring and oversight. The toolkit includes fact sheets, publications, and analytical tools, as well as links to webinars and related resources. While it is focused primarily on capital development projects, the material is relevant to TSM&O contractual arrangements.

http://www.fhwa.dot.gov/ipd/p3/toolkit/default.aspx.

Regional Transportation Operations Collaboration and Coordination: A Primer for Working Together to Improve Transportation Safety, Reliability, and Security – FHWA. This primer was written for transportation professionals and public safety officials from cities, counties, and States who are responsible for day-to-day management and operations within a metropolitan region. The primer is intended to help agencies and organizations (and the operations people within them) understand the importance of regional collaboration and coordination, how it happens, and how to get started.

http://ntl.bts.gov/lib/jpodocs/repts_te/13686/13686.pdf.

The TIM Network. The TIM network is a web site designed for communications among partners in incident management sponsored by a set of coalitions, committees, and forums with this interest. It includes information about webinars, podcasts, Twitter chats, and links to key sites.

http://timnetwork.org/.

White Paper on Interagency Agreements to Support Regional Transportation Systems Management and Operations – FHWA. This paper provides information on interagency agreements to support regional management and operations, drawing from 23 agency examples.

https://drive.google.com/viewerng/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnx0cmJydHNtb2NvbW1pdHRlZXxneDozMDM2ZTMyYzc4MTI0ZTA3.

Appendix: Steps to Implement Common Implementation Plan Priority Actions for Collaboration Dimension

The steps listed below implement the most common priority actions identified by workshop participants when developing their implementation plans. Although the actions themselves are not stated, they generally address improvement in each of the collaboration elements. The steps for each action were developed by the workshop site core team, assisted by a template of facilitator-supplied suggested steps based on workshop outputs, and structured consistent with the basic CMM guidance presented in the AASHTO TSM&O Guidance.

Public Safety Agency Collaboration

1. Establish a committee that meets regularly to discuss TSM&O and encourage dissemination of TSM&O knowledge. Develop goals for this committee and outline the issues it would address. Explore the possibility of using existing committees to expand TSM&O responsibilities and roles. Establish a TIM Working Group to provide a forum for developing a coordinated TIM plan.

2. Review peer State TIM programs and coordination efforts to identify successful practices to engage and sustain involvement of TIM partners, program structures, effective strategies for promoting TIM, and successful practices for overcoming challenges or roadblocks.

3. Establish a more formal structure and means of interaction where established relationships already promote some good coordination on TIM processes. Identify those areas that need additional outreach and engagement and formulate a strategy to build TIM coordination processes. Consider corridor-level TIM programs.

4. Identify specific operational agreements for TIM that outline roles and responsibilities for different responders. Explore feasibility of updating current mutual aid agreements to include TSM&O objectives.

5. Develop mutually acceptable performance metrics to establish a basis for measuring the relationship between changes in procedures and improved performance.

6. Collect and analyze performance data for incidents, emergencies, and events of different types.

7. Establish a process for consistent debriefings after major incidents (crashes, storms) involving multiple responder agencies. Leverage example processes from a peer State review. Identify champions/co-champions from TIM responders to support this effort. Engage senior management/executive level personnel from local police, sheriff, or fire agencies (as appropriate on a regional basis).

8. Identify gaps or challenges in furthering collaboration for TSM&O, initially with traffic incident management. Identify additional constraints to partnering where there has been resistance or lack of involvement.

9. Document data sharing issues, including current data sharing arrangements, and institutional barriers to sharing data among partners to support TSM&O needs. Consider leveraging a Performance Measure data plan to address some of these issues.

MPO/RTPA/Local Government Collaboration

1. Establish a committee that meets regularly to discuss TSM&O and encourage dissemination of TSM&O knowledge. Develop goals for this committee and outline the issues it would address. Explore the possibility of using existing committees to expand TSM&O responsibilities and roles. Identify lead for championing staff participation/getting on meeting agendas.

2. Encourage creation of an operations committee/group within the organization.

3. Develop mutually acceptable performance metrics to establish a basis for measuring the relationship between changes in procedures and improved performance. Collect and analyze performance data for incidents, emergencies, and events of different types.

4. Identify information transfer needs and reach agreement on data items, formats, and sequences and how information will be communicated at each stage in incident and emergency management.

5. Engage in continuing discussions with local agencies regarding sharing of closed circuit television camera and surveillance information.

6. Engage in continuing discussions with local agencies to promote signal systems and highway coordination.

7. Establish a major incident and emergency debriefing process for review and rationalization of responsibilities and procedures.

8. Explore the possibility of Computer Aided Dispatch information integration as a method for improving prompt incident identification while addressing potential interoperability issues, reluctance, and privacy concerns. Identify potential pilot opportunity to advance automating this information exchange.

9. Selectively put formal agreements and goals in place regarding regional operations, incident management, etc., where the benefit of securing program/activity sustainability can be confirmed.

10. Identify approaches to improved interstate collaboration in multistate metro or corridor contexts.